

WORKBOOK

SAT[®] WORKBOOK

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CHAPTER 1

Introduction



Introduction | What's the Point?

You've already taken the first, and often most difficult, step in your SAT prep journey: You've shown up and made the conscious decision to invest time and energy in your prep. Congratulations! Now that you have done so, let's make sure you know what this test is all about.

It's Used to Compare Students for College Admissions

The SAT serves as a part of your application, which colleges use along with your grade point average, extra-curricular activities, recommendations, and any other unique qualifications, to determine whether to accept you into their school.

Remember, college admissions tests make up just one aspect of your application. For many students, and many schools, other factors are more significant. Circumstances including athletic ability, a rare and valued field of study, a family with several generations of attendance at the school, a particularly high GPA, etc, may make your SAT score almost a formality. However, it never hurts to have a great score. No one has ever gotten rejected because their score was too high.

So let's do our best to make this portion of your application work in your favor. If your score is significantly higher than the average incoming freshman class from last year at the school of your choice, that's one more thing that sets you apart as the admissions officers evaluate your application.

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It's Used to Predict Your First Year Grades

According to the College Board, SAT scores, along with your GPA, can be used to predict first year college success. The SAT is not supposed to be, and certainly isn't, a college test or a predictor of career success. In fact there is evidence that it's not even a very good predictor of first year college grades.

Introduction | SAT Score Ranges

SAT scores only matter in relation to the schools you want to attend. To fully understand your scores and how they relate to those that will give you the best possibility of admission, research the colleges on your personal list. Below is a selection of schools and their corresponding SAT score ranges that you can use as a reference.

School	SAT Range (25th - 75th percentile)
Yale University	1420 - 1590
Columbia University	1450 - 1580
Duke University	1390 - 1580
Georgetown University	1350 - 1520
Emory University	1350 - 1520
Cornell University	1350 - 1530
New York University	1320 - 1500
University of Wisconsin	1238 - 1470
SUNY Binghamton	1230 - 1380
University of Maryland - College Park	1210 - 1420
Stony Brook University (SUNY)	1210 - 1410
SUNY Geneseo	1170 - 1350
Indiana University	1140 - 1350
Baruch College (CUNY)	1100 - 1320
Howard University	1090 - 1300
SUNY Oswego	1080 - 1260
Hunter College (CUNY)	1070 - 1260
City College (CUNY)	1050 - 1300
Arizona State University	1030 - 1270
Spelman College	1000 - 1190
SUNY Albany	1000 - 1190
Hampton University	920 - 1090
John Jay College of Criminal Justice (CUNY)	920 - 1060
North Carolina Central University	890 - 1030
Virginia State University	850 - 1020

For homework, fill in the average SAT score ranges for your top 3 choice schools. A couple of helpful sites include: www.collegeboard.com and nces.ed.gov/collegenavigator.

School	SAT Range

Introduction | What's on the SAT?

Over the next “few” pages we’re going to give you everything you need to succeed on the exam and get that score that will blow admissions officers away.

Just by being here, you’ve taken the first step toward achieving the score you want. However, this doesn’t mean you can daydream during class. Actively participate by asking and answering questions. And your prep doesn’t stop when you leave this room. Complete any homework assigned and come to class prepared to discuss it.

The most important part of succeeding on the SAT is being familiar with the exam – ALL OF IT. You need to know about the structure and content, about how your scores are generated, about how to approach the varied question types, and about how you can help yourself beat the system.

Let’s start with a basic overview of how the exam is structured.

Section	# of Questions	Time Allotted	Topics Tested	Scoring			
Reading Test	52 (4 single passages and 1 paired-passage)	65 minutes	<u>Topic</u>	<u># of Questions</u>	200 – 800		
			Literature	10-11			
			Social Sciences	10-11			
			Social Studies	10-11			
Writing and Language Test	44 (4 passages)	35 minutes	<u>Topic</u>	<u># of Questions</u>	200 – 800		
			Expression of Ideas	24			
			Standard English Conventions	20			
Math Test (No Calculator)	20 (15 Multiple Choice and 5 Grid-Ins)	25 minutes	<u>Topic</u>	<u># of Questions</u>	200 – 800		
			Algebra	8			
			Advanced Math	9			
Math Test (Calculator)	38 (30 Multiple Choice and 8 Grid-Ins)	55 minutes	<u>Topic</u>	<u># of Questions</u>	200 – 800		
			Algebra	11			
			Problem Solving and Data	17			
			Advanced Math	7			
Essay (Optional)	1	50 minutes			2-8 (on each of 3 components: Reading, Analysis, and Writing)		

Introduction | Scoring

For each individual section of the SAT, you will receive a raw score and a scaled score.

Raw Scores

Your raw score is the total number of actual points you have accumulated from answering questions correctly. A few things you should know about the raw score:

- Each right answer adds 1 point to your raw score.
- Each wrong answer does not add or subtract points from your raw score.
- Unanswered questions do not add or subtract points from your raw score.

Scaled Scores

Scaled scores are generated by a complex and secret formula from which a conversion chart (like the one shown below) is generated. You will receive a scaled score on both test sections. These scores are then added to generate your total (composite) score. College admissions officers will see both your scaled scores for each section as well as your total score. However, they will not see your raw scores. Take a look at a sample conversion chart below. The Evidence-Based Reading and Writing score is an approximation, as that scaled score is calculated in a slightly different way.

Scaled Score	Reading & Writing Raw Score	Math Raw Score	Scaled Score	Reading & Writing Raw Score	Math Raw Score	Scaled Score	Reading & Writing Raw Score	Math Raw Score
800	95-96	58	600	59-68	38-39	400	31-38	-
790	94-95	57	590	57-67	37	390	30-36	15
780	92-94	56	580	56-65	36	380	28-34	14
770	92-93	-	570	54-64	35	370	27-32	13
760	89-92	55	560	53-63	33-34	360	25-31	12
750	87-91	54	550	51-61	32	350	23-29	-
740	86-89	53	540	50-60	31	340	22-27	11
730	84-88	52	530	49-59	30	330	20-25	10
720	82-86	-	520	48-57	28-29	320	19-23	9
710	80-85	51	510	47-56	27	310	17-21	8
700	79-83	50	500	44-55	26	300	15-18	-
690	76-82	49	490	43-53	25	290	13-17	7
680	74-81	48	480	42-52	23-24	280	12-15	6
670	73-79	46-47	470	41-50	22	270	10-14	-
660	71-78	45	460	40-48	21	260	9-13	5
650	69-76	44	450	39-47	20	250	7-11	-
640	67-74	43	440	37-45	19	240	6-10	4
630	65-73	42	430	36-44	18	230	5-9	3
620	63-71	41	420	34-42	17	220	4-7	-
610	61-70	40	410	33-40	16	210	3-6	2

Introduction | Scoring

The SAT includes several additional scores you can use to determine your strengths and areas of need. These scores are not quite as important as your section or total scores.

Test Scores

You will receive a score from 10 – 40 for each of the three parts: the Reading Test, the Writing and Language Test, and the Math Test. Your Evidence-Based Reading and Writing section score is the sum of your Reading Test and Writing and Language Test scores multiplied by 10.

Cross-test Scores

Cross-test scores measure your ability to analyze texts and solve problems in two different subject areas: Analysis in History/Social Studies and Analysis in Science. These subject areas appear in questions in all three of the tests on the SAT and are also scored from 10 – 40.

Subscores

You are given seven subscores, from 1 – 15 each, which measure your abilities on several content areas. The Reading Test and the Writing and Language Test contribute to the Command of Evidence and Words in Context subscores. The Writing and Language Test also reports subscores for Standard English Conventions and Expression of Ideas. The Math Test provides subscores for Heart of Algebra, Problem Solving and Data Analysis, and Passport to Advanced Math.

Superscore

Superscoring is the process by which colleges consider your highest section scores (Math and Evidence-Based Reading and Writing) across all the administrations of the test you took, and combine them to form your highest possible composite score. For example, if the first time you take it you score a 700 on Math and a 520 on Reading and Writing, and the second time you got a 620 on Math and a 620 on Reading and Writing, your superscore would be a 1320, 700 from your first Math test and 620 from your second Reading and Writing test. Not all colleges superscore, however. Research the schools you are interested in to find out their specific policies.

Introduction | Pacing

Thus far we've discussed the test format and content, as well as how the test-makers generate your score. The key now is to know how you can start to improve that score. The most important step is to determine a pacing plan and to stick with it. It's all about momentum – choosing the proper pace so you can maximize your score and last through the test.

Remember, the people who write the SAT design it to put pressure on test-takers. This leads to stress and a tendency to rush – which leads to mistakes. Do yourself a favor: slow down and stick to your pacing plan. If you do, you will see your score go up.

To find an appropriate pace for you, follow the rules below:

1. Take your foot off the gas pedal.

By rushing through a section with the objective of getting to each and every question, there is a higher possibility of making silly mistakes and giving away points on questions you should be answering correctly.

2. Know your goals.

Deciding on a target score and devising a pacing plan to achieve that target score is vital.

3. Earn points where you can get them.

Find the questions YOU feel you can do the best on. As you work through this book you will discover that there are some question types you get right more often, and others you get wrong more often. Use your time to get the points on the questions you are good at. However, NEVER leave a question completely blank. If you have no idea how to answer it, still bubble in a guess, as you never lose points for a wrong answer.

4. Use the allotted time wisely.

The SAT is all about the efficient usage of your time. Spend the time for each section answering the number of questions that you need to achieve your target score.

So, how do you know how many questions you should be spending time on in each section?

Introduction | Pacing

Determine Your Target Score

In order to create your testing plan, you'll need to evaluate the scaled score you currently have and determine a reasonable target score.

To help you decide on a reasonable target score, keep a couple of things in mind:

1. **Be Incremental.**
Have a target score in mind but work toward that target score in stages. Do not try to achieve all the score improvements on the first practice test.
2. **Be Realistic and Fair to Yourself.**
Huge score improvements are possible, but they take a lot of work. There is no one timetable that tells you how many hours per week you need to study to get a certain score. Just know that the bigger the improvement, the more work you need to do – inside and outside class.

How to Get Your Best Score

To get your best score you must get as many questions right as possible. This means you want to work slowly in order to avoid careless mistakes. However, you lose no points for a wrong answer, so you also want to answer **every** question. Here's what to do:

- Work slowly and carefully on your TARGET NUMBER of questions.
- Guess using a “letter of the day” for every question you skip or don't have time to get to.

Take a look at these two students and how they approached 20 SAT Math questions.

Joe Schmoie

Correct	B	H	C	K	C	F	E	G	D	F	D	H	C	G	D	F	B	J	B	K
Student	✓	J	✓	F	✓	J	✓	✓	✓	G	A	-	B	✓	C	✓	D	✓	-	G

Total Correct Answers: 9 Total Wrong Answers: 9

Skipped Questions: 2 Guessed Correctly (of those skipped): 0 Raw Score: 9

Bell Curves Student:

Correct	A	H	C	H	D	K	B	K	B	F	D	J	A	F	B	K	D	K	D	J
Student	✓	✓	✓	J	✓	✓	C	✓	C	✓	C	✓	✓	G	✓	✓	✓	✓	C	✓

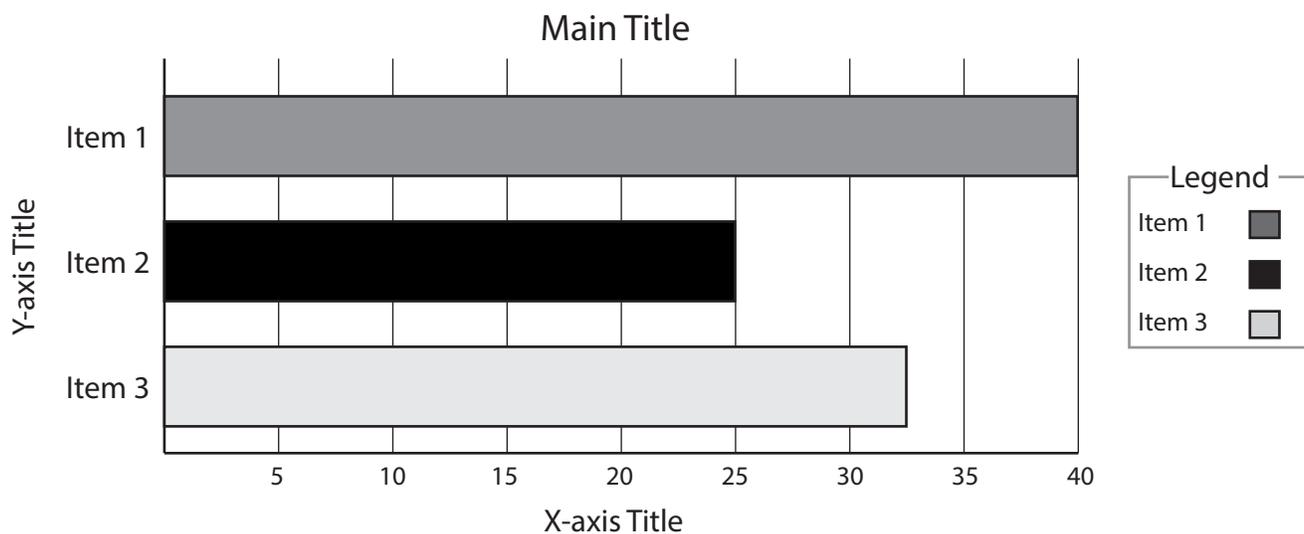
Total Correct Answers: 14 Total Wrong Answers: 6

Skipped* Questions: 5 Guessed Correctly (of those “skipped”): 2 Raw Score: 14

* Note: Although we use the term skipped, we do not mean you should leave it blank. Instead, do not spend time on that question and just put in a guess without wasting time. (Notice that this score report has no blanks.)

Introduction | Informational Graphics

The SAT will include questions on informational graphics, or infographics, in each section. We have specific instructions for how to deal with these questions in their particular sections, but overall there are some important tips to remember when dealing with infographics.



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1. Read All Labels.

Read and understand the main title, any axis titles, the axis markings, and/or the legend. Understanding these will allow you to correctly interpret the data in the graphic.

2. Look for Trends and Extremes in the Data.

See if the data tend to follow any certain overall pattern. Also note the highest and lowest values and if there are any outliers.

3. Connect the Data to the Question.

If the question asks you to refer to a piece of information on a chart or graph, read the relevant data carefully. If the question asks you to extend the graph or chart to include new data, follow the trends of the existing data.

Introduction | Exam Registration

When

The SAT is offered nationally on select Saturday (or Sunday for those with religious restrictions) mornings. Certain schools will also offer a schoolday exam administered during a weekday morning that you do not need to register or pay for yourself. Below are the tests and registration dates for the national test dates.

Test	Registration
October	September
November	October
December	November
March	February
May	April
June	May
August	June

*Please note that not every test is offered in every city and state. Check the SAT Web site, sat.collegeboard.org, for specific information about the testing locations in your area. Some test dates are very popular and sites fill up quickly, so don't wait to register if you know you are targeting a specific date.

The Essay

The SAT has an *optional* essay component and students may choose to take the exam with or without it. However, many universities require or "recommend" students to take the SAT with the essay. Please research the schools you are interested in for their specific requirements.

How Often

The SAT can be taken as many times as you choose, but should, in most cases, be taken 2-3 times. The SAT offers Score Choice, which allows you to choose which scores you send to colleges, so you don't have to send every administration you have taken if you choose not to. However, some colleges and scholarship programs do not allow you to take advantage of this option, and require you to send all your scores.

How Much

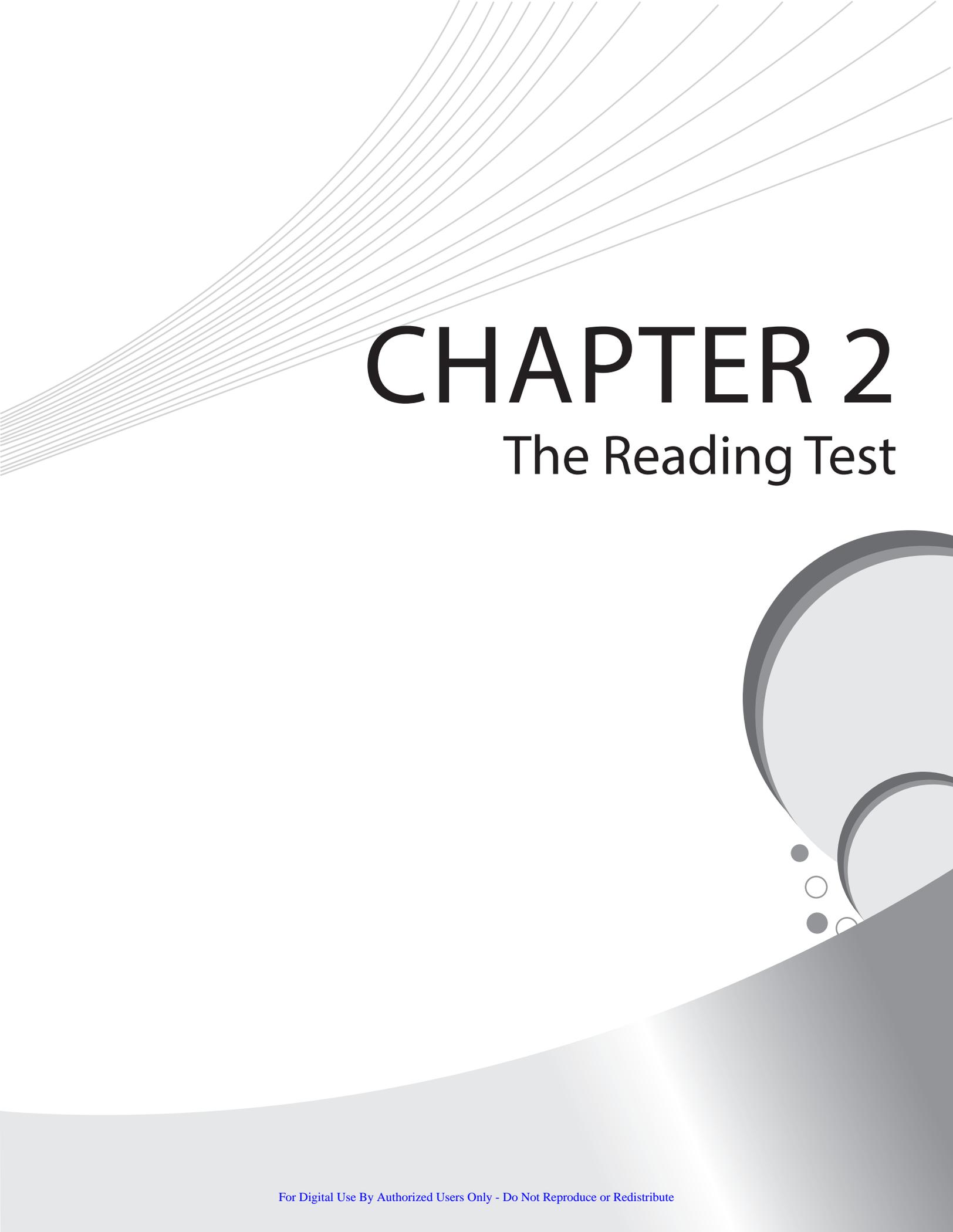
The cost is \$46 for the SAT without the essay and \$60 with it. (The schoolday exam is given free of charge but does not include the essay.) Vouchers may be available from your guidance counselor if you cannot afford the testing fee. If you qualify for a voucher, you are eligible to apply for free to up to four colleges from a list of over 2,000 schools. Additional fees may apply for standby testing, testing center location change or late registration.

QAS & SAS

If you choose, you can order and pay for a Question and Answer Service (QAS) form and test. If you do so, you will receive a copy of the test you took with a guide that gives correct answers and scoring information, a report that lists the type and level of difficulty of each question, along with the answers you chose, and whether they were correct, incorrect, or omitted. You can choose to order the QAS when you register, or after you have taken the test. You are not given the option to request the QAS service during every administration of the exam. The fee for the QAS is \$18.00. If you are planning to take the exam again and your testing date allows you to order the QAS, it is a helpful tool to learn from as you continue your preparation. The Student Answer Service (SAS) provides a report with information about the type of questions on your test, their level of difficulty, and whether your answers were correct, incorrect, or omitted. The SAS costs \$13.50.

Contact Info

Visit sat.collegeboard.org or call (866) 756-7346.



CHAPTER 2

The Reading Test

Reading | Format

The Reading Test contributes one quarter of your overall SAT total score, as it makes up half of your Evidence-Based Reading and Writing score.

The number of questions you get correct on this section will be converted into a test score, as shown in the chart below. The conversion chart is slightly different for each administration, but these numbers give you a general idea of where you are scoring. The highest possible test score is a 40.

Raw Score	Test Score	Raw Score	Test Score	Raw Score	Test Score
0	10	18	21	36	30
1	10	19	22	37	31
2	10	20	22	38	31
3	11	21	23	39	32
4	12	22	23	40	32
5	13	23	24	41	33
6	14	24	24	42	33
7	15	25	24	43	34
8	15	26	25	44	34
9	16	27	25	45	35
10	17	28	26	46	35
11	18	29	27	47	36
12	18	30	27	48	37
13	19	31	28	49	37
14	19	32	28	50	38
15	20	33	29	51	39
16	20	34	29	52	40
17	21	35	30		

This test score is then added to your Language and Writing Test score and the sum is multiplied by 10 to yield your scaled Evidence-Based Reading and Writing score, the highest score on which is an 800.

The Reading Test will always consist of four single passages and one paired-passage, each made up of 500-700 words. These five passages will always have 10 or 11 questions and be drawn from the following fields:

- One literature single passage drawn from American or world literature
- One social science single passage
- One social studies single or paired-passage drawn from American founding documents or global texts, and
- Two single passages, or one single and one paired-passage, drawn from the natural sciences.

There will be two infographics on the Reading Test, one in the social science passage and one in a natural science passage.

Reading | Comprehension

The fundamental skill tested in all Reading questions is the same: *The ability to read and extract information*. To excel, you must learn to read comprehensively and clearly *without adding, subtracting, or altering* what you've read.

The Keys to Success

Many people find the questions on the Reading Test to be among the hardest on which to improve their score. However, if you understand how the passages are structured and the keys for success you should be able to maximize your score.

The keys to SAT Reading success are: Time Management, Question Prioritization and Translation.

Time Management

As there are always 5 passages to attack in 65 minutes, this breaks down to 13 minutes per passage. Many people waste time reading passages multiple times: once before looking at the questions, again to answer the questions, and finally to verify the answer selected. This is a huge waste of time. We're going to avoid this by learning how to effectively attack and understand a question so we can spend our time thinking about the answers (since selecting the correct answer is what you get credit for). Learning what to read and when to read it are key to an effective plan for the Reading Test.

Question Prioritization

Questions in this section are *not* presented in order of difficulty (as they are in Math), so *you* have to decide which questions to focus on, and in what order. Typically, you will want to answer the detail questions with line references first, and save the general questions for later (or, skip them altogether while still bubbling in an answer in hopes of getting lucky). General questions (main idea, tone, or overview) require much more reading and a deeper understanding of the passage than detail questions do, so saving or guessing on them makes sense. *That* is efficient test-taking!

Translation

Reading passages (and oftentimes the questions themselves) are difficult to translate into simple English from complex SAT-speak. The keys to proper translation are:

- Read the passage (or question) literally.
- Read for *what* the author says, and *why* the author says it.

Reading | Take It Literally

Questions in the Reading section ask about information in the passages, rather than your opinions. Passages will be drawn from a wide range of topics (from history to fiction) and be written in a variety of styles (some esoteric and dense, some cogent and simple), but the SAT cannot and will not test you on prior knowledge about a specific subject. In short, this means that:

Reading passages give you all the information you need to answer the questions!

The Reading Test, therefore, is like an open-book test. All you have to do is find the relevant information. This should be manageable as long as you remember:

SAT reading passages ...

- Are rarely black and white.
- Often present complex and multi-faceted ideas.
- Typically qualify most statements and arguments.
- Require you to understand the reason for the information given.

How to Improve Your Comprehension Outside the Classroom:

- Read more challenging books, newspapers, magazines, blogs, etc.
- Constantly ask yourself why an author is saying something or why a certain character is doing something.
- Discuss your analyses with friends, family, teachers, etc.

Why You Should Improve Your Comprehension:

- Having good reading comprehension skills will help you correctly dissect and analyze any text. This is especially important in college as you will be reading a lot of challenging material.
- Having good reading comprehension skills will help you communicate your ideas clearly.
- The questions on the Reading section of the SAT require good comprehension skills.

Reading | Drill

The SAT cannot test you on your outside knowledge or personal associations with any topic. However, as the Reading Test gets challenging, with subtle, nuanced, and complicated phrases, you might find yourself tempted to make assumptions and leaps in logic about the meaning of a text. Resist this temptation! Instead, ask yourself the same, basic questions: “What, *literally*, does the text say? What does it mean? Why?” Question every choice and make the passage prove it to you.

Let’s look at some examples:

The sentence, “The woman’s clothing was inappropriate,” means:

Daniel’s answer: The woman was scantily clad.

Patrice’s answer: The woman was at a Fourth of July picnic in a wool business suit.

Angeline’s answer: The woman was wearing red to a funeral.

Who, if anyone, is right? Why? _____

The sentence, “The woman’s clothing was inappropriate, since her role in the company was that of a dish washer rather than an executive,” means:

Daniel’s answer: The woman should have had on a business suit.

Patrice’s answer: The woman was wearing a suit.

Angeline’s answer: The woman was dressed too formally given her position.

Who, if anyone, is right? Why? _____

Instructions: Read each of the following sentences and write down what they want you to assume and what they actually say.

- The question’s difficulty needed to be adjusted. Assumption: _____
Actual: _____
- The cafeteria lunch made the students weep. Assumption: _____
Actual: _____

Reading | Action Plan

For many students, the most daunting parts of the Reading section are the length of the passages and the complexity of the subject matter. Fortunately, following the steps below will make them less overwhelming. Before beginning to work through the Action Plan on a given passage, follow this simple rule: Start with your Strength. There is no rule that says you must do the passages and questions in order. As you practice, you may discover that you are more successful on certain types of passages and less successful on others. Start with the ones you are naturally better at, aiming for high accuracy on those. This will keep you calm and build confidence throughout the section.

1. Read and digest the blurb.

The blurb will give you some brief background information on the passage you're about to read.

2. Locate the referenced questions and label them in the passage.

A referenced question will point you to a specific part of the text (a set of lines, a paragraph, etc.) Write the question number alongside the passage, directly next to the referenced location. One specific type of referenced question is a followup question. These are easy to recognize because they usually ask, "Which choice provides the best evidence for the answer to the previous question?" and have line references as answer choices. Locate the first referenced line in the choices and put a star next to it in the passage along with the question number. We will talk about how to handle answering these specific questions shortly.

3. Begin reading the passage.

Start at the beginning of the passage and skim until you reach your first labeled reference. As you read, jot down main ideas and underline important details. When you arrive at your labeled reference, stop reading.

4. Translate the question.

Translate the question into your own words so you understand what is being asked. Don't try to answer something unless you are sure of what you are looking for.

5. Make a prediction.

Answer the question in your own words before looking at the choices. The SAT will often give you tricky choices to distract you. By answering in your own words first, you can avoid these tempting options.

6. Eliminate incorrect choices.

Eliminate any answer choice that is not similar to your prediction. If you are not sure what a choice means, keep it and come back to it at the end if you have not found another choice that works.

7. Attack the remaining questions.

The questions will generally progress in chronological order, so oftentimes the questions that come at the beginning will pertain to the beginning of a passage, and so on. Therefore, if you skipped any questions on your way to the first referenced one, take a glance at them now to see if you are able to answer them based on what you just read. If you can, go ahead and answer them. If not, keep reading to the next reference and repeat steps 4 - 6. Once you have finished answering the referenced questions, go back and answer anything you may have skipped, which will often be main idea questions.

Reading | Question Types

Before we get into actually working through the full Action Plan, let's make sure you feel comfortable with each step. One step that many people are tempted to skip when they are practicing on their own is Step 4, translating the questions. However, the best way to achieve success on the Reading section is to know exactly what you are being asked.

Questions generally come in one of these three forms:

What Questions

What questions ask *what* or *what else* the passage tells you. Typical types of *what* questions are:

Information Retrieval: These ask what the passage states.
Inference: These ask what else must be true given what you were told.
Vocabulary-in-Context: These ask what a word means as used in the passage.
Main Point: These ask what the author's point is.

Typical phrasing: Which statement about the Slater Paradox is supported by the passage?
 In line 57, "claims" most nearly means
 The comment about "the new artistic model" suggests that

Why Questions

Why questions ask you for the reason behind something the author does. Typical types of *why* questions are:

Purpose: These ask why the passage mentions a specific piece of information.
Primary Purpose: These ask for the reason an author writes a passage.

Typical phrasing: The primary purpose of the statements in lines 4 - 6 ("One . . . of an age") is to
 The author uses the phrase "rarified region" (line 23) in order to

How Questions

How questions ask the way in which the author does something. Typical types of *how* questions are:

Organization: These ask how the author structures the passage or a part of the passage.
Tone: These ask how the author feels about a particular topic.
Argument: These ask how the author supports his argument, or how it may be weakened or strengthened.

Typical phrasing: The tone of lines 11 - 12 is best described as
 Which of the following would weaken the author's argument about the ape?

Reading | Question Translation

Wicked Wording

Many questions, like the passages, use verbose, complicated language designed to hide what the questions are actually asking. The questions also often do not contain an actual question, but instead leave it to the answer choices to complete a thought. Furthermore, the questions often begin with a qualifier such as, “according to the passage,” or, “according to the author,” which is a pointless distraction since everything used to answer the question will be based on the passage and author.

SAT-to-English Translation

To avoid the confusion caused by the questions, translate the questions out of SAT-speak by posing the question in simpler language that still captures the meaning. Be careful not to fall into the trap of regurgitating the question with synonyms or concepts that are just as difficult as those in the original. Consider the following example:

The passage states that the primary reason traditional studies of financial markets and commercial structures in Latin American countries overlook imbalances in the allocation of financial resources is

22

Daniel thinks the question should be translated as:

What does the passage say is the principle reason that traditional studies of financial markets and commercial structures in Latin American countries don’t consider imbalances in resource allocation?

Patrice thinks the question should be translated as:

Why are there imbalances in the allocation of financial resources in Latin American countries?

Angeline thinks the question should be translated as:

Why do studies of financial markets in Latin America ignore imbalances in the sharing of money?

Who’s right? Why?

Reading | Drill

Instructions: Determine whether each question is a what, why, or how question. Then use the space provided to translate it into straightforward language, beginning with one of our three question words.

Question	Type		
1. The view of robotics held by the author can best be described as	<input type="checkbox"/> What	<input type="checkbox"/> Why	<input type="checkbox"/> How
2. The author uses the idea of the doors to	<input type="checkbox"/> What	<input type="checkbox"/> Why	<input type="checkbox"/> How
3. The author refers to the “cod fisherman” (line 53) primarily to illustrate	<input type="checkbox"/> What	<input type="checkbox"/> Why	<input type="checkbox"/> How
4. Lines 33-38 primarily serve to	<input type="checkbox"/> What	<input type="checkbox"/> Why	<input type="checkbox"/> How
5. The author of Passage 1 would most likely respond to the last statement in Passage 2 (lines 73-82) by asserting that	<input type="checkbox"/> What	<input type="checkbox"/> Why	<input type="checkbox"/> How
6. Which of the following rhetorical devices does the author use in the passage?	<input type="checkbox"/> What	<input type="checkbox"/> Why	<input type="checkbox"/> How
7. The African novelist’s comment in lines 23-28 chiefly focuses on the	<input type="checkbox"/> What	<input type="checkbox"/> Why	<input type="checkbox"/> How
8. The statement in lines 56-64 (“But . . . fish”) indicates that the author	<input type="checkbox"/> What	<input type="checkbox"/> Why	<input type="checkbox"/> How
9. The tone of the second passage is best described as	<input type="checkbox"/> What	<input type="checkbox"/> Why	<input type="checkbox"/> How
10. Which of the following best describes the relationship between the two passages?	<input type="checkbox"/> What	<input type="checkbox"/> Why	<input type="checkbox"/> How

Reading | Question Types

Detail Questions

The vast majority of questions will be specific rather than general. These ask about details in the passage and often refer to a specific portion of the passage, either by directing you to referenced lines of text or a through the use of specific buzz words. Detail questions may ask you to:

- Identify and/or interpret details
 - ex: “According to the passage, other members of the genus *Laticauda* and the banded sea krait differ in which of the following ways?”
- Understand vocabulary-in-context
 - ex: “The author uses the word ‘indifference’ to indicate:”

Every passage has at least one vocabulary-in-context question, and most have two. These questions take two formats: Synonym and Inference.

- Synonym Vocabulary in Context questions are ALWAYS referenced and require you to select an answer that means the same as the target word as it is used in the passage.
- Inference Vocabulary in Context questions are also ALWAYS referenced, but rather than requiring you to select a synonym, these questions ask you to choose an answer that reflects the REASON or the EFFECT of an author’s use of a particular word or phrase in context.

To answer both types of questions, use the following approach:

Vocabulary-in-Context Approach

1. Expand the reading window.

The SAT is sneaky and will often provide necessary context either before and/or after the sentence in which the referenced word actually appears.

2. Bleep it out.

Paraphrase your synonym answer by reading “bleep” in place of the vocabulary word and then replacing it with your own simplified word or phrase capturing the way the word is used in context.

3. Do not choose or eliminate an answer choice simply because you don’t know its meaning.

Students who lack confidence will sometimes select an unknown answer choice simply because they figure if they don’t know what the answer means, it must be the correct one. Do not make this mistake!

4. ALWAYS plug your answer back into the text before choosing it.

The answer you select should fit into the context of the reading.

Reading | Question Types

Followup Questions

Followup questions are another type of detail question because they reference specific places in the passage. They ask for the “best evidence” to answer the previous question and the answer choices are always line references. Use these questions as opportunities to get two points from a single piece of information.

Followup Question Approach

1. Identify the Followup Questions.

As you are going through Step 2 of the Action Plan, you will come across followup questions. When you find one, draw an arrow to the previous question as a reminder to answer them together.

2. Label the First Referenced Line in the Passage with a Star.

Place a star next to the first referenced line from the answer choices, along with the question number. This will serve as a visual marker as you read.

3. Read the Previous Question and Check Whether the Referenced Line Answers It.

As you read, when you reach a starred line reference, check to see if it provides evidence to answer the previous question. If so, select that as an answer. If not, cross it off and label the next referenced line with a star. Continue reading and answering other questions as you go, until you reach the next starred line. Repeat this step until you find an answer that works.

4. Answer the Previous Question.

Once you have found an answer choice that provides sufficient support for the previous question, answer it using that evidence as a guide.

Informational Graphics Questions

Informational Graphics questions are also examples of Detail questions, as they reference a specific place in the passage. They usually come at the end of a passage and will ask you to draw specific conclusions from tables, graphs, and charts. You may be asked to analyze the graphic itself or connect the information to the text. There will be two Informational Graphics, one of which will show up in a Social Science passage and the other in a Natural Science passage.

Informational Graphic Questions Approach

1. Locate the Informational Graphic Questions.

They usually come at the end of a passage.

2. Read the Question and Determine the Applicable Information.

3. Consider the Information Given (NOT the data).

Break down the axes, legends, and/or any additional information that comes with the graphic.

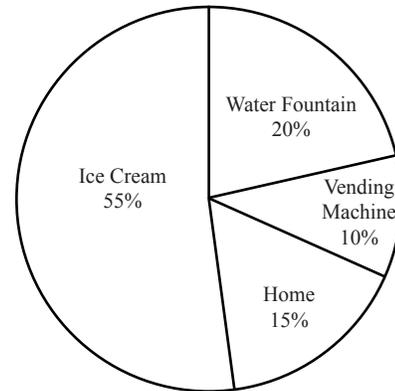
4. Analyze the Data.

Carefully analyze the given graphic and check the data against the relevant part of the passage.

Reading | Drill

The ice cream industry did not begin to use the Dixie cup until approximately 1920, some 12 years after Hugh Moore had invented it. Initially the product was not the cups themselves, but rather water from vending machines that used the disposable cups. Having been unsuccessful with the vending machines, Moore decided to sell the disposable paper cups in an attempt to replace the unsanitary tin cups that were commonly used for drinking water. Soon after laws were passed in various states banning public sippers, demand for Moore's disposable cups skyrocketed. After years of success a new use for Moore's disposable cup emerged when he and the ice cream industry became acquainted.

Figure 1
Primary Uses for Moore's Disposable Cups in 1935



- According to the passage, Moore's disposable cups became a success due to
 - their durability.
 - the ban on shared tin cups.
 - the increasing popularity of vending machines.
 - the rise of the ice cream industry.
- Which choice provides the best evidence for the answer to the previous question?
 - Lines 1-3 ("The ice...invented it")
 - Lines 3-5 ("Initially...cups")
 - Lines 8-10 ("Soon...skyrocketed")
 - Lines 10-12 ("a new...acquainted")
- The figure and the passage together show that the most popular use of the disposable cup
 - changed between 1920 and 1935.
 - was in home.
 - declined after 1935.
 - was not the original intention.

What information in the figure and the passage is relevant to the question?

How does the relevant information in the graphic connect with the relevant information in the passage?

Reading | Question Types

Inference Questions

Another type of Detail question is an Inference. These require you to “read between the lines,” or to draw a conclusion based on information in the text. The conclusion you draw is not explicitly stated — that would be a supporting detail — but is rather an idea implied by the text. Making a logical inference requires you to analyze and/or synthesize information from the passage to arrive at a new idea that, although not explicitly stated in the passage, is nevertheless supported by the information in the text.

Inference questions may take different forms:

Purpose of a Word or Detail	Analysis of Effect, Assumptions & Implications	Hypothetical Response	Unstated Relationships
The author most likely uses the examples in line X to highlight ...	The analogy in the final sentence of Paragraph X has primarily which effect?	The experts mentioned in Lines Y-Z would likely describe X as ...	Which choice best describes the developmental pattern of the passage?
Why did character X say or do Y?	How do the words X, Y, and Z in the third paragraph help establish the author’s tone?	How would the author of Passage 1 respond to X in Passage 2?	During the course of the third paragraph, the narrator’s focus shifts from X to ...?
The authors refer to works by X most likely to ...	It can be inferred that the author believes what about X?	Which choice best describes how X would most likely have reacted to Y’s remarks?	Which choice best describes the relationship between the 2 passages?
The authors use the word X in lines Y-Z to indicate that ...	What does the passage suggest about X?		
It can reasonably be inferred that detail X in Line Y was intended to ...	An unstated assumption made by the authors is that ...		

Inference Approach

1. Paraphrase an Answer.

Even if multiple answers would be possible, have an idea of what you are looking for before reading the choices.

2. Pay Close Attention to the Wording of Each Answer.

Often one word (such as “prove” versus “demonstrate”) can make one answer better than another.

3. Treat these like True/False Questions.

Select the answer that is MOST TRUE, or MOST SUPPORTED by the information in the text.

Reading | Question Types

General Questions

General questions are less common, but will often be the first question that shows up with any passage. They ask about the passage as a whole, or about large chunks of the passage, often concerning themselves with the main idea, mood, tone, or intent of the passage. There are three types of Reading questions that require you to recognize the general idea of a passage or paragraph:

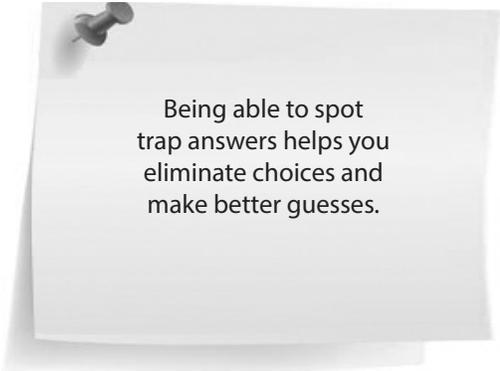
Main Idea	Summary	Purpose
<p>The central claim of the passage is that....</p> <p>The main idea of the final paragraph is that...</p> <p>The central problem described in the passage is that...</p>	<p>Which choice best describes what happens in the passage?</p> <p>Which choice best summarizes the passage?</p> <p>Which choice best reflects the overall sequence of events in the passage?</p>	<p>The main purpose of the passage/ paragraph is to:</p> <p>Argue Consider Discuss Examine Explain Illustrate Present Provide Question Suggest Summarize etc.</p> <p>+ MAIN IDEA</p>
<p>Most of the time these questions have NO line references</p> <p>To successfully answer Main Idea questions, pay close attention to the introductory and concluding paragraphs since they often contain the general idea, which the rest of the passage goes on to develop.</p>	<p>These questions tend to appear in the Literature passage.</p> <p>To successfully answer Summary questions, pay attention to the introductory and concluding paragraphs and to the topic sentences of body paragraphs. The answer choice that best reflects the most general information in these spots is usually the correct one.</p>	<p>Purpose questions are very similar to Main Idea questions. The difference is the addition of a “purpose” word similar to the ones listed above followed by the main idea or by the general topic of the selection.</p> <p>To successfully answer Purpose questions, make sure both the “purpose” word and the main idea that follows are correct as slight flaws in either cause that answer to be incorrect.</p>

Reading | Common Wrong Answers

As we have discussed, the SAT likes to give you tricky answers in an effort to catch you in a trap. Although the subject matter of SAT reading passages varies, the basic types of tricky wrong answer choices remain the same. By familiarizing yourself with the patterns that wrong answers commonly follow, you will more readily be able to spot and eliminate likely traps after making your predictions.

The most common wrong answers fall into one of the following categories:

Type	Explanation	Common Traits
Off-Topic	Off-topic answers bring up the wrong topic from the passage.	Mentions the topic, but an aspect of it which the author doesn't talk about or is not the answer to the question.
Extreme	Uses language stronger than that of the original passage.	Strengthens the emotions or tone of what the author says.
Vague	Requires you to guess what is meant by the wording.	Offers a general, and often true conclusion, but does not clearly connect to the question at hand.
Contradicts the Passage	Goes directly against the passage.	Comes from a dissenting opinion the author mentions.
Contradicts Reality	Ridiculous statements that contradict common sense.	Draws outlandish conclusions, or makes unsound assumptions.
Half-Right	Part of the answer is deceptively correct, but the other half is untrue.	Cites key phrases from the passages, but is ultimately made incorrect by one or more words.



Being able to spot trap answers helps you eliminate choices and make better guesses.

Reading | Drill

Instructions: Read the mini passage below and answer the following questions using the Action Plan and approaches we've been discussing.

The following passage is an excerpt from an article on reptiles. The author discusses a particularly interesting species of snake.

While it is a zoologist's job to study animals (some of them rare), it is not every day that zoologists have the opportunity to study truly unique creatures. One such extraordinary creature is the banded sea krait, and those
5 who are able to study it marvel at its distinctiveness. The banded sea krait (*Laticauda colubrina*) inhabits numerous warm water environments, though it is largely concentrated around the coastal coral reef regions of Australia and New Zealand. With the ability to live both
10 on land and in water, the banded sea krait is one of the few amphibious reptiles on the planet.

The sea krait is a type of sea snake that has undergone an evolution that is considered limited in comparison to other members of the genus *Laticauda*. A banded sea
15 krait is easily identified by its small head and cylindrical-shaped body that ends in a laterally compressed tail. As its name would indicate, the banded sea krait has bands running over the entire length of its 6 foot body. In addition to being able to survive extended periods of
20 time on land or in water, *Laticauda colubrina* differs from other members of its genus because it is ovoviviparous, meaning that it comes ashore to lay eggs. In exhibiting this behavior, sea kraits also distinguish themselves as one of the only reptiles to participate in group migrations. Similar
25 to salmon, sea kraits usually return to the same area to lay their eggs. They do so in migratory groups with numbers ranging from five to fifty participants.

Banded sea kraits also go ashore to engage in courtship, shed skin, and digest the food that they usually
30 obtain by trapping small fish or eels in coral reef crevices and poisoning their prey with an injection of venom via their small hollow fangs. While this venom is highly toxic (approximately ten times more toxic than cobra or rattlesnake venom), making *Laticauda colubrina* one of
35 the most deadly animals on the planet, very few humans have been fatally wounded, owing largely to the snakes' docile nature and small fangs.

1. The author's purpose in writing this passage is most likely to

Question Translation: _____

Your answer: _____

2. The author uses the verb "marvel" in line 5 to indicate that

Question Translation: _____

Your answer: _____

3. The main focus of the second paragraph in relation to the passage as a whole is

Question Translation: _____

Your answer: _____

Reading | Drill

4. Based on the passage, which of the following most likely contributes to the distinctive differences between banded sea kraits and other members of its genus?

Question Translation: _____

Your answer: _____

5. According to the passage, salmon and sea krait both

Question Translation: _____

Your answer: _____

6. The passage indicates that all of the following are reasons the banded sea krait comes ashore EXCEPT

Question Translation: _____

Your answer: _____

7. According to the passage, which of the following pairs of reasons account for the lack of human fatalities from banded sea krait bites?

Question Translation: _____

Your answer: _____

8. As it is used, in line 37 “docile” most nearly means

Question Translation: _____

Your answer: _____

Reading | Drill

1

The author's purpose in writing this passage is most likely to

- A) define the characteristics that make animals extraordinary.
- B) describe some of the distinguishing qualities of the banded sea krait.
- C) argue for the protection of members of the genus *Laticauda*.
- D) explain why the banded sea krait is more unique than other members of the genus *Laticauda*.

2

The author uses the verb “marvel” in line 5 to indicate that

- A) many zoologists have never heard of the banded sea krait.
- B) the banded sea krait is the most unusual sea snake in existence.
- C) the banded sea krait inspires amazement and admiration in those who study it.
- D) members of the genus *Laticauda* are extremely rare.

3

The main focus of the second paragraph in relation to the passage as a whole is

- A) an analysis of the evolutionary forces that led to the unique adaptations of the banded sea krait.
- B) a description of some of the unique characteristics of the banded sea krait compared to other animals.
- C) a comparison of the banded sea krait's habitat to those of other members of the genus *Laticauda*.
- D) support for the theory that the banded sea krait and the salmon share a common ancestor.

4

Based on the passage, which of the following most likely contributes to the distinctive differences between banded sea kraits and other members of its genus?

- A) Evolutionary forces
- B) Climate
- C) Habitat
- D) Food resources

5

According to the passage, salmon and sea krait both

- A) lay their eggs on land.
- B) return to the same area to lay their eggs.
- C) migrate in groups of 5 to 50.
- D) live in the waters of Australia and New Zealand.

6

The passage indicates that all of the following are reasons the banded sea krait comes ashore EXCEPT

- A) to shed its skin.
- B) to find a mate.
- C) to complete the digestive process.
- D) to regulate its body temperature.

7

According to the passage, which of the following pairs of reasons account for the lack of human fatalities from banded sea krait bites?

- A) The sea krait's passive nature and its hollow fangs
- B) The sea krait's aggressive nature and its small fangs
- C) The sea krait's nonthreatening nature and its small fangs
- D) The sea krait's cruel nature and its venomous fangs

8

As it is used in line 37, the word “docile” most nearly means

- A) weak.
- B) confused.
- C) unassertive.
- D) lethal.

Reading | Literature

The first passage on the Reading Test will be the only fictional piece you see on the exam. Literary passages have a different purpose and organization than the other passages do. They have no introductory paragraph with a thesis statement, no body paragraphs with topic sentences containing the main idea, no concluding paragraph containing important insights, etc. Rather, literature is a form of art, the main point or theme of which is seldom expressed directly. Literary passages attempt to convey, via plot, character, word choice, setting, and dialogue, some kind of implied universal truth.

Literature is the most challenging of all the genres of writing, simply because it requires the reader to constantly make inferences and reach conclusions about what a character's actions mean, how his or her thoughts contribute to the author's message, why the author uses a particular phrase, what an object symbolizes, etc. Thus, understanding literature requires careful critical thinking.

The good news is that in order for the SAT literature passages to convey a coherent theme, it must be self-contained. In other words, there needs to be some kind of narrative structure – a beginning, middle, and end – showing some kind of conflict or tension that is somehow resolved. It is this necessary narrative structure that we can use to read the literature passages more strategically. First, however, we need to be aware of some typical literary conflict/resolution patterns:

Conflict	Example	Resolution
Between Two Characters	<ul style="list-style-type: none"> • A daughter wants to postpone college to travel while her mother strongly disagrees. • A jealous boss makes life miserable for a superior employee with limited career options. 	<p>→ The daughter reluctantly decides to go her own way.</p> <p>→ The employee decides to begin looking for new work despite his limited options.</p>
Within A Character	<ul style="list-style-type: none"> • A man repeatedly breaks his promises to maintain employment, despite catastrophic consequences. • A woman's intense fear of abandonment keeps her stuck in an abusive relationship. 	<p>→ The man becomes homeless yet is surprisingly satisfied with his reduced circumstances.</p> <p>→ With the help of another survivor, the woman begins to overcome her shame and gains insight into why she stays.</p>
Between A Character & An Outside Force	<ul style="list-style-type: none"> • The pervasive racism and sexism, of the 1940s South prevent a gifted black woman from realizing her potential. • A group of men struggle to survive a blizzard on their climb up Mount Everest. 	<p>→ The woman sinks into a depression relieved only by her rich fantasy life.</p> <p>→ They begin to succeed when they work as a group rather than individuals.</p>

It is not unusual for a passage to have mixed conflicts or for the conflict to be very subtle and sometimes difficult to identify. Many of the questions that accompany a literature passage refer in some way to the narrative's conflict and/or resolution, which can often be found at the beginning and the end of the passage.

Reading | Literature

The following passage is adapted from *The Picture of Dorian Gray* by Oscar Wilde.

The studio was filled with the rich odor of roses, and through the open door came the heavy scent of lilac. From the couch on which he was lying, Lord Henry Wotton could catch the gleam of the sweet blossoms of a laburnum, whose tremulous branches seemed hardly able to bear the burden of a beauty so flame-like as theirs. The murmur of the bees shouldering their way through the unmown grass seemed to make the stillness more oppressive. The dim roar of London was like the note of a distant organ.

In the center of the room stood the portrait of a young man of extraordinary personal beauty, and in front of it, some distance away, was artist himself, Basil Hallward, whose sudden disappearance some years ago caused public excitement and gave rise to so many strange conjectures.

As the painter looked at the form he had so skillfully mirrored in his art, a smile of pleasure passed across his face, and seemed to linger there. But he suddenly started up, and closing his eyes, placed his fingers upon the lids, as though he sought to imprison within his brain some curious dream from which he feared he might awake.

“It is your best work, Basil, the best thing you have ever done,” said Lord Henry languidly. “You must send it next year to the Academy.”

“I don’t think I shall send it anywhere,” he answered, tossing his head back in that odd way that used to make his friends laugh at him.

Lord Henry elevated his eyebrows and looked at him in amazement. “Not send it anywhere? Have you any reason?”

“I know you will laugh at me,” he replied, “but I can’t exhibit it. I have put too much of myself into it.”

“Too much of yourself in it! I didn’t know you were so vain; I really can’t see any resemblance between you, with your rugged strong face and your coal-black hair, and this young Adonis, who looks as if he was made out of ivory and rose-leaves. Why, my dear Basil, he is a Narcissus, and you—well, of course you have an intellectual expression and all that. But beauty, real beauty, ends where an intellectual expression begins. Intellect is in itself a mode of exaggeration, and destroys the harmony of any face.

The moment one sits down to think, one becomes all nose, or all forehead, or something horrid. Look at the successful men in any of the learned professions. How perfectly hideous they are! Don’t flatter yourself, Basil: you are not in the least like him.”

“You don’t understand,” answered the artist. “Of course I’m not like him. I know that. I should be sorry to look like him. There is a fatality about all physical and intellectual distinction, the sort of fatality that seems to dog through history the faltering steps of kings. It is better not to be different from one’s fellows. Your rank and wealth, Harry; my brains, such as they are—my art, whatever it may be worth; Dorian Gray’s good looks—we shall all suffer for what the gods have given us, suffer terribly.”

After a pause, Lord Henry pulled out his watch. “I am afraid I must be going,” he murmured. “Before I go, I insist on your answering a question I put to you some time ago. I want you to explain why you won’t exhibit Dorian Gray’s picture. I want the real reason.”

The wind shook some blossoms from the trees, and the lilac-blossoms, with their clustering stars, moved to and fro in the languid air. Lord Henry felt as if he could hear Basil’s heart beating, and wondered what was coming.

“Henry,” said Basil Hallward, looking him straight in the face, “every portrait that is painted with feeling is a portrait of the artist, not of the sitter. The sitter is merely the accident, the occasion. It is not he who is revealed by the painter; it is rather the painter who, on the colored canvas, reveals himself. The reason I will not exhibit this picture is that I am afraid that I have shown the secret of my own soul.”

What type of conflict is in this passage?

What is that conflict?

What is the resolution?

Reading | Literature

1

As used in line 10, “dim” most nearly means

- A) dark.
- B) overcast.
- C) faint.
- D) gloomy.

2

Basil Hallward could best be described as

- A) extroverted.
- B) modest.
- C) standoffish.
- D) reclusive.

3

It can reasonably be inferred from the passage that when Basil responds to Lord Henry in lines 33-34 (“I know . . . into it”), he means that

- A) he is self-conscious because he looks too much like the man in the painting.
- B) the painting is a window into the artist’s true mind and he does not wish to reveal that
- C) he has spent too many hours working on the painting and he does not want to give it away.
- D) he has already promised to give the painting to someone else.

4

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 19-23 (“But he . . . awake”)
- B) Lines 48-49 (“Don’t flatter . . . him”)
- C) Lines 57-59 (“Dorian . . . terribly”)
- D) Lines 73-75 (“It is . . . himself”)

5

Lord Henry indicates that he believes true beauty and intellect to be

- A) manifested equally in Basil’s painting.
- B) mutually exclusive.
- C) exhibited by Dorian Gray.
- D) necessary qualities in an upstanding gentleman.

6

With which of the following statements about Dorian Gray would Lord Henry most likely agree with?

- A) He had a striking resemblance to Basil Hallward.
- B) His looks must have been a source of suffering.
- C) His hair and skin were fair.
- D) He was a personal friend with whom he socialized often.

7

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 37-39 (“with your . . . rose-leaves”)
- B) Lines 39-40 (“Why, my . . . Narcissus”)
- C) Lines 57-59 (“Dorian . . . terribly”)
- D) Lines 71-72 (“every portrait . . . sitter”)

8

It can be inferred from lines 51-52 (“I should . . . like him”) that Basil

- A) believes himself to be more attractive than Dorian Gray.
- B) thinks that Dorian Gray’s looks bring him suffering.
- C) cannot understand why Lord Henry does not see the resemblance between himself and Dorian Gray.
- D) believes that his intellect is more valuable than beauty and the two can never overlap.

9

The main purpose of lines 65-69 (“The wind . . . coming”) is to

- A) describe in detail the scene at Lord Henry’s home.
- B) build the anticipation for the revelation in the following paragraph.
- C) highlight how impatient Lord Henry was becoming with Basil’s refusal to answer his question.
- D) reference the flowers described at the beginning of the passage.

10

In the passage, Dorian Gray is compared to

- A) the Academy.
- B) a king.
- C) a grasshopper.
- D) Adonis.

Reading | Literature

This passage is adapted from the short story “Gregorio” by Percy Addleshaw.

Gregorio found himself in Madam Marx’s cafe, idly watching the passers-by. He felt happier, for he was amassing that which alone could insure his happiness. Each day gold pieces were added to the amount saved, and the cafe at Benhur seemed within his grasp. Security from want soothed him, so that which should have troubled him scarcely interested him at all. Upon first seeing Xantippe and the Englishman together, his anger had been violent; but when the futility of his rage became certain, his aggressive passion softened. He was content now to sit all day with Madam Marx, and returned home in the evening when Xantippe was away. He had spoken to her once since she had told him she hated him. He had entered his room one day and Xantippe was there, talking to her child, and quietly bade him go away.

“It’s my room as well,” Gregorio answered.

“It is my money that pays for it,” she replied.

Xantippe told him that, if he stayed, she would grow to dislike her son since he was the father.

Gregorio was wise enough to stay calm. If she lost her love for the boy, his and the boy’s chances of prosperity would be destroyed. So he closed the door, and ran downstairs. He persuaded himself that keeping in the background would cause Xantippe’s hatred to dissipate. As for her feelings toward himself, he ceased to care. The money was worth the cost of its attainment, and a woman’s laugh was less sweet to him than the chink of gold and silver pieces.

Madam Marx brought him coffee and sat beside him. She looked at Gregorio with a possessive smile.

“Have you seen Xantippe since she turned you out? You are welcome here; it is foolish to go where one is not wanted.”

“I’ve not seen her.”

“If she had ever loved you, she would not have thrown you out. I should not have complained had I been in her place.”

“It’s that Englishman, He has spoiled her. I hate him.”

“Why? Because he has stolen your wife’s love? It is lucky for both of you. There are not men so rich as the English.”

Madam Marx laid her fat hand upon Gregorio’s shoulder. It irritated him, but he didn’t resist.

“No. The money more than compensates me. But

I hated the man when I first saw him. There was a woman he talked to. He could scarcely express himself but he had money, and gave her champagne and flowers. And I was starving.”

“You have money now—his money. Why worry about him? He won’t follow you to Benhur, I fancy.”

Darkness came, and Gregorio was impatient to see his son. He rose and left the cafe. He had promised the boy a boat, and blamed himself for having forgotten to buy it. Grumbling, he hurried along the street, determined to waste no time. He would hurry always to obey the commands of the king, his son.

Soon he darted swiftly under the shadow of a wall, for he saw Amos. But the old man’s sharp eyes detected the victim, and, following Gregorio into his hiding-place, Amos approached him.

“Why hide when we have so much to say to one another?”

Gregorio professed ignorance.

“My friend, the money you borrowed is still owing in part.”

“You will be paid. We are saving money.”

“I will be paid now; otherwise, you are to blame for the consequences.”

And with a courtly salute Amos left. Gregorio realized he had been foolish not to pay something, but it hurt to part with gold. He determined, however, to send Amos something when he returned home. So good a watch had been kept, he never doubted the child’s safety. But what if Amos got him put in jail? So he reckoned up how much he could afford to pay, and, having bought the toy, returned eagerly home. He ran upstairs, singing loudly, and rushed into the room. “Here,” he cried, “is the ship! I have not forgotten it.” But the room was empty.

With a heartbroken sob Gregorio fell swooning on the floor.

1

Which choice best describes what happens in the passage?

- A) One character is in love with another but he rebuffs her advances.
- B) A man feels guilty about a debt he owes.
- C) A man dreams of the prospect of financial security but ultimately pays a larger price.
- D) One character has a conversation with another about how to win back his son’s affection.

Reading | Literature

2

According to the passage, why is Gregorio saving money?

- A) He plans to purchase a cafe.
- B) He desires to move to another country with his family.
- C) He needs to repay his debts.
- D) He wants to buy an expensive gift for his son.

3

Which choice provides the best evidence for the answer to previous question?

- A) Lines 4-6 (“Each . . . grasp”)
- B) Lines 47-48 (“The money . . . saw him”)
- C) Lines 58-59 (“He would . . . son”)
- D) Lines 72-75 (“Gregorio . . . home”)

4

How does Gregorio react to Xantippe’s claim that his continued presence would cause her to dislike her son?

- A) He decides to spend more time with her in an effort to save their relationship.
- B) He becomes angry and storms out of the house.
- C) He keeps his distance and spends his days at a cafe.
- D) He is saddened and consults Madame Marx for advice.

5

The author’s use of the phrase on lines 29-30 (“a woman’s . . . pieces”) conveys the idea that Gregorio

- A) finds wealth to be meaningless without companionship.
- B) values companionship less than he values wealth.
- C) believes that a romantic relationship would inhibit his ability to acquire wealth.
- D) is afraid that a woman would attempt to take his fortune.

6

It can be inferred from the passage that Madame Marx

- A) is romantically attracted to Gregorio.
- B) has a motherly bond with Gregorio.
- C) secretly wishes for Gregorio’s demise.
- D) wants to see Xantippe and Gregorio reconcile.

7

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 2-4 (“He . . . happiness”)
- B) Lines 14-15 (“He . . . hated him”)
- C) Lines 31-32 (“Madam Marx . . . smile”)
- D) Lines 52-53 (“You have . . . fancy”)

8

As used in line 53, “fancy” most nearly means

- A) imagine.
- B) hope.
- C) know.
- D) wish.

9

Based on the passage, Gregorio’s incentive for paying back Amos is

- A) fear that Amos may have him arrested.
- B) concern that Amos may harm his son.
- C) the desire to maintain an upstanding reputation in his town.
- D) worry that Xantippe will find out about his debts.

10

It can be inferred from the passage that Gregorio falls “swooning on the floor” (lines 83-84) because

- A) he suspects that something terrible has happened to his son.
- B) he is disappointed that he will not be able to give his son the gift he had purchased.
- C) he fears that Xantippe has left with the Englishman.
- D) he is ashamed of his mounting debt.

Reading | Literature

This passage is adapted from the novel *Sullen Soldier* by Russell Bell.

Standing on the porch, the Lieutenant had already begun to feel that he would not know what to do with himself from here on out. “It’s like nothing I’ve ever seen. What more could a man ask?” The words seemed natural given the splendor of his surroundings. Redwoods 5 studded his son’s land and only these old milemarkers of a bygone era, complete with their choirs of sparrows and buttertailed flycatchers, would be able to interrupt the setting sun. By the third sunset on that porch, the 10 Lieutenant had already unpacked his things twice. Nobody had known of his second unpacking; it had been quickly reversed to avoid embarrassment. For an unexplainable reason, the first thing he found himself doing on his second morning in Tim’s home was removing neatly 15 folded shorts from the dresser and replacing them in his trunk. If it was a conscious action, it did not make any sense. The Lieutenant knew when he arrived, and first unpacked the trunk, that he would be here for good. And, as everyone had told him, it was for the best.

20 For the best or not, things were already moving in the direction he had imagined. They were going nowhere, and they were not doing it with much urgency. The thoughts that had overwhelmed him on his flight from Arlington seemed to have no trouble fencing him in on a balcony 25 expanse that would make most anyone else dizzy for all its endless sky. The Lieutenant quickly realized the empty house to “knock around in” was rarely empty. Men lugging tools would let themselves in to do work on the premises. They made the necessary apologies when they 30 crossed paths with this man of distinction, whom they presumed not to disturb. But, for all their etiquette they were a disruption. And as infrequent an overnight guest as his own son was, it was clear that his hospitality would be on display for his friends: their names were blocked in as 35 guests on the calendar for every foreseeable weekend.

Of course, these were not the things that had the Lieutenant absentmindedly gathering himself to undo his arrival. For all his professed solemnity, worsened by the recent passing of his devoted wife, it was the absence of 40 starting every day in the service of distinguished work that left him unsure of himself. Meeting the carpenters on his way for a second or third cup of joe before noon, he would make inquiries into the nature of what they were doing. He could hardly decide on a tone with which to 45 ask a simple question, usually with origins more in mere curiosity than of any possessiveness of the house itself. It had long been the case that thirty years as an officer left him unable to comfortably demonstrate an appreciation

for a job well done without sounding as if he was passing 50 judgment, however favorably. Where once he felt that his daily responsibilities justified any lapses in his manner, he no longer felt as sure footed about casually needling people who were merely doing their job. Having been cut loose for over a year, he could hardly say the same for 55 himself. The arrival of the workers every few days, could scarcely be said to interfere with the day of a pastured officer. They merely disrupted his ability to forget that for nearly a year he had not done much of anything. And his closest family, with their hearty laughs, told him he better 60 get used to it.

Occasional visits to his last post in Arlington were no more uplifting. They were always cordial, but the encounters reminded him that he was now misplaced on either side of the base’s entry checkpoint. With Thea’s 65 passing, nothing else on the east coast held much sway over him; it had been as good a time as any to reevaluate his roles.

Returning to the vista one late afternoon, he nodded to a young man holding the bottom of a ladder. The man 70 above him was old enough to be graying, with one foot balanced on the top rung as he taped over the mahogany trim. The Lieutenant continued several paces before thinking that the ladder seemed to be at an awfully steep angle. He shot another look at the workman stationed at 75 eye level, careful not to seem as if he was getting ready to pry. The workman was already looking toward him. Again they nodded, but he did not say a thing.

1

Which choice best describes the developmental pattern of the passage?

- A) A thorough analysis of the aging process
- B) A detailed depiction of a turning point in one’s life
- C) An enthusiastic retelling of a humorous anecdote
- D) A nostalgic description of a picturesque setting

2

The main purpose of the opening sentence of the passage is to

- A) highlight the Lieutenant’s feelings of excitement about his new life.
- B) provide context for why the Lieutenant is unhappy.
- C) establish the Lieutenant’s perspective on his future.
- D) contrast the Lieutenant’s feelings with those of his son.

Reading | Literature

3

The statement on lines 3-4 (“It’s . . . ask?”) relates to the passage as a whole by

- A) demonstrating the Lieutenant’s great fondness for nature.
- B) showing how easily the Lieutenant is able to adapt to his current conditions.
- C) testifying to the Lieutenant’s enjoyment of a peaceful life.
- D) illustrating the confusion the Lieutenant feels at not being satisfied with simple beauties

4

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 17-18 (“The Lieutenant . . . for good”)
- B) Lines 22-26 (“The thoughts . . . sky”)
- C) Lines 50-53 (“Where once . . . their job”)
- D) Lines 66-67 (“it had . . . his roles”)

5

The tone of the passage could be best described as

- A) melancholy.
- B) upbeat.
- C) combative.
- D) unreasonable.

6

Based on the information in lines 44-50 (“He could . . . favorably”) it can be inferred that the Lieutenant was

- A) good humored but impatient.
- B) insincere but authoritarian.
- C) methodical but inconsiderate.
- D) demanding and not always polite.

7

As it is used in line 52, “needling” most nearly means

- A) threading.
- B) questioning.
- C) twisting.
- D) threatening.

8

As it is used in line 56, the word “pastured” conveys that the Lieutenant

- A) has found an easy life in this new rural setting.
- B) has grown tired of the meddling of his children.
- C) is not especially busy in his retirement.
- D) has been forgotten by those closest to him.

9

It can be inferred from the passage that the Lieutenant’s wife, Thea, played what role in his moving in with his son?

- A) She aggressively encouraged her husband to make the move.
- B) She played no role in the decision of her husband to move in with his son.
- C) Her death had been an influential factor in the Lieutenant’s choice to be on the east coast.
- D) She fretted about what the Lieutenant would do once he was on his own.

10

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 1-3 (“Standing . . . out”)
- B) Lines 38-41 (“For all . . . himself”)
- C) Lines 62-64 (“They were . . . checkpoint”)
- D) Lines 64-66 (“With Thea’s . . . him”)

Reading | Social Science

Social Science

Social Science passages present research on a particular issue from fields such as anthropology, archaeology, business, economics, sociology, psychology, education, or geography. With this type of passage, pay close attention to the following:

- Examples the author provides to illustrate his or her points
- The author's purpose
- Names associated with specific concepts
- Cause-and-effect relationships
- Comparisons or contrasts made by the author

Try the following Social Science passages and accompanying questions. Remember to look for the key points in the box above and apply our Action Plan as you answer the questions.

As a reminder, you will see an infographic accompanying a Social Science passage, so don't forget the additional Action Plan we discussed about approaching those types of questions!

Reading | Social Science

This passage is adapted from the book *Free Culture* by Lawrence Lessig.

Since the inception of the law regulating creative property, there has been a war against “piracy.” The precise contours of “piracy” are hard to sketch, but the animating injustice is easy to capture. As Lord Mansfield wrote in a case that extended the reach of English copyright law to include sheet music, “A person may use the copy by playing it, but he has no right to rob the author of the profit, by multiplying copies and dispersing them for his own use.”

Today the Internet has provoked a war against “piracy.” Peer-to-peer (p2p) file sharing is among the most efficient of the technologies the Internet enables. Using distributed intelligence, p2p systems facilitate the easy spread of content in a way unimagined a generation ago.

This efficiency does not respect the traditional lines of copyright. The network doesn’t discriminate between the sharing of copyrighted and uncopyrighted content. Thus there has been a vast amount of sharing of copyrighted content. That sharing in turn has excited the war, as copyright owners fear it will “rob the author of the profit.”

The warriors have turned to the courts, legislatures, and technology to defend their “property” against this “piracy.” A generation of Americans, the warriors warn, is being raised to believe that “property” should be free. Forget tattoos, never mind body piercing—our kids are becoming thieves!

There’s no doubt that “piracy” is wrong and that pirates should be punished. But before we summon the executioners, we should put this notion of “piracy” in some context. Though the term is increasingly used, at its core is an idea that is almost certainly wrong. The idea goes something like this: “Creative work has value; whenever I use or build upon the creative work of others, I am taking from them something of value. Whenever I take something of value from someone else, I should have his permission. Taking something of value from someone else without permission is wrong. It is a form of piracy.”

This view runs deep within the current debates. It is what NYU law professor Rochelle Dreyfuss criticizes as the “if value, then right” theory of creative property—if there is value, then someone must have a right to that value.

This was the perspective that led a composers’ rights organization, ASCAP, to sue the Girl Scouts for failing to pay for the songs their girls sang around campfires. There was “value” (the songs) so there must have been a “right”— even against the Girl Scouts.

This idea is certainly a possible understanding of how creative property should work. It might well be a possible design for a system of laws protecting creative property. But the “if value, then right” theory of creative property has never been America’s theory of creative property. It has never taken hold within our law.

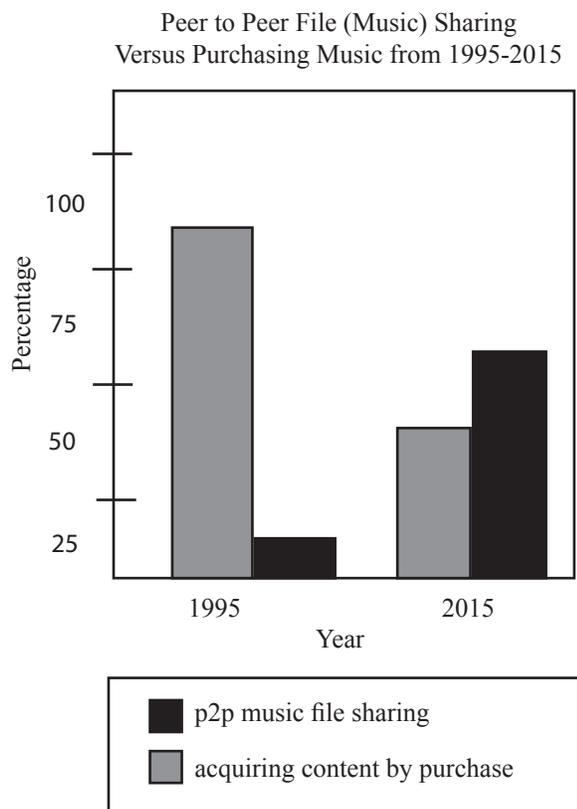
Instead, in our tradition, intellectual property is an instrument. It sets the groundwork for a richly creative society but remains subservient to the value of creativity. The current debate has this inverted. We have become so concerned with protecting the instrument that we are losing sight of the value.

The source of this confusion is a distinction that the law no longer takes care to draw—the distinction between republishing someone’s work and building upon or transforming that work. Copyright law at its birth had only publishing as its concern; copyright law today regulates both.

Before the technologies of the Internet, this conflation didn’t matter. The technologies of publishing were expensive; hence, the vast majority of publishing was commercial. Commercial entities could bear the burden of the law—even the burden of the Byzantine complexity that copyright law has become. It was just one more expense of doing business.

But with the birth of the Internet, this natural limit to the reach of the law has disappeared. The law controls not just the creativity of commercial creators but effectively that of anyone. Although that expansion would not matter much if copyright law regulated only “copying,” when the law regulates as broadly and obscurely as it does, the extension matters greatly. The burden of this law now vastly outweighs any original benefit—certainly as it affects noncommercial creativity, and increasingly as it affects commercial creativity. Thus, the law’s role is less to support creativity, and more to protect certain industries against competition. We may be seeing, as Richard Florida writes, the “Rise of the Creative Class.” Unfortunately, we are also seeing an extraordinary rise of regulation of this creative class.

Reading | Social Science



42

1

The main purpose of the passage is to

- A) explain why a recently common practice should not be illegal under any circumstance.
- B) expose the consequences of the over-application of a law.
- C) argue for a change to an established law.
- D) question the appropriateness of applying a law to regulate the use of the Internet.

2

The author's use of quotations around the word "piracy" serves to

- A) demonstrate his doubt that piracy exists.
- B) raise a question about the definition of the word.
- C) minimize the severity that is often attached to the term.
- D) mock those who use the term incorrectly.

3

What function do the first two paragraphs serve in the passage as a whole?

- A) They explain the development of a recent phenomenon.
- B) They summarize the findings of the author's research into a problem.
- C) They introduce background to an argument the author later makes.
- D) They give an overview of a problem that has not been sufficiently addressed by the experts mentioned in the passage.

4

According to the passage, America has traditionally viewed intellectual property as

- A) a right.
- B) a burden.
- C) a commodity.
- D) an instrument.

5

As used in line 57, "subservient" most nearly means

- A) dominant.
- B) beholden.
- C) elusive.
- D) helpful.

Reading | Social Science

6

The author’s perspective on the current application of copyright law is that it could result in the

- A) mass arrest of American citizens.
- B) stifling of creativity.
- C) censorship of the Internet.
- D) breakdown of the justice system.

7

As used in line 68, “conflation” most nearly means

- A) fusion.
- B) tradition.
- C) constraint.
- D) belief.

8

From the author’s perspective, the main objective of current copyright law is to

- A) protect certain industries against competition.
- B) defend the creative freedom of artists.
- C) assure that people will not use the Internet to commit crimes.
- D) guarantee that creators will be adequately compensated for their work.

9

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 35-38 (“Whenever . . . piracy”)
- B) Lines 64-66 (“Copyright. . . both”)
- C) Lines 75-77 (“The law. . . anyone”)
- D) Lines 84-85 (“Thus. . . competition”)

10

The graph following the passage offers evidence that consumer preferences have

- A) switched from file sharing to content purchasing.
- B) made no significant change since 1995.
- C) swung largely towards file sharing.
- D) entirely forsaken paying for music.

11

The graph following the passage adds supplemental evidence to the author’s point that

- A) the limits of the law have all but disappeared in the face of the Internet and, subsequently, increased “piracy.”
- B) creative youth have less respect for art as property.
- C) current copyright law regulates p2p file sharing only.
- D) consumers of music are purchasing musical content far less in 2015 than they were in 1995.

Reading | Social Science

The following is excerpted from Mark Twain's *Purchasing Civic Virtue* essay.

The human race has always been interesting and we know by its past that it will always continue to be so. It is monotonous; it is always the same; it never changes. Its circumstances change from time to time, for better or worse, but the race's character is permanent and never changes. In the course of the ages it has built up several great and worshipful civilizations and has seen unlooked-for circumstances slyly emerge bearing deadly gifts which looked like benefits and were welcomed, whereupon the decay and destruction of each of these stately civilizations has followed.

It is not worthwhile to try to keep history from repeating itself, for man's character will always make the preventing of the repetitions impossible. Whenever man makes a large stride in material prosperity and progress he is sure to think that he has progressed, whereas he has not advanced an inch. Nothing has progressed but his circumstances. He stands where he stood before. He knows more than his forebears knew but his intellect is no better than theirs and never will be. He is richer than his forebears but his character is no improvement upon theirs. Riches and education are not a permanent possession; they will pass away, as in the case of Rome and Greece and Egypt and Babylon, and a moral and mental midnight will follow—with a dull, long sleep and a slow reawakening. From time to time he makes what looks like a change in his character but it is not a real change, and it is only transitory anyway. He cannot even invent laws and keep them intact; circumstances are stronger than he and all his works. Circumstances and conditions are always changing, and they always compel him to modify his laws to harmonize with the new situation.

Republics have lived long but monarchs live forever. By our teaching we learn that vast material prosperity always brings in its train conditions which debase the morals and enervate the nation—then the countries' liberties come into the market and are bought, sold, squandered, thrown away, and a popular idol is carried to the throne upon the shields or shoulders of the worshipping people and planted there in permanency. We are always being taught—no, formerly we were always being taught—to look at Rome and beware. The teacher pointed to Rome's stern virtue, incorruptibility, love of liberty, and all-sacrificing patriotism—this when she was young and poor; then he pointed to her later days when her sunbursts of material prosperity and spreading dominion came and were exultingly welcomed by the people.

The teacher reminded us that Rome's liberties

were not auctioned off in a day, but were bought slowly, gradually, furtively, little by little; first with a little corn and oil for voters who were not quite so poor, later still with corn and oil for pretty much every man that had a vote to sell—exactly our own history over again. At first we granted deserved pensions, righteously and with a clean and honorable motive, to the disabled soldiers of the Civil War. The clean motive began and ended there. We have made many and amazing additions to the pension list but with a motive which dishonors the uniform and the Congresses which have voted the additions, the sole purpose behind the additions being the purchase of votes. It is corn and oil over again, and promises to do its full share in the eventual subversion of the republic and the substitution of monarchy in its place. The monarchy would come anyhow, without this, but this has a peculiar interest for us in that it prodigiously hastens the day. We have the two Roman conditions: stupendous wealth with its inevitable corruptions and moral blight, and the corn and oil pensions—that is to say, vote bribes, which have taken away the pride of thousands of tempted men and turned them into willing, unashamed alms receivers.

1

In line 3, the author refers to the human race as “monotonous” because he believes that

- A) human nature itself is constant.
- B) the appearance of change is temporary.
- C) civilization has reached a point of equilibrium and there is no more room for advancement.
- D) it only appears interesting in retrospect.

2

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 1-2 (“The human race. . . so”)
- B) Lines 3-6 (“Its circumstances. . . changes”)
- C) Lines 18-20 (“He knows. . . be”)
- D) Lines 40-42 (“We. . . beware”)

3

The statement on lines 9-11 (“whereupon . . . followed”) is said to follow from

- A) a failure to develop new technology to keep up with advancing civilizations.
- B) an inability to plan ahead.
- C) an acceptance of bribes from outsiders.
- D) the unforeseen detriments of progress.

Reading | Social Science

4

It can be inferred from the passage that intellectual progress itself is

- A) ephemeral.
- B) useless.
- C) relative.
- D) accumulated.

5

The phrase “moral and mental midnight” (line 24) most likely refers to

- A) a time of public despair.
- B) a period of intellectual inactivity.
- C) the height of the empires mentioned previously in the passage.
- D) the end of civilization.

6

The author’s view of laws is best described as

- A) critical.
- B) old-fashioned.
- C) inconsistent.
- D) objective.

7

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 12-14 (“It is . . . impossible”)
- B) Lines 28-29 (“He . . . intact”)
- C) Lines 30-32 (“Circumstances . . . situation”)
- D) Line 33-34 (“Republics . . . forever”)

8

The statement on lines 33-34 (“Republics . . . forever”) refers to the notion that

- A) human nature tends to undermine democracy.
- B) monarchies are better remembered in history.
- C) monarchies are richer than republics.
- D) democracy grants too much power to those in charge.

9

The author implies that the politicians’ primary motive for granting pensions after the Civil War was to

- A) centralize political power.
- B) increase their own wealth by controlling which soldiers received a pension.
- C) eliminate poverty.
- D) curry favor with the electorate.

10

The main function of the last paragraph is to

- A) describe ancient Roman attitudes and explain how these attitudes led to the fall of the republic.
- B) explain the drawbacks of the pension system established for Civil War soldiers.
- C) relate an anecdote the author was told by his teacher.
- D) provide a concrete illustration of a point previously made in the passage.

Reading | Social Science

The following is excerpted from Clarence Darrow's *Crime: Its Cause and Treatment*.

There can be no discussion of “crime” and “criminals” without an investigation of the meaning of the words. A majority of people, even among the educated, speak of a “criminal” as if the word has a clearly defined meaning and as if people are divided by a plain and distinct line into the criminal and the virtuous. However, there is no such division, and from the nature of things, there never can be such a line.

Strictly speaking, a crime is an act forbidden by the law of the land, and one which is considered sufficiently serious to warrant providing penalties for its commission. It does not necessarily follow that this act is either good or bad; the punishment follows for the violation of the law and not for any moral transgression. No doubt most of the things forbidden by the penal code are injurious to the organized society of the time and place. But even then it does not always follow that the violator of the law is not a person of higher type than the majority who are directly responsible for the law.

An action is not necessarily bad because it is forbidden by the law. Legislators are forever repealing and abolishing criminal statutes, and organized society is constantly ignoring laws until they fall into disuse and die. Laws against witchcraft and laws affecting religious beliefs are well-known examples of legal and innocent acts which legislatures and courts once made criminal. Every time a legislature meets, it changes penalties for existing crimes and makes criminal acts that were not previously forbidden.

Judging from the kind of people sent to Congress, the fact that certain things are forbidden does not mean that these things are necessarily evil, but rather, that politicians believe there is a demand for such legislation from the class of society that is most powerful in political action.

In this uncertainty as to the basis of good and bad conduct, many appeal to “conscience” as the infallible guide. What is conscience? It is not a distinct faculty of the mind, and if it were, would it be more reliable than the other faculties? There is no doubt that all people have what is called a conscience, a feeling that certain things are right and others are wrong. This conscience does not affect all the actions of life, but the ones which, to them, are the most important. It varies with the individual. What reason has the world to believe that conscience is a correct guide to right and wrong?

The origin of conscience is easily understood. One’s conscience is formed as habits are formed—by the time and place in which one lives. For some, the eating of pork would hurt their conscience; for others the eating of any meat; for some the eating of meat on Friday. Conscience is purely a matter of environment, education and temperament, and is

no more infallible than any habit or belief.

Some seek to avoid the difficulties of the problem by saying that a “criminal” is one who is “anti-social.” An anti-social person is one whose life is hostile to the organization or the society in which he lives; one who injures the peace, contentment, prosperity or wellbeing of his neighbors or social organization in which he lives. In this sense, many of the most venerated men of history have been “criminals;” their lives and teachings have been in greater or lesser conflict with the doctrines, habits and beliefs of the communities in which they lived.

No two men have the same power of adaptation to the group, and it is quite plain that the ones who are the most servile and obedient to the opinions and life of the crowd are the greatest enemies to change and individuality. The fact is, none of the generally accepted theories of the basis of right and wrong has ever been the foundation of law or morals. The basis that the world has always followed, and perhaps always will accept, is not hard to find.

The “criminal” is the one who violates the habits and customs of the community in which he lives. These customs must be so important as to make their violation a serious affair. Such violations are considered evil regardless of whether the motives are selfish or unselfish, good or bad. Men did not arrive at moral ideas by a scientific or a religious investigation of good and bad or of right and wrong.

1

The author uses quotation marks around specific words throughout the passage in order to

- A) question the sincerity with which the terms are used.
- B) challenge the popular meanings of certain commonly used terms.
- C) use irony to illustrate the absurdity of such terms.
- D) provide explanations for unusual terms.

2

According to the passage, which of the following is true about conscience?

- A) It is useful for determining which actions are right and wrong.
- B) It corresponds closely with laws.
- C) It is relative and therefore not a universal tool for determining morality.
- D) It is lacked by those who intentionally damage society.

Reading | Social Science

3

The main function of the second paragraph in relation to the passage as a whole is to provide

- A) a transition between a discussion of specific words to a discussion of specific events.
- B) the prevalent definitions for terms examined throughout the passage.
- C) a distinct example of the phenomenon mentioned in the first paragraph.
- D) a counterpoint to the author’s opinion.

4

The author mentions laws against witchcraft primarily to demonstrate

- A) how what is deemed criminal by lawmakers may not actually be harmful.
- B) that laws governing morality are necessary to stop such behavior.
- C) the flawed ethics of legislators.
- D) the effect that the politically powerful have on legislation.

5

The author of the passage considers politicians to be

- A) morally inferior to many of the people they represent.
- B) skilled at determining the validity of laws.
- C) only worried about retaining their elected posts.
- D) primarily concerned with appeasing powerful constituents.

6

Which of the following provide the best evidence for the answer to previous question?

- A) Lines 21-23 (“Legislators . . . die”)
- B) Lines 26-28 (“Every . . . forbidden”)
- C) Lines 29-31 (“Judging . . . evil”)
- D) Lines 31-33 (“that politicians . . . action”)

7

As it is used in line 35, “infallible” most nearly means

- A) benevolent.
- B) trustworthy.
- C) maimed.
- D) ludicrous.

8

According to the author, one who commits a crime

- A) should face extreme punishment.
- B) is likely to commit further crimes in the future.
- C) lacks a conscience.
- D) cannot be judged as either morally good or bad.

9

With which of the following statements regarding the term “anti-social” would the author most likely agree?

- A) It should be reserved only for the worst members of society.
- B) It can be used to describe people who cause great social changes.
- C) It is synonymous with the word criminal.
- D) It has more positive connotations than most people believe.

10

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 52-53 (“Some . . . ‘anti-social’”)
- B) Lines 54-55 (“An anti-social . . . lives”)
- C) Lines 57-59 (“In this . . . criminals”)
- D) Lines 65-67 (“The fact . . . morals”)

11

The last paragraph differs from the rest of the passage in that it

- A) cites an outside source.
- B) states a conclusion against which the author argues.
- C) uses real-world examples.
- D) contains the author’s thesis on the central issue of the passage.

Reading | Social Studies

Social Studies

This type of passage presents an essay or speech from U.S. founding documents or international texts influenced by them. These texts will be very similar to documents you analyze in history or social studies class. As with all of the passages on the Reading section, you do not need to have any outside knowledge. With this type of passage, pay close attention to the following:

- Examples the author provides to illustrate his/her points
- The author's purpose
- Any specific stance the author takes
- How the author makes his/her case
- Comparisons/contrasts made by the author

Try the following Social Studies passages and accompanying questions. Remember to look for the key points in the box above and apply our Action Plan as you answer the questions.

Reading | Social Studies

This passage is adapted from Shirley Chisholm's address to Congress in 1970 about the proposed Equal Rights Amendment.

Resolution 264, before us today, which provides for equality under the law for both men and women, represents one of the most clear-cut opportunities we are likely to have to declare our faith in the principles that shaped our Constitution. It provides a legal basis for attack on the most subtle, most pervasive, and most institutionalized form of prejudice that exists. Discrimination against women, solely on the basis of their sex, is so widespread that it seems to many persons normal, natural, and right.

Legal expression of prejudice on the grounds of religious or political belief has become a minor problem in our society. Prejudice on the basis of race is, at least, under systematic attack. There is reason for optimism that it will start to die with the present, older generation. It is time we act to assure full equality of opportunity to those citizens who, although in a majority, suffer the restrictions that are commonly imposed on minorities.

The argument that this amendment will not solve the problem of sex discrimination is not relevant. If the argument were used against a civil rights bill, as it has been used in the past, the prejudice that lies behind it would be embarrassing. Of course laws will not eliminate prejudice from the hearts of human beings. But that is no reason to allow prejudice to continue to be enshrined in our laws to perpetuate injustice through inaction.

What would be the economic effects of the equal rights amendment? Direct economic effects would be minor. If any labor laws applying only to women still remained, their amendment or repeal would provide opportunity for women in better-paying jobs in manufacturing. More opportunities in public vocational and graduate schools for women would also tend to open up opportunities in better jobs for women.

Indirect effects could be much greater. The focusing of public attention on the gross legal, economic, and social discrimination against women by hearings and debates in the Federal and State legislatures would result in changes in attitude of parents, educators, and employers that would bring about substantial economic changes in the long run.

Sex prejudice cuts both ways. Men are oppressed by the requirements of the Selective Service Act, by enforced legal guardianship of minors, and by alimony laws. Each sex, I believe, should be liable when necessary to serve and defend this country. Each has a responsibility for the support of children.

This is what it comes down to: artificial distinctions between persons must be wiped out of the law. Legal discrimination between the sexes is, in almost every instance, founded on outmoded views of society and the pre-scientific beliefs about psychology and physiology. It is time to sweep away these relics of the past and set further generations free of them.

Evidence of discrimination on the basis of sex should hardly have to be cited here. It is in the Labor Department's employment and salary figures for anyone who is still in doubt. Its elimination will involve so many changes in our State and Federal laws that, without the authority and impetus of this proposed amendment, it will perhaps take another 194 years. We cannot be parties to continuing a delay. The time is clearly now to put this House on record for the fullest expression of that equality of opportunity which our founding fathers professed. They professed it, but they did not assure it to their daughters, as they tried to do for their sons.

The Constitution they wrote was designed to protect the rights of white, male citizens. As there were no black Founding Fathers, there were no founding mothers – a great pity, on both counts. It is not too late to complete the work they left undone. Today, here, we should start to do so.

1

The main issue that Chisholm describes in the passage is that women

- A) do not hold positions of power to influence major decisions of government.
- B) could be a major force of direct economic change if they were not burdened by current law.
- C) face unequal treatment under the law to the detriment of society.
- D) have a right to defend the country during times of war.

Reading | Social Studies

2

As used in line 7, “institutionalized” most nearly means

- A) relating to a school.
- B) coming from an authority.
- C) placed in an asylum.
- D) culturally ingrained.

3

The second paragraph establishes a contrast between

- A) the severity of different forms of discrimination.
- B) the views of younger and older generations.
- C) the majority and the minority of society.
- D) optimism and pessimism.

4

Chisholm dismisses a line of criticism about the Equal Rights Amendment by

- A) applying the same reasoning to civil rights legislation.
- B) flatly rejecting the evidence for the argument.
- C) challenging society to improve its moral character.
- D) arguing that law can counter personal prejudices.

5

Chisholm contends that the economic impact of the Equal Rights Amendment will be

- A) a drastic, positive shift in economic production.
- B) primarily felt in the future as the product of adjustments of perspective.
- C) primarily felt in the present due to an increase of women in manufacturing.
- D) minimal since women are already an integral part of the economy.

6

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 27-29 (“What would . . . minor”)
- B) Lines 29-32 (“If any . . . manufacturing”)
- C) Lines 35-41 (“The focusing . . . run”)
- D) Lines 55-56 (“Evidence . . . here”)

7

It can reasonably be inferred that the Selective Service Act is

- A) a major point of contention for advocates of the Equal Rights Amendment.
- B) another example of legal injustice faced by women.
- C) a bill that opposes the Equal Rights Amendment.
- D) applicable only to men.

8

Chisholm uses the phrase “artificial distinctions” on line 48 to emphasize

- A) the idea that society is the same as it was before is flawed.
- B) the inaccuracy of the beliefs about differences in the genders.
- C) how revolutionary recent scientific discoveries are.
- D) the divisions between the current and subsequent generations.

9

Chisholm believes that ending discrimination based on gender will

- A) force a major restructuring of governmental policies.
- B) cause a largely negative backlash from men.
- C) take over a century’s worth of effort to achieve.
- D) be a task for the children of the present generation.

10

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 49-54 (“Legal discrimination . . . them”)
- B) Lines 58-59 (“Its elimination . . . laws”)
- C) Lines 59-61 (“without . . . years”)
- D) Lines 65-66 (“They professed . . . sons”)

Reading | Social Studies

This passage is adapted from a letter entitled *To Every Englishman in India*, written by Mahatma Gandhi.

I wish that every Englishman will see this appeal and give thoughtful attention to it.

In my humble opinion no Indian has cooperated with the British Government more than I have for an unbroken period of twenty-nine years of public life in the face of circumstances that might well have turned any other man into a rebel. I ask you to believe me when I tell you that my cooperation was not based on the fear of the punishments provided by your laws or any other selfish motives. It was free and voluntary cooperation based on the belief that the sum total of the activity of the British Government was for the benefit of India. I put my life in peril four times for the sake of the Empire. I did this in the full belief that acts such as mine must gain for my country an equal status in the Empire.

So late as last December I pleaded hard for a trustful cooperation, I fully believed that Mr. Lloyd George* would redeem his promise to the Mussalmans and that the revelations of the official atrocities in the Punjab would secure full reparation for the Punjabis. But the treachery of Mr. Lloyd George and its appreciation by you, and the condonation of the Punjab atrocities have completely shattered my faith in the good intentions of the Government and the nation which is supporting it.

But though, my faith in your good intentions is gone, I recognize your bravery and I know that what you will not yield to justice and reason, you will gladly yield to bravery.

See what this Empire means to India:

Exploitation of India's resources for the benefit of Great Britain. An ever-increasing military expenditure, and a civil service the most expensive in the world. Extravagant working of every department in utter disregard of India's poverty. Disarmament and consequent emasculation of a whole nation lest an armed nation might imperil the lives of a handful of you in our midst. Traffic in intoxicating liquors and drugs for the purposes of sustaining a top heavy administration. Progressively representative legislation in order to suppress an evergrowing agitation seeking to give expression to a nation's agony. Degrading treatment of Indians residing in your dominions.

I know you would not mind if we could fight and wrest the sceptre from your hands. You know that we are powerless to do that, for you have ensured our incapacity to fight in open and honourable battle. Bravery on the battlefield is thus impossible for us. Bravery of the soul still remains open to us. I know you will respond to that also.

I am engaged in evoking that bravery. Non-cooperation means nothing less than training in self-sacrifice. Why should we cooperate with you when we know that by your administration of this great country we are lifting daily enslaved in an increasing degree.

This response of the people to my appeal is not due to my personality. People flock in their thousands to listen to us because we today represent the voice of a nation, a nation fighting for independence out from under iron heels.

My religion forbids me to bear any ill-will towards you. I would not raise my hand against you even if I had the power. I expect to conquer you only by my suffering.

You are in search of a remedy to suppress this rising ebullition of national feeling. I venture to suggest to you that the only way to suppress it is to remove the causes. But this you cannot do unless you consider every Indian to be in reality your equal and brother.

The other solution, namely repression, is open to you. I prophesy that it will fail. It has begun already. The Government has already imprisoned two brave men of Panipat for holding and expressing their opinions freely. Another is on his trial in Lahore for having expressed similar opinion. One in the Oudh District is already imprisoned. Another awaits judgment. You should know what is going on in your midst. Our propaganda is being carried on in anticipation of repression. I invite you respectfully to choose the better way and make common cause with the people of India whose salt you are eating. To seek to thwart their inspirations is disloyalty to the country.

*British Prime Minister from 1916 -1922

1

Gandhi uses the words “wish” and “appeal” in line 1 primarily to

- A) demonstrate his genuine compassion for the many Englishmen in India.
- B) highlight his own moral superiority.
- C) use respect as a mediating tool in a difficult conversation.
- D) stress the urgency of his address.

Reading | Social Studies

2

Gandhi indicates that the cooperation he describes in the passage

- A) has turned him into a rebel.
- B) was based primarily on his fear of punishment by the British Government.
- C) has only now begun after 29 years of rebellion.
- D) came from his initial belief that the British Government was beneficial to India.

3

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 3-5 (“In my . . . life”)
- B) Lines 7-12 (“I ask . . . India”)
- C) Lines 16-17 (“So late . . . cooperation”)
- D) Line 25 (“But . . . gone”)

4

According to the third paragraph, how has Gandhi’s opinion of Mr. Lloyd George changed?

- A) His trust in Mr. George has grown stronger.
- B) His previous respect for Mr. George has been completely destroyed.
- C) Although his faith in Mr. George has been shattered, he now has hope this faith can be restored.
- D) He believes there is slightly less of a chance Mr. Lloyd George will honor the requested reparations.

5

As it is used in line 27, “yield” most nearly means

- A) grow.
- B) holler.
- C) stop.
- D) surrender.

6

The long list of actions in lines 30-42 serves to demonstrate

- A) the failings of India’s economy.
- B) the reach of Britain’s ever-increasing military presence in India.
- C) the pervasive poverty in India.
- D) the copious amounts of British oppression to which India has been subjected..

7

The phrase on line 44 “wrest the sceptre” most likely means to

- A) obtain weapons for the Indian army.
- B) assassinate the King of England.
- C) reclaim sovereign independence for India.
- D) conquer England for India.

8

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 30-31 (“Exploitation . . . Britain”)
- B) Lines 47-49 (“Bravery . . . also”)
- C) Lines 52-54 (“Why . . . degree”)
- D) Lines 56-59 (“People . . . heels”)

9

The main purpose of the second to last paragraph is to

- A) accuse the English of anti-Indian sentiment.
- B) warn England that they will lose this battle.
- C) insist that equality for Indians is the only answer to the current conflict.
- D) mock the English Government’s efforts to combat the uprising.

10

The central claim of the passage is that

- A) the British Government will stop oppressing India either by choice or due to Indian bravery.
- B) the British Government is using too much of India’s salt.
- C) the British Government must share their resources with India.
- D) Gandhi will stop the British Government’s policies of oppression with his suffering.

11

As it is used in line 65, “ebullition” most nearly means

- A) outpourings of emotion.
- B) heat waves.
- C) an overflow of opinions.
- D) silence.

Reading | Natural Science

Natural Science

This type of passage presents a science topic and discusses its significance. One of the key differences between a Natural Science passage and a Social Science passage is that in a Natural Science passage, the author is concerned with relationships between natural phenomena, whereas in a Social Science passage, the author is interested in relationships between people. Do not be distracted by technical terminology with which you are unfamiliar. If knowing the definition of some term is important to answering a question, the passage will define the term, or you will be able to use context clues to ascertain its meaning. Take note of the following:

- Laws, rules, and theories presented, and to whom they are attributed
- How details and examples relate to larger ideas
- The author's perspective on the topic
- Cause-effect relationships
- Comparisons/contrasts between schools of thought

Look at the following Natural Science passages and accompanying questions. Remember to look for the key points in the box above and apply our Action Plan as you answer the questions.

Reading | Natural Science

This passage is adapted from the article *Diabetes Overview* published by the U.S. Department of Health.

An estimated 23.6 million people in the United States—7.8 percent of the population—have a condition known as diabetes. Diabetes is a disorder of metabolism—the way the body uses digested food for growth and energy. Food is broken down into glucose, the main source of fuel for the body. After digestion, glucose passes into the bloodstream, where cells use it for growth and energy. For glucose to enter cells, insulin, a hormone produced by the pancreas, must be present.

When people who do not suffer from diabetes eat, the pancreas automatically produces the right amount of insulin to transport glucose into the cells. In diabetics, however, the pancreas produces little or no insulin. As a result, glucose builds up in the blood, overflows into the urine, and passes out of the body. Thus, the body loses its main source of fuel, even though the blood may actually contain an adequate amount of glucose.

There are three types of diabetes: type 1, type 2, and gestational diabetes. Type 1 diabetes is an autoimmune disease, a disease that results when one's immune system turns against a part of the body. In diabetics, the immune system attacks and destroys insulin-producing beta cells in the pancreas. Scientists do not know what causes the body's immune system to attack the beta cells, but they believe that genetic and environmental factors, possibly viruses, are involved. Type 1 diabetes accounts for 5 to 10 percent of diagnosed cases in the United States. Although it develops most often in children and young adults, it can appear in people at any age. Symptoms of type 1 diabetes usually develop over a short period of time and may include increased thirst and urination, constant hunger, weight loss, blurred vision, and extreme fatigue. If not treated with insulin, a person with type 1 diabetes can lapse into a life-threatening coma known as diabetic ketoacidosis.

Roughly 90 to 95 percent of people with diabetes have type 2. This form is most often associated with old age, obesity, family history, physical inactivity, and certain ethnicities. About 80 percent of people with type 2 diabetes are overweight, so maintaining a reasonable body weight may help to prevent the onset of the disease. Ethnicity also plays a role, as those of African American, Mexican American, or Pacific Islander descent exhibit the highest rates of diabetes cases. When type 2 diabetes is diagnosed, the pancreas is usually producing enough insulin, but for unknown reasons the body cannot use it effectively. After several years of this, insulin production

decreases. Unlike in type 1 diabetes, however, the symptoms of type 2—fatigue, frequent urination, weight loss, blurred vision, and slow healing of wounds—develop gradually. Some people even exhibit no symptoms at all.

Some women develop the third type, gestational diabetes, late in pregnancy. It occurs more often in certain ethnic groups and among women with a family history of diabetes. It is caused by the hormones associated with pregnancy. Although this form of diabetes usually disappears after the birth of the baby, women who have had gestational diabetes have a 40 to 60 percent chance of developing type 2 diabetes within 10 years.

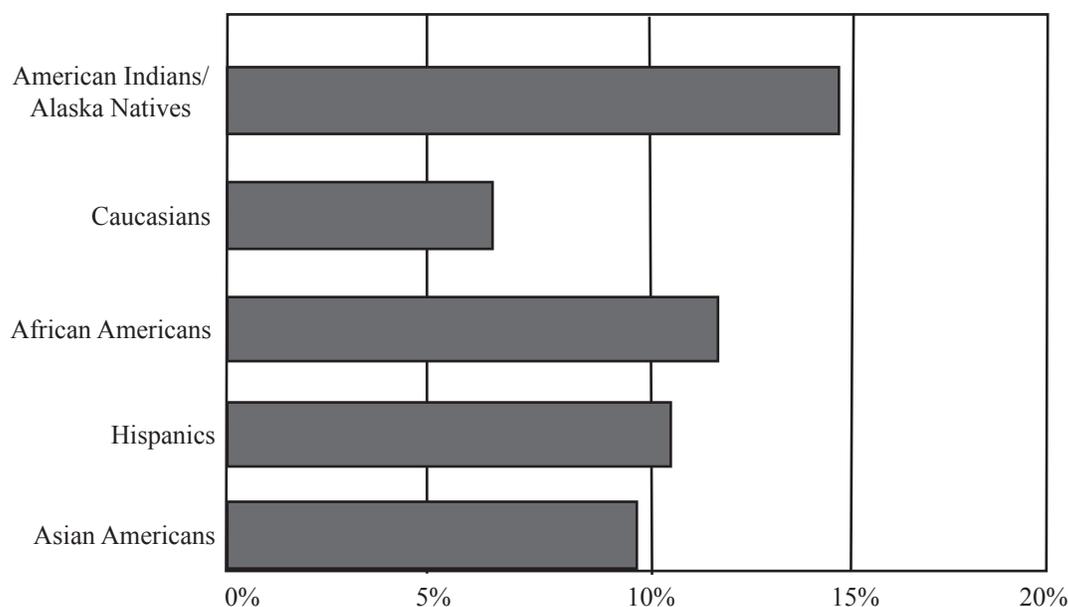
Diabetes is recognized as one of the leading causes of death and disability in the United States. It can lead to blindness, heart and blood vessel disease, kidney failure, amputations, and nerve damage. In 2006, it was the seventh leading cause of death. However, diabetes is likely underreported on death certificates, as other conditions may be noted instead since diabetics often suffer from multiple health issues.

The prevalence of diabetes in the United States is likely to increase moving forward with the shift towards a more sedentary lifestyle. A large segment of the population is also aging, bringing a larger number of people into the age range most at risk. In addition, minority groups who have an increased risk make up the fastest-growing segment of the U.S. population. Some doctors have claimed that the frequency of diagnosed diabetes cases will increase by 165% by the year 2050.

Despite this bleak outlook, in recent years, advances in diabetes research have led to better ways of managing and treating its complications. Major advances include the development of quick-acting and long-acting insulins, laser treatment for diabetic eye disease, and successful kidney and pancreatic transplantations. Researchers continue to look for ways to manage, prevent, or cure the disorder.

Reading | Natural Science

Rates of Type 2 Diabetes Diagnosed Diabetes by Ethnicity



Adapted from the American Diabetes Association

1

The first paragraph serves primarily to

- A) explain why a health issue occurs.
- B) illustrate the prevalence of a health concern in the United States.
- C) describe why a health issue is more widespread in the United States than in other countries.
- D) introduce a disease that will be the focus of the passage.

2

As it is used in line 17, “adequate” most nearly means

- A) scant.
- B) average.
- C) sufficient.
- D) frequent.

3

According to the passage, all of the following are symptoms of type 1 diabetes EXCEPT

- A) decreased hunger.
- B) extreme fatigue.
- C) blurred vision.
- D) increased thirst.

4

According to the passage, one difference between type 1 diabetes and type 2 diabetes is that

- A) in type 1 diabetes the pancreas produces little to no insulin while in type 2 diabetes the pancreas usually produces enough insulin.
- B) type 1 diabetes usually develops later in life while type 2 diabetes usually occurs in children.
- C) type 1 diabetes occurs as a result of weight loss while type 2 diabetes occurs as a result of obesity.
- D) in type 1 diabetes, glucose builds up in the pancreas while in type 2 diabetes glucose builds up in the blood.

Reading | Natural Science

5

Which choice best supports the article’s implication that type 2 diabetes following gestational diabetes is not inevitable?

- A) Lines 37-39 (“This form . . . ethnicities”)
- B) Lines 48-51 (“the symptoms . . . gradually”)
- C) Lines 57-60 (“Although . . . years”)
- D) Lines 69-70 (“The prevalence . . . forward”)

6

According to the passage, diabetes is likely to be underreported as the underlying cause of death in death certificates because

- A) doctors often mistake diabetes for other diseases.
- B) diabetes is not perceived as a potentially fatal illness.
- C) many diabetics also suffer from another disease.
- D) some diabetics are unaware that they have diabetes.

7

As it is used in line 71, “sedentary” most nearly means

- A) solitary.
- B) spry.
- C) heavy.
- D) inactive.

8

According to the passage, all of the following are examples of major advancements in diabetes research EXCEPT

- A) laser treatment for diabetic eye disease.
- B) successful kidney transplantation.
- C) the development of quick-acting insulins.
- D) the development of early-detection tests.

9

Based on the information in the graph, the difference between the number of Hispanics and American Indians/Alaska Natives with Type 2 diabetes is approximately

- A) 14.
- B) 11.
- C) 3.
- D) Cannot be determined from the information given.

10

Does the information in the graph support the author’s claim in lines 42-44 (“Ethnicity . . . cases”)?

- A) Yes, because African Americans have a rate of diagnosed diabetes cases of approximately 12%.
- B) Yes, because American Indian/Alaska natives have the highest rate of diagnosed diabetes cases.
- C) No, because Mexican Americans are not featured on the graph, so their rate of diagnosed cases must be minimal.
- D) No, because American Indian/Alaska natives have the highest rate of diagnosed diabetes cases.

Reading | Natural Science

The following passage is adapted from a scientific journal published in 2005.

It would be too dramatic to suggest a conspiracy, but for nearly fifty years, physicists have actively ignored an ever-growing weed in a beautifully designed garden. The dilemma is as follows: There are two distinct pillars supporting modern physics. At the smallest end of the scale there is quantum mechanics, a branch of physics that deals exclusively with the atomic world of molecules, including the subatomic particles that comprise it. At the other end is general relativity, which explains the largest elements of the universe from stars and planets to solar systems and galaxies. Each concept has provided generations of physicists with powerful tools to accurately unlock the secrets of many worlds. Yet, when analyzed together, a shocking and ground-shattering conclusion emerges: *the two theories are irreconcilable.*

It may seem incredible that you have never heard about this fundamental scientific contradiction. Seemingly, this disagreement would have created a grand debate between physicists. But because physicists usually only work with either large, massive things (like stars and planets) or small, light things (like protons and electrons), a conflict between the two occurs infrequently, and only in the most extreme circumstances. Thus, physicists who use quantum mechanics and physicists who use general relativity can, without consequence, disregard the equations that build the foundation of the opposing model. For this reason, quantum mechanics and general relativity have coexisted in near blissful ignorance for nearly half a century.

However, there *are* situations in which the universe is extreme. On the inside of a black hole, a gigantic mass can be effortlessly crushed to an atomic size. In addition, the big bang theory hypothesizes that the whole universe began as a miniscule, though massive, pebble that violently erupted to form the immensity of the universe today.

Both of these examples require the concurrent use of both quantum mechanics and general relativity. But when brought together, the equations from the two models begin to jerk and sputter like a broken-down garbage disposal.

Less figuratively, physicists who utilize an unpleasant amalgam of these two theories only find incongruous answers to their well-posed questions.

Even if you never desire to draw away the veil of mystery surrounding the depths of a black hole or the origins of the universe, you can't help but feel that the animosity between quantum mechanics and general relativity poses a fundamentally destructive problem

that requires resolution. Is it really possible that the universe is ultimately divided into two levels, one that requires a set of laws for the unimaginably large and another contradicting set for things that are microscopically small?

Superstring theory, a modern structure compared to the venerable pillars of quantum mechanics and general relativity, answers with a decisive no. Over the past decade, physicists and mathematicians around the world have meticulously researched this new approach to understanding matter at its foundational level. This approach ultimately solves the conflict between quantum mechanics and general relativity. In reality, superstring theory does more than just resolve the tension between the two theories: within this framework, quantum mechanics and general relativity actually require each other for the theory to be true. Because of superstring theory, the union between the two models is not just peaceful but necessary. Superstring theory has the potential to show that all the astounding events in the universe — from the vibrating dance of light's wave particles to the elegant pirouette of a planetary orbit — are indications of one incredible physical principle, one inclusive equation.

1

As it is used in line 8, the word “comprise” most nearly means

- A) amplify.
- B) negotiate.
- C) constitute.
- D) encircle.

2

The primary purpose of the second paragraph is to

- A) provide further evidence of a conflict introduced at the beginning of the passage.
- B) summarize the ongoing conflict between two different sciences.
- C) propose an alternative argument to the one that currently exists in the scientific community.
- D) critique the separation of the two schools of thought, encouraging unity.

Reading | Natural Science

3

According to the passage, the two incompatible theories have peacefully coexisted to this point because

- A) neither theory is still used by the scientific community.
- B) physicists can effectively combine certain equations from both theories.
- C) the theories only apply to a limited set of events.
- D) physicists work in specific scales where these theories do not interact.

4

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 11-15 (“Each . . . irreconcilable”)
- B) Lines 19-23 (“But . . . circumstances”)
- C) Lines 23-26 (“Thus . . . model”)
- D) Lines 41-43 (“Less . . . questions”)

5

The author’s use of italics in line 30 serves primarily to

- A) accentuate a well-known hypothesis.
- B) substantiate a valid belief.
- C) highlight an area of agreement.
- D) underscore an important idea.

6

The author refers to black holes primarily to

- A) represent the mysteries of the universe.
- B) contrast them with the big bang theory.
- C) provide an example of a situation in which the quantum scale intersects with general relativity.
- D) raise a topic physicists know little about.

7

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 30-32 (“However. . . size”)
- B) Lines 32-36 (“In . . . today”)
- C) Lines 37-38 (“Both . . . relativity”)
- D) Lines 38-40 (“But . . . disposal”)

8

The author uses the phrase “garbage disposal” in line 40 most likely to suggest that the two theories

- A) are inherently useless and should be thrown out.
- B) can only be used by a professional.
- C) do not work together effectively.
- D) can be easily repaired when using superstring theory.

9

Which of the following, if true, would best refute the author’s assertion about the “modern structure” in line 54?

- A) Mathematical equations that reconcile the quantum mechanics with general relativity
- B) Evidence that the laws governing the universe change according to the size of the object being studied
- C) Speculation that the universe did not actually begin with the big bang
- D) Confirmation the interior of a black hole is as dense as scientists have thought

10

The primary purpose of the final paragraph is to

- A) clearly answer the question posed by the passage as a whole.
- B) solve the aforementioned conflict by introducing, and expounding on, a new theory and its benefits.
- C) praise the scientific community for their grappling with an unprecedented change.
- D) summarize recent physics experiments.

Reading | Paired-Passages

One of the five passages you will deal with will be paired, meaning there will be two related passages with questions concerning each passage as well as questions concerning both passages together. When you see a dual passage, approach each passage and its respective set of questions as if it were separate from the other passage. See the approach for dual passages below:

Paired-Passages Action Plan

1. Focus on the questions that ask about only the first passage.

Dual passage questions will ask about Passage 1, Passage 2, or both passages. Isolate the ones that ask solely about Passage 1. These will show up first in the list of questions.

2. Follow the General Action Plan for Passage 1.

This includes labeling line references in the questions and answer choices, making predictions before selecting answer choices, and using process of elimination to get rid of any choices that do not match your predictions. Answer all of the questions that refer solely to the information in Passage 1.

3. Follow the General Action Plan for Passage 2.

Answer all of the questions that refer solely to the information in Passage 2.

4. Answer any questions that reference both passages.

As you read through the second passage, try to understand how the two passages are similar and how they are different. Once you have finished all the questions for Passage 2, answer the questions that reference both passages.

Look at the following passages and accompanying questions. Apply our Action Plan as you answer the questions.

Reading | Paired-Passages

Passage 1 and Passage 2 are excerpts from 2009 articles on conservation.

Passage 1

The public rise of conservationism has been startling both in its suddenness and in its breadth. People who only a decade or two ago were shopping for automobiles with a mind to bring their living standard (and living room experience) to the road, are pressing automotive dealers for information on a vehicle's long term fuel efficiency and bio-diesel compatibility.

More adventurous and proactive buyers are flocking to dealerships to purchase vehicles with hybrid engines that run on both gasoline and rechargeable electric batteries. This has become especially apparent among younger and more educated drivers, particularly those who live on the west coast. There even seems to be an emerging trend among motorists to petition their legislatures to set aside funding for the development of distribution stations for ethanol, an "earth friendly" bio-diesel.

The approximately 3,100 ethanol-blend pumps in 42 states across the country might be considered "odd ducks" indeed in a country with tens of thousands of stations offering regular, super, and premium grades of gasoline. No less shocking is the persistence of such consumers to tolerate compromised performance and various refueling inconveniences while making the transition to more conscientious fuel consumption. Nevertheless, all indicators seem to say it is a revolution in the making, with a front line of grass roots consumer advocates wearing their choices on their sleeves, and on their bumper stickers.

Passage 2

There is a growing political trend to set mandatory deadlines for fuel efficiency in automotive lines being proposed for future manufacture. While there are swaths of young, forward thinking constituencies petitioning their governments for fuel standards to be revised and energy conservation targets to be established, the real benefits of such legislation will be limited to a few, opportunistic organizations including very wealthy mega-corporations. The major contributors to national productivity will be penalized for their energy saving innovations while disingenuous, predatory, or largely marginal businesses throw their weight behind populist legislation written to serve a social good, but more likely to disinherit the electorate from the real time and energy saving gains that result from a reinvestment of resources in traditional areas of

technological advance.

For every conservation-minded piece of legislation to pass into law, there is an opportunistic multinational corporation that backs it to benefit its own bottom line to the detriment of industry-wide reinvestment of profit. Fuel economy laws are an excellent example. Seemingly a boon for the environment, such legislation is often passed with the support of automotive manufacturers whose product lines are disproportionately concentrated into apparently "thrifty" sedans, while more diversified automotive manufacturers with investments in heavy trucks, mechanical equipment, and diesel buses are unintentionally disadvantaged by an idealistic public.

While such legislation is well-intentioned, it often creates harmful capital shortages for those businesses that are responsible for reinvesting in the most impactful energy-saving research and developing ideas such as fuel-efficient diesel engines or mass transit designs. Such innovations save more fuel, per person, than even the most economical gas hybrid passenger sedans, and are spurred on by letting the companies that specialize in them raise the capital to reinvest in the development cycle of these established technologies.

60

1

The primary purpose of Passage 1 is to express

- A) unease about unpredictable changes in public preferences.
- B) disconcertion over the preoccupation of the public with untested energy alternatives.
- C) disbelief that alternatives such as ethanol could ever rival proven energy sources such as petroleum.
- D) astonishment at the emergence of a robust conservation movement.

2

The author of Passage 1 includes the information about motorists petitioning their representatives for funding for ethanol distribution stations in order to

- A) show that "proactive" buyers will have a very difficult time agreeing upon an alternative energy policy.
- B) demonstrate how developed the conservation movement has become.
- C) emphasize the difference between practical and frivolous approaches to political change.
- D) hint at the inklings many in the conservation movement have towards political revolution.

Reading | Paired-Passages

3

The author uses the phrase “odd ducks” (line 20) most likely to

- A) convey dissatisfaction with the limited distribution of alternative fuels.
- B) disregard the efficacy of ethanol-based fuel alternatives.
- C) insinuate that ethanol is still a long way from being a standard fuel source.
- D) establish that ethanol refueling stations are an unlikely sight in most places.

4

As it is used in line 32, “swaths” most nearly means

- A) cloths.
- B) areas.
- C) groups.
- D) crowds.

5

The claim about multinational corporations backing conservationist legislation implies that

- A) such legislation would not be able to pass without the support of multinationals.
- B) such legislation is not as beneficial to conservation as it appears.
- C) such legislation inevitably benefits some consumers while disadvantaging others.
- D) such legislation is well thought out but poorly executed.

6

The author of Passage 2’s main objection to fuel economy mandates is that

- A) they are not widely supported by the public.
- B) focusing on fuel efficiency will always be an insufficient remedy to the nation’s continuous thirst for new sources of energy.
- C) mandating fuel efficiency will compel companies unequipped for fuel efficiency improvements to support sub-par innovations.
- D) mandating fuel efficiency is a self-defeating approach to encouraging innovation in energy conservation.

7

Which choice provides the best evidence for the answer to the previous question?

- A) Line 38-40 (“The major . . . innovations”)
- B) Lines 51-55 (“Seemingly . . . sedans”)
- C) Lines 55-58 (“more . . . public”)
- D) Lines 59-63 (“While such . . . designs”)

8

It can be inferred from Passage 2 that one reason manufacturers of heavy trucks and buses do not benefit from environmental legislation is that

- A) heavy trucks and buses use more fuel per vehicle than do sedans.
- B) manufacturers of sedans have a much better financed political lobby than do other manufacturers.
- C) heavy trucks and buses may use less fuel than do sedans, but the fuels on which they rely emit especially high levels of pollution into the environment.
- D) heavy truck and bus manufacturers are innovators of technologies that are likely to have a significantly negative environmental impact.

9

The primary difference between the purposes of Passage 1 and Passage 2 is that

- A) Passage 1 clarifies the argument between advocates and detractors of alternative fuels while Passage 2 advances the agenda of those in favor of gradual change.
- B) Passage 1 documents an unpredicted social movement while Passage 2 calls into question the sincerity of the advocates of that movement.
- C) Passage 1 aims to raise awareness of the inadequacy of current sources of fuel, while Passage 2 debunks the myths put forth by Passage 1.
- D) Passage 1 outlines the reasons for improving fuel efficiency while Passage 2 decries the inconsistency of consumer preferences.

Reading | Paired-Passages

10

The author of Passage 2 would most likely refer to the “motorists” (line 15) mentioned in Passage 1 as

- A) opportunistic.
- B) deceived.
- C) forward-thinking.
- D) delusional.

11

The authors of both passages would most likely agree with which of the following statements?

- A) Those advocating for revised fuel standards are unaware of whom this legislation will truly affect.
- B) Conservationism has increased significantly within the past 15 years.
- C) Although some of the advocates are young people, most of the motorists petitioning their government for fuel efficiency are over the age of 35.
- D) Hybrid engines will radically change the automotive industry.

Reading | Paired-Passages

Passage 1 is from a 2001 book that examines Martin Luther King's historic *I Have a Dream* speech. Passage 2 is from an earlier biography of Martin Luther King, written by an African American historical scholar.

Passage 1

No matter how influential at the time, most speeches by America's great orators have failed to withstand the test of time. Perhaps the greatest exception to this rule is Martin Luther King's career-defining "I Have a Dream" speech, which simultaneously transformed race politics in America and stereotyped its author as a passive activist. Delivered in 1963, this speech is often held up as the quintessential King address. To many, this speech symbolizes King's nonviolent message of racial equality and justice. Yet the complex duality of his message of nonviolent rebellion and extreme militancy is often overlooked by casual readers and scholars alike. Some scholars suggest that this speech does not serve as a true rallying cry of the Civil Rights Movement, as it lacks the power and call to action found in King's later orations. These same scholars would also note that the speech inaccurately solidified King as solely a nonviolent dreamer rather than as a protester, a nonconformist, or an activist. To fully appreciate the power of King's message, one King scholar recommended a moratorium on reading or listening to the "I Have a Dream" speech.

Any such ban on reading King's iconic address all but concedes that its narrow interpretation will continue to cloud the true intentions of this speech. But King's inspirational speech could be immune to such pigeon-holing. The opening of this speech still stirs the emotions that people felt upon first encountering those words, and people still speak of these feelings with a reverence often reserved for a child or a venerated grandparent. Not least among the benefits of reading or hearing this speech is the opportunity to reminisce about a movement that, in ten short years, ended a system of civil injustice that had been untouched since the 1870s. While it is clear that the United States still has an arduous journey to achieve racial and social equality, this speech helps the United States make great strides on that journey. Segregation is no longer lawful or practiced in the United States; there are no longer German Shepherds attacking marchers in the streets of Southern cities; no black school children requiring police escorts.

The recognition of King's ideas is invoked yearly during the celebration of his birthday. This celebration observes King's influence on the racial progress that the United States has made with an emphasis on the progress that the country still has to make.

Passage 2

Martin Luther King's ideas, wisdom, and influence are largely based on those of past visionaries and philosophers from different, and often conflicting, backgrounds. King managed to amalgamate these various ideas and form the primary foundations for his beliefs concerning American equality. Although King is recognized for promoting nonviolence to achieve social equality, he also agreed with other visionaries who advocated that social equality could ultimately be achieved only by dismantling capitalism. Martin Luther King believed that capitalism had outlived its relevance as well as contributed to the persistence of social injustices around the world. Because of this economic structure, racially persecuted groups of people would never have the ability to change injustice embedded in the system unless they received or seized the power to reshape the system.

Most of King's admirers tend to neglect his complex ideas beyond those concerning nonviolent resistance. Indeed, these admirers are inclined to ignore or even disregard attacks contrary to classic "Kingisms" by transforming King into a nonviolent deity. Unfortunately, this transformation disintegrates the nature of his ideas into simple clichés, thus reducing the character of King himself. As a result, the world essentially experiences a watered-down version of King, rather than getting a complete picture of this complex Civil Rights leader. This simplistic version of King is further propagated by the constant and inappropriate use of his most popular phrases: "I have a dream," "At the center of nonviolence stands the principle of love," and "Darkness cannot drive out darkness." It is inevitable that upon hearing the first four lines of his famous "I Have a Dream" speech, we instantly board a time machine and travel back to the Smithsonian Mall on that summer's day in 1963. We can feel the heat of ire and the glow of optimism stemming not only from King's speech but also from the thousands of audience members seeking to change America's racial status-quo.

Reading | Paired-Passages

- 95 For many Americans, this image captures the core representation of King. “I have a dream” can be applied to anyone wanting change an unjust system – no matter that person’s background or beliefs, there will always have an instance in which she or he dreams for a better world.

1

The scholars mentioned in line 14 believe the complete image of King should

- A) exaggerate the contradictions within King’s beliefs.
- B) compare King with other Civil Rights leaders.
- C) observe King’s powerful influence outside of the United States.
- D) acknowledge King’s multifaceted message.

2

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 9-11 (“To many . . . justice”)
- B) Lines 18-20 (“the speech . . . activist”)
- C) Line 26-28 (“But . . . pigeon-holing”)
- D) Lines 28-30 (“The opening . . . words”)

3

What effect do the words “some” and “suggest” (line 14) and “recommended” (line 22) have on the tone of the first paragraph?

- A) They create an optimistic tone that makes it clear that the author does not think King’s depiction is a serious discrepancy.
- B) They create a diplomatic tone that makes it clear that the author believes this is one valid argument among many.
- C) They establish a critical tone that makes it clear that the author believes those who find merit in the famous speech ought to change their beliefs in the face of better evidence.
- D) They establish a casual tone that makes it clear the author is not invested in changing the way King is viewed by the public.

4

As it is used in line 26, “cloud” most nearly means

- A) obscure.
- B) darken.
- C) fabricate.
- D) secure.

5

The statement on lines 39-43 (“Segregation . . . escorts”) is presented in order to

- A) dispute historical events.
- B) express a strong desire for a better future.
- C) contrast past events with future events.
- D) underscore a point with concrete examples.

6

Lines 69-71 (“Most . . . resistance”) are a transition within Passage 2 from

- A) a discussion of King’s influences to a dismissal of his legacy.
- B) a recognition of King’s views to an examination of people’s interpretation of them.
- C) an observation of King’s significance to an examination of his lesser-known beliefs.
- D) a defense of King’s viewpoints to a disinterest in those who ignore them.

Reading | Paired-Passages

7

Which of the following statements best summarizes the main idea of the second paragraph of Passage 2?

- A) King is most famous for supporting nonviolence, but he was dually passionate about ending capitalism and its inevitable economic discrimination.
- B) “I have a dream” and other noteworthy phrases are used inappropriately, doing a great disservice to the public perception of a complex man.
- C) Despite all criticism, the first four lines of the iconic speech are incomparably transporting.
- D) A refusal to look at King’s complexity has injured the legacy of a multifaceted Civil Rights leader.

8

Which line from Passage 1 best supports the claim in lines 69-71 of Passage 2 (“Most of . . . resistance”)?

- A) Lines 1-3 (“No matter . . . time”)
- B) Lines 11-14 (“Yet the . . . alike”)
- C) Lines 20-23 (“To fully . . . speech”)
- D) Lines 28-32 (“The opening . . . grandparent”)

9

The author of Passage 2 would most likely believe that the interpretation of King’s principles mentioned in lines 44-45 of Passage 1 (“The recognition . . . birthday”) is

- A) foolish.
- B) introspective.
- C) inadequate.
- D) unorthodox.

10

Which statement best characterizes the relationship between the two passages?

- A) Passage 2 discusses a figure that is criticized in Passage 1.
- B) Passage 2 overemphasizes a person who is neutrally characterized in Passage 1.
- C) Passage 2 expounds on another facet of the problem presented in Passage 1.
- D) Passage 2 negates the viewpoints promoted in Passage 1.

11

The authors of both passages would agree that King’s “I Have a Dream” speech

- A) has been influenced by many great thinkers.
- B) was significant on the national and international level.
- C) represented King’s entire ideology.
- D) has had a lasting effect on many Americans.

Reading | Practice

The following passage concerns an article written by an author who is nervously confronting its publication.

I unfolded the copy of *Le Figaro*. Why, here is an article on my subject! No! This is too bad, my very words, . . . I shall write to the editor, . . . but I said this, too, and here is my name at the bottom. . . . It is my
5 article! But for a moment, my thoughts, swept on by the impetus of this reaction, and perhaps already at this date grown rather the worse for wear, continue to believe it isn't, just as elderly people cannot arrest a movement
10 thought: it is my article.

Then I pick up that sheet of paper which by a mysterious process of multiplication, preserving its singleness while withholding it from nobody, is both one and ten thousand, which is given to as many newsboys
15 who ask for it, and carried damp with morning fog and printer's ink, under the red span of sky over Paris to all those people who have just woken up and are about to drink their morning coffee. What I am holding in my hand is not only my own thought, it is thousands of
20 awakened attentions taking it in. And if I am to realize what is happening, I must abandon myself, I must be for a moment some one of the ten thousand readers whose curtains have just been drawn and on whose freshly awakened mind my thought is about to dawn in
25 a manifold surprise which fills me with more hope and faith than the sunrise overhead. So I pick up *Le Figaro* as if I did not know there was an article by me in it; I purposely avert my glance from the place where my words appear, trying to discover experimentally where it
30 would be likeliest to fall, and loading the dice by folding the page with that part hindermost, as someone who is waiting spaces out the minutes so that he may not be led away into counting them too fast.

I feel my lips purse up in the grimace of my reader
35 who expects to find nothing in particular, then my glance falls on my article, in the center of the page, and I begin to read. Every phrase conveys the image meant to call up. In every sentence the thought I wanted to express is made clear from the first words; but as it reaches
40 me in the sentence it is more abundant, more detailed, enriched—since I, the author, am for the time being the reader, and at the receiving end merely, and when I wrote I was at the producing end, and to the same thought which is now re-shaping itself in my mind I then
45 added harmonious amplifications which at the sentence's beginning had not entered my head, and whose ingenuity now amazes me.

I feel it is really impossible that the ten thousand who at this moment are engaged in reading my article

50 should not be feeling as much admiration for me as I feel for myself. And the thought of their admiration plugs the little gaps in my own. If I compared my article with the article I meant to write—as later on, alas! I shall do—instead of delightfully coherent passages I should probably find
55 palsied stammerings which even to the most well-wishing reader could barely hint at what, before I took pen in hand, I supposed myself able to express. That was how I felt when I wrote it, when I revised it; in an hour's time I shall feel so again; but at this moment each sentence that I extorted from
60 myself flows, not into my own mind, but into the minds of thousands on thousands of readers who have just woken up and opened *Le Figaro*.

1

Which choice best describes the developmental pattern of this passage?

- A) A thorough analysis of how an article came into print
- B) A heartfelt response to negative criticism
- C) A description of a thought experiment
- D) A reflection on the print process

2

In line 8, “arrest” most nearly means

- A) charge.
- B) check.
- C) retain.
- D) seize.

3

The author repeatedly uses ellipses in the first paragraph most likely to convey the narrator's

- A) displeasure at seeing his work in print.
- B) thought process while reading the paper.
- C) surprise at seeing his article in such a prestigious paper.
- D) dismay at seeing how his words have been edited.

Reading | Practice

4

The authors use of the phrase on line 12 (“mysterious process of multiplication”) refers to

- A) writing.
- B) mathematics.
- C) birth.
- D) printing.

5

In lines 28, the narrator averts his glance in order to

- A) lengthen the time he spends waiting before he begins to read.
- B) show his disdain for his own words.
- C) discover where an impartial reader’s view would likely land on the page.
- D) appreciate the imagery his words evoke.

6

An assumption made by the author is that the readers of his article

- A) tend to be skeptical.
- B) are inclined to peruse his article deeply.
- C) are appreciative of his considerable writing skills.
- D) are unlikely to fully grasp his technical abilities.

7

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 20-26 (“And . . . overhead”)
- B) Lines 34-37 (“I feel . . . read”)
- C) Lines 48-51 (“I feel . . . myself”)
- D) Lines 57-62 (“That. . . *Le Figaro*”)

8

As used in line 49, “engaged” most nearly means

- A) involved.
- B) joined.
- C) betrothed.
- D) enlightened.

9

It can be inferred from the passage that the narrator is usually very

- A) wary of his audience.
- B) solicitous of outside criticism.
- C) confident in his ability.
- D) critical of his own work.

10

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 5-9 (“But . . . begun it”)
- B) Lines 18-20 (“What . . . in”)
- C) Lines 41-47 (“since . . . me”)
- D) Lines 52-57 (“If . . . express”)

Reading | Practice

The following passage is excerpted from a series of lectures on Shakespeare by A.C. Bradley.

What is the substance of a Shakespearean tragedy? What is the nature of the tragic aspect of life as represented by Shakespeare? What is Shakespeare's conception of tragedy? These expressions do not imply that Shakespeare himself ever asked or answered such questions. These imply only that Shakespeare, in writing tragedy, represented a certain part of life in a certain way. Therefore, through examination of his writings, we ought to be able to describe the tragic parts of life.

However, in doing so, we must remember two things, the first being that the tragic aspect of life is only one aspect. We cannot arrive at Shakespeare's whole dramatic way of looking at the world from studying his tragedies alone. Secondly, through studying his work, we can arrive at Shakespeare's dramatic view. We are not able to conclude whether this view corresponds directly with his opinions outside of his poetry – the opinions of the being whom we sometimes oddly call 'Shakespeare the man.'

In approaching this subject it will be best to start directly from the facts. Shakespeare's tragedies are preeminently the story of one person, the 'hero,' or at most of two, the 'hero' and 'heroine.' (It is only in the love-tragedies, *Romeo and Juliet* and *Antony and Cleopatra*, that the heroine is as much the center of the action as the hero. Therefore, for the sake of brevity, we will speak of the tragic story as being concerned primarily with one person.)

A tragedy depicts the troubled part of the hero's life, which precedes and leads up to his death. No play at the end of which the hero remains alive is, in the full Shakespearean sense, deemed a tragedy. An instantaneous death occurring by 'accident' in the midst of prosperity would not suffice. It is, rather, a tale of suffering, which, as a rule, is unexpected, and contrasted with previous happiness or glory. A tale, for example, of a man slowly worn to death by disease or poverty, however dreadful it might be, would not be tragic in the Shakespearean sense.

This exceptional suffering and calamity, which generally extends far and wide beyond the hero so as to create a whole scene of woe, are essential ingredients in a Shakespearean tragedy. They are chief sources of tragic emotions, especially that of pity. However, the proportions of pity in a tragedy naturally vary greatly. It plays, for example, a much larger part in *King Lear* than it does in *Macbeth*.

Shakespearean tragedy is concerned always with persons of 'high degree'; often with kings or princes; if not, with leaders in the state like *Coriolanus*, *Brutus*, *Antony*. And this characteristic of Shakespeare's tragedies, though not the most vital, is neither

external nor unimportant. The pangs of unrequited love and the anguish of remorse are the same in a peasant and a prince. The story of the prince or the general, however, has a greatness and dignity of its own. His fate affects the welfare of a whole nation or empire; and when he falls suddenly from the height of earthly greatness to the dust, his fall produces a sense of contrast, of the powerlessness of man, and of the omnipotence of Fortune or Fate, which no tale of private life can possibly rival.

A Shakespearean tragedy, as so far considered, may be called a story of exceptional calamity leading to the death of a man in high estate. But it is clearly much more than this. No amount of calamity could alone provide the substance of its story. The calamities of tragedy do not simply happen; they proceed mainly from the actions of men.

We see human beings placed in certain circumstances; and we see, arising from the cooperation of characters in these circumstances, certain actions. This series of interconnected deeds leads, by an apparently inevitable sequence, to a catastrophe. The effect of such a series is to make us regard the sufferings which accompany it, and the catastrophe in which it ends, not only as something which happens to the persons concerned, but equally as something which is caused by them. This at least may be said of the hero, who always contributes in some measure to the disaster in which he perishes.

11

The primary purpose of the first paragraph of the passage is to

- A) hint at Shakespeare's emotional complexity.
- B) introduce questions that stem from reading a specific type of Shakespearean work.
- C) define key terms.
- D) succinctly explain Shakespeare's conception of tragedy.

12

According to the author, readers cannot capture the entirety of Shakespeare's worldview through solely studying his tragedies because

- A) tragedy is only one part of the life experience.
- B) tragedy is overly dramatized in Shakespeare's work and as such is not a realistic portrayal of suffering.
- C) Shakespearean tragedies only focus on nobility.
- D) Shakespeare purposefully obscured his own viewpoints from his tragedies.

Reading | Practice

13

Which of the following provides the best evidence for the answer to previous question?

- A) Lines 4-6 (“These . . . questions”)
- B) Lines 10-14 (“However . . . alone”)
- C) Lines 25-27 (“Therefore . . . person”)
- D) Lines 31-33 (“An . . . suffice”)

14

From the author’s use of the phrase on line 18 (“Shakespeare . . . man”), it can be inferred that

- A) Shakespeare intentionally separated his personal life from his work as an artist.
- B) Shakespeare’s poetry speaks often of his opinions of tragedy.
- C) there is a distinction to be made between Shakespeare as an individual and the work he created.
- D) there has been confusion previously regarding Shakespeare’s gender.

15

According to the passage, in love-tragedies such as *Romeo and Juliet*, the heroine

- A) is the first to die in the story.
- B) is an equally key part of the story as the hero.
- C) is an important but secondary character.
- D) evokes the most pity.

16

Based on the description in the fourth paragraph, which of the following could NOT be the plot of a Shakespearean Tragedy?

- A) An exiled King and his jester travel the world and in the middle of the story the King dies
- B) A nobleman believes wrongly that his wife loves another man so kills her and later, himself
- C) A prince seeks revenge for the death of his father but eventually gives up and relocates to another country
- D) A pair of lovers find themselves in a bewitched woods overnight and experience a range of misfortunes and trickery before being killed

17

The primary purpose of the fifth paragraph is to

- A) describe an entire scene of “woe.”
- B) explain that pity is a fixed component of great theater.
- C) prove that *King Lear* is more of a tragedy than *Macbeth*.
- D) discuss and clarify the emotional components of a Shakespearean tragedy.

18

The author believes that “Shakespearean Tragedy” must not lack

- A) the suffering and death of a hero or heroine.
- B) an instantaneous, often accidental, death of a king.
- C) a peasant character with integrity.
- D) a great amount of pity.

19

Which of the following provides the best evidence for the answer to previous question?

- A) Lines 51-53 (“The pangs . . . prince”)
- B) Lines 60-62 (“A Shakespearean . . . estate”)
- C) Lines 63-64 (“No . . . story”)
- D) Lines 64-66 (“The calamities . . . men”)

20

As it is used in line 58, “omnipotence” most nearly means

- A) all-powerful.
- B) preventability.
- C) predictability.
- D) anguish.

21

The author of this passage would most likely agree that

- A) tragedy is solely defined by an upsetting course of events.
- B) tragedy is regularly brought on by those who suffer for it most.
- C) all unfortunate events are equal in storytelling merit.
- D) the goal of tragedy is to leave a reader with an understanding of the lack of control over his or her life.

Reading | Practice

The following passage is an excerpt from the book *The Economic Aspects of Geology* by C.K. Leith.

Physiography is a phase of geology which investigates the surface features of the earth. It has to do not only with the description and classification of surface forms, present and past (physical geography or geomorphology), but with the processes and history of their development. The subject is closely related to geography, climatology, sedimentation, and hydrology.

The central feature of physiography is the erosion cycle or topographic cycle. In this cycle, erosion, acting through the agencies of wind, water, and ice, is constantly at work on the earth's surface; the eroded materials are in large part carried off by streams, ultimately to be deposited in the ocean near the continental margins. The final result is the reduction of the land surface to an approximate plain, called a peneplain, somewhere near sea level. Geological history shows that such peneplains are often elevated again with reference to sea level, by earth forces or by subsidence of the sea, when erosion again begins its work, cutting narrow, steep gulches and valleys, leaving behind broad intervening uplands. At this point, the erosion surface is described as that of topographic youth. From this point, it forms wider and more extensive valleys, leaving only points and ridges of the original peneplains. In this stage the surface is said to represent topographic maturity. Erosion then rounds off and reduces the elevations of these points, leaving few or none of the original points on the peneplain, widening the valleys still further and tending to reduce the whole country to a nearly flat surface, resulting in the condition of topographic old age. The final stage is again the peneplain. Uplift may begin again before the surface is reduced to base level; in fact, there is a constant oscillation and contest between erosion and relative uplift of the land surface.

The action of the erosion cycle on rocks of differing resistance to erosion and of diverse structure gives rise to the great variety of surface forms. The physiographer sees these forms, not as heterogeneous units, but as parts of a definite system and as stages in an orderly series of events. He is able to see into the topographic conditions beyond the range of immediate and direct observation. He is able to determine what these forms were in the past and to predict their condition in the future. A given structure may, in different stages of topographic development, give quite diverse topographic forms. In such a case it is important to realize that the diversity is only superficial. On the other hand, a slight local divergence from the usual topographic forms in a given region may reflect a similar

local divergence in the underground structure. Thus an appreciation of the physiographic details may suggest important variations in the underground structure which would otherwise pass undiscovered.

Many mineral deposits owe their origin or enrichment to weathering and other related processes which are preliminary to erosion. These processes vary in intensity, distribution, and depth, with the stage of erosion, or in relation to the phase of the erosion cycle. They vary with the climatic conditions which operate on the erosion surface. Mineral deposits are therefore often closely related to the topographic features, present and past, in kind, shape, and distribution.

For example, many of the great copper deposits of the western United States owe their values to a secondary enrichment through the agency of waters working down from the surface. When this fact of secondary enrichment was discovered, it was naturally assumed that the process was related to the present erosion surface and to present climatic and hydrologic conditions. Certain inferences were drawn, therefore, as to depth and distribution of the enriched ores. This conception, however, proved to be too narrow, as evidence was found to show that in many cases the copper deposits had been concentrated in previous erosion cycles. The importance of this knowledge from an exploring and development standpoint is clear. It has made it possible to find and follow rich ores, far from the present erosion surface, which would otherwise have been disclosed solely by chance. Studies of this kind in the copper camps are so recent that much remains to be learned. The economic geologist advising exploration and development in copper ores who does not in the future take physiographic factors into account is likely to go wrong in essential ways, as he has done in some cases in the past.

The primary purpose of the first paragraph is to

- A) persuade the reader to subscribe to a geological ideology.
- B) explain the history of geomorphology.
- C) define an important term that is used throughout the passage.
- D) discuss the five stages of the topographic cycle.

Reading | Practice

23

A “penplain” (line 16) can best be described as

- A) land leveled by erosion over time.
- B) an area of land significantly higher than sea level.
- C) land in the first stage of the erosion cycle.
- D) a featureless plain near the sea.

24

As it is used in line 33, “oscillation” most nearly means

- A) argument.
- B) stabilization.
- C) fluctuation.
- D) oxygenation.

25

According to the passage, the physiographer’s role in studying the erosion cycle is to

- A) carefully work to keep erosion from taking place.
- B) ensure the cycle is perceived solely as heterogeneous.
- C) directly observe and record the erosion cycle.
- D) holistically understand the process, causes, and consequences of erosion.

26

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 35-37 (“The action. . . forms”)
- B) Lines 37-42 (“The physiographer. . . observation”)
- C) Lines 46-47 (“In. . . superficial”)
- D) Lines 50-53 (“Thus. . . undiscovered”)

27

The inferences referenced in the last paragraph were misguided because

- A) evidence was found later on that challenged and expanded the initial theory.
- B) these inferences did not take economic geology into account.
- C) copper deposits were enriched through present erosion and climate conditions.
- D) evidence was found that has called for an entirely new theory.

28

The author believes the science behind copper ores is important because

- A) developing these ores is a dangerous task.
- B) this knowledge has direct economic implications.
- C) this knowledge is valuable to miners.
- D) this knowledge ensures the preservation of copper ores in the future.

29

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 69-71 (“Certain . . . ores”)
- B) Lines 74-76 (“The importance . . . clear”)
- C) Lines 76-79 (“It . . . chance”)
- D) Lines 80-84 (“The economic . . . past”)

30

Of the following choices, the best alternative title for this passage would be

- A) The Cause and Effects of the Erosion Cycle
- B) The Economic Value of Copper
- C) How Penplains Affect Topography
- D) The Significance of Geological History

31

The author would most likely agree with which of the following statements?

- A) Although much has been studied in the copper camps, there are many unanswered questions.
- B) There is an erroneous perception that more research is needed on the erosion of copper ores.
- C) A geologist does not need to concern herself with physiography, as geology and physiography are separate areas of study.
- D) Because geologists in the past have made errors, future geologists should steer clear of the copper discussion.

Reading | Practice

The following passage is excerpted from the *Fireside Chats of Franklin D. Roosevelt*.

I want to talk for a few minutes with the people of the United States about banking—with the comparatively few who understand the mechanics of banking but more particularly with the overwhelming majority who use banks for the making of deposits and the drawing of checks. I want to tell you what has been done in the last few days, why it was done, and what the next steps are going to be. I recognize that the many proclamations from state capitols and from Washington, the legislation, the treasury regulations, etc., couched for the most part in banking and legal terms should be explained for the benefit of the average citizen. I know that when you understand what we in Washington have been about I shall continue to have your cooperation as fully as I have had your sympathy and help during the past week.

First of all let me state the simple fact that when you deposit money in a bank the bank does not put the money into a safe deposit vault. It invests your money in many different forms of credit—bonds, commercial paper, mortgages and many other kinds of loans. In other words, the bank puts your money to work to keep the wheels of industry and of agriculture turning around. A comparatively small part of the money you put into the bank is kept in currency—an amount which in normal times is wholly sufficient to cover the cash needs of the average citizen.

What, then, happened during the last few days of February and the first few days of March? Because of undermined confidence on the part of the public, there was a general rush by a large portion of our population to turn bank deposits into currency or gold—a rush so great that the soundest banks could not get enough currency to meet the demand. By the afternoon of March 3rd, scarcely a bank in the country was open to do business.

It was then that I issued the proclamation providing for the nation-wide bank holiday, and this was the first step in the government’s reconstruction of our financial and economic fabric. The second step was the legislation promptly and patriotically passed by the Congress confirming my proclamation and broadening my powers so that it became possible in view of the requirement of time to extend the holiday and lift the ban of that holiday gradually. This law also gave authority to develop a program of rehabilitation of our banking facilities. Congress showed a devotion to public welfare and a realization of the emergency and the necessity for speed that it is difficult to match in our history.

This bank holiday, while resulting in many cases in great inconvenience, is affording us the opportunity to supply the currency necessary to meet the situation. No sound bank is a dollar worse off than it was when it closed its doors last Monday. Neither is any bank which may turn out not to be in a position for immediate opening. The new law allows the twelve Federal Reserve Banks to issue additional currency on good assets and thus the banks which reopen will be able to meet every legitimate call. The new currency is being sent out by the Bureau of Engraving and Printing in large volume to every part of the country. It is sound currency because it is backed by actual, good assets.

As a result, we start tomorrow, Monday, with the opening of banks in the twelve Federal Reserve Bank cities—those banks which on first examination by the treasury have already been found to be all right. This will be followed on Tuesday by the resumption of all their functions by banks already found to be sound. On Wednesday and succeeding days banks in smaller places all through the country will resume business, subject, of course, to the government’s physical ability to complete its survey.

It is possible that when the banks resume a very few people who have not recovered from their fear may again begin withdrawals. Let me make it clear that the banks will take care of all needs. It needs no prophet to tell you that when the people find that they can get their money—that they can get it when they want it for all legitimate purposes—the phantom of fear will soon be laid. People will again be glad to have their money where it will be safely taken care of and where they can use it conveniently at any time. I can assure you that it is safer to keep your money in a reopened bank than under the mattress.

The success of our whole great national program depends, of course, upon the cooperation of the public—on its intelligent support and use of a reliable system.

As it is used in line 10, “couched” most nearly means

- A) articulated.
- B) beset.
- C) framed.
- D) bedridden.

Reading | Practice

33

According to the passage, the proclamation issued by Roosevelt was a step towards

- A) establishing a nation-wide bank holiday in support of helping the banks restabilize.
- B) giving the Bureau of Engraving and Printing extraneous time to print the needed funds.
- C) encouraging citizens to only invest their money with the Federal Reserve Bank.
- D) investigating widespread fraud and misuse of currency.

34

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 29-34 (“Because . . . demand”)
- B) Lines 36-39 (“It . . . fabric”)
- C) Lines 39-44 (“The second . . . gradually”)
- D) Lines 49-51 (“This . . . situation”)

35

The primary purpose of the statement in lines 49-50 (“while . . . inconvenience”) is to

- A) criticize the banks for their inefficiency.
- B) empathize with the frustrations of those individuals he is working to convince.
- C) apologize to those his new proclamation will vex.
- D) prepare the American people for a painful transition.

36

Roosevelt’s primary argument regarding the bank holiday is that it will mostly benefit

- A) America’s foreign allies and affairs.
- B) the smallest, rural banks, which gives aid to the poorest areas of the country.
- C) banks in all parts of the country, and consequently, American industry and agriculture.
- D) the Federal Reserve.

37

According to the passage, Roosevelt believes individuals should stop withdrawing their money from the banks because

- A) bank employees need time to rest.
- B) it’s their civic duty to share money during wartime.
- C) money loses value if it’s kept under a mattress.
- D) money is far safer in the banking system than anywhere else.

38

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 67-71 (“On . . . survey”)
- B) Lines 72-74 (“It . . . withdrawals”)
- C) Lines 81-83 (“I . . . mattress”)
- D) Lines 84-86 (“The . . . system”)

39

The last sentence of the passage primarily serves to

- A) persuade the listeners of the importance of their actions during this crisis.
- B) pressure the public into accepting the proclamation without question.
- C) thank the public for their unending support and participation in democracy.
- D) lambast the banks for taking advantage of the public’s intelligence.

40

The overall tone of this passage could be described as

- A) apologetic.
- B) certain.
- C) incensed.
- D) pleading.

Reading | Practice

41

It can be inferred that Roosevelt would agree with which of the following statements?

- A) All banks are infallible.
- B) The Federal Reserve can coexist healthily without public participation.
- C) The nation can only succeed if those governed are willing to protect themselves first, the nation second.
- D) The nation can only succeed with ordinary Americans trusting the establishment to do justly on their behalf.

42

Roosevelt's usage of the word "you" throughout the passage signifies that he is speaking to

- A) Congress.
- B) wealthy Americans.
- C) a small group of bankers.
- D) the American population, regardless of income or occupation.

Reading | Practice

The following passage is excerpted from a scientific book about animals from the past.

Fossils are the remains, or even the indications, of animals and plants that have, through natural agencies, been buried in the earth and preserved for long periods of time.

5 This may seem a rather meager definition, but it is a difficult matter to frame; fossils are not necessarily the remains of extinct animals or plants, neither are they, of necessity, objects that have become petrified or turned into stone. It is not essential for a specimen to have had
10 its animal matter replaced by some mineral in order that it may be classed as a fossil, for the Siberian Mammoths, found entombed in ice, are very properly spoken of as fossils, although the flesh of at least one of these animals was so fresh that it was eaten.

15 Many fossils, however, have been changed into stone by the slow removal of the animal or vegetable matter present and its replacement by some mineral, usually silica or some form of lime. Additionally, some of the best fossils may be merely impressions of plants or
20 animals and no portion of the objects themselves; some of our most important information has been gathered from these same imprints. Nearly all our knowledge of the plants that flourished in the past is based on the impressions of their leaves left on the soft mud or smooth
25 sand that later on hardened into enduring stone. Such, too, are the casts of the burrows of worms and the many footprints of the reptiles, great and small, that crept along the shore or stalked beside the waters of the ancient seas. The creatures themselves have passed away, their
30 massive bones even are lost, but the prints of their feet are as plain today as when they were first made.

Impressions of vertebrates may be almost as good as actual skeletons, as in the case of some fish, where the fine mud in which they were buried has become changed
35 to a rock, similar to porcelain in texture; the bones have either dissolved away or shattered into dust at the splitting of the rock, but the imprint of each little fin-ray and every threadlike bone is as clearly defined as it would have been in a freshly prepared skeleton.

40 So why is it that fossils are not more abundant? Why, of the vast majority of animals that have dwelt upon the earth since it became fit for the habitation of living beings, does not a trace remain?

The answer to this query is that, unless the
45 conditions were such as to preserve at least the hard parts of any creature from immediate decay, there was small probability of its becoming fossilized. The objects must be protected from the air, and, practically, the only way that this happens in nature is by having them covered

50 with water, or at least buried in wet ground. If an animal dies on dry land, where its bones lie exposed to sun and rain and frost and snow, it does not take these destructive agencies long to reduce the bones to powder; in the rare event of a climate devoid of rain, mere changes of
55 temperature, by producing expansion and contraction, will sooner or later cause a bone to crack and crumble.

Usually, too, the work of the elements is aided by that of animals and plants. Everyone has seen a dog make way with a pretty good-sized bone, and the Hyena
60 has still greater capabilities in that line; and ever since vertebrate life began there have been carnivorous animals of some kind to play the role of bone-destroyers. Now and then we come upon a fossil bone, long since turned into stone, on which are the marks of the little cutting
65 teeth of field mice, put there long, long ago, and yet looking as fresh as if made only last week. These little beasts, however, are indirect rather than direct agents in the destruction of bones by gnawing off the outer layers, and thus permitting the more ready entrance of air and
70 water.

Suppose, however, that some animal has sunk in the depths of a quiet lake, where the wash of the waves upon the shore wears the sand or rock into mud so fine that it floats out into still water and settles there as gently as
75 dew upon the grass. Little by little the bones are covered by a deposit that fills every groove and pore, preserving the mark of every ridge and furrow; and while this may take long, it is merely a matter of time and favorable circumstance to bury the bones as deeply as one might
80 wish. If, instead of a lake, our animal had gone to the bottom of some estuary into which poured a river turbid with mud, the process of entombment would have been still more rapid, while, had the creature been engulfed in quicksand, it would have been the quickest method of all.

85 At least two examples of the great dinosaur *Thespesius* have been found with the bones all in place, the thigh bones still in their sockets and the ossified tendons running along the backbone as they did in life. This would hardly have happened had not the body been
90 surrounded and supported so that every part was held in place and not crushed, and it is difficult to see any better agency for this than burial in quicksand.

Reading | Practice

43

The author views the definition of fossils as a “difficult matter to frame” (line 6) because

- A) contrary to what is popularly thought, the definition of what is considered a fossil does not include the remains of extinct animals and plants.
- B) the criteria that must be met in order for an item to be classified as a fossil is so specific that it leaves out most items.
- C) specific criteria to be considered a fossil are not required, making a simple definition a challenge.
- D) the impressions that vertebrates leave in mud are equally as valuable a source of information as any typical fossil.

44

The primary purpose of the statement in lines 30-31 “the prints . . . made”, is to state that

- A) the fossilized imprints look fairly ordinary.
- B) sometimes no physical remains must be left in order to have a valuable fossil.
- C) the feet of a certain animal long ago and the feet of the same animal in modern times look the same.
- D) the footprints are barely visible on the fossils themselves.

45

The author’s questions in lines 40-43 serve to

- A) challenge a preceding point.
- B) transition from an explanation of “what” to an explanation of “why.”
- C) transition from a discussion on imprint fossils to fossils that are created by entombment.
- D) pique the reader’s interest.

46

As it is used in line 54, “devoid” most nearly means

- A) at risk for.
- B) full.
- C) buoyant.
- D) absent.

47

The primary purpose of the sixth paragraph is to

- A) link global water shortages with an upsurge in fossils.
- B) factually answer the questions posed in the previous paragraph.
- C) disprove a previously asserted claim.
- D) describe a new theory of how fossilization takes place.

48

According to the passage, why are the field mice considered indirect agents of bone destruction?

- A) The bones of the field mice don’t decay fully upon burial.
- B) The imprint of mice teeth mars the purity of the fossilized bone.
- C) The mice gnaw much of the bone off, prompting it then to crack and crumble.
- D) The mice chew the outer layers of the bone, leaving the bone vulnerable to further damage.

Reading | Practice

49

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 50-53 (“If . . . powder”)
- B) Lines 57-58 (“Usually . . . plants”)
- C) Lines 62-66 (“Now . . . week”)
- D) Lines 66-70 (“These . . . water”)

50

Based on the information in the passage, which of the following examples would be most likely to successfully fossilize the fastest?

- A) A dead rabbit strewn in the middle of a field
- B) A dead rabbit at the bottom of a muddy river
- C) A dead rabbit buried in quicksand
- D) A dead rabbit buried in the snow

51

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 71-75 (“Suppose . . . grass”)
- B) Lines 75-80 (“Little . . . wish”)
- C) Lines 80-84 (“If . . . all”)
- D) Lines 85-88 (“At . . . life”)

52

The author mentions Thespesius most likely in order to

- A) provide an example to back up a claim made in the previous paragraph.
- B) highlight the history of archaeological research that focuses on dinosaurs.
- C) remark on the rarity of the bones still being in place upon discovery.
- D) prove that quicksand, as opposed to mud, is better for the entombment process.

53

The primary idea of the passage is that

- A) fossilization by burial is most efficient.
- B) the types and processes of fossils and fossilization vary.
- C) there would be more traces of past life if natural elements did not impede fossilization.
- D) there is some confusion over the definition of a fossil.

CHAPTER 2

PRACTICE



Reading | Practice

The following passage has been adapted from a 2002 novel about the lives of two brothers.

The two brothers had little in common but blood, and even that was shared begrudgingly. It was said that the newly-born Herman howled when Ishmael’s flickering, candle-cast shadow fell upon the infant. It was the two brothers’ first interaction, and it was to set the tone for all of those that followed.

Ishmael grew up tall and strong, a strapping lad with a well-defined chin whose only struggle was managing his various romantic conquests. Herman shared Ishmael’s jawline, but was smaller and thinner, a pale boy who squinted in the sunlight. The two were known about town as the ‘winsome chinsomes,’ a moniker applied adoringly to Ishmael by pining lasses, and derisively to the morose Herman by nearly everyone. When Ishmael finally turned eighteen, he struck out on his own, eventually settling down in some metropolis which seemed barely to contain his oversized personality. Rumors and stories drifted back to his hometown in rural Arkansas. Ishmael was the CEO of a large corporation in New York. Ishmael had become Hollywood’s newest star and was overseeing a project shrouded in secrecy. Ishmael was an artist in Paris, flitting enigmatically from studio to studio while the Louvre desperately sought his works. So said Marge at the pharmacy, in February, June, and December, respectively.

And what, then, of his brother? No rumors followed his life, for it was duly (and dully) documented. At seventeen, Herman got his first job as a car salesman at a small dealership in town. He did fairly well, and in a year or two, moved into his own apartment. After half a decade more of reliable sales, Herman met the lovely and charming Elizabeth, and in due time, asked her to marry him. Elizabeth encouraged Herman’s career, but wished that he would further pursue his little-known but formidable skill with a paintbrush.

The exact events of the marriage’s decline are somewhat hazy, but some facts are certain. It is certain that Ishmael exchanged silvery-tongued words with his sister-in-law which piqued her dissatisfaction. And it is known that Elizabeth walked out on Herman two months later.

Herman wrote many letters to Elizabeth’s father (for she had not left a forwarding address) asking

after her, frantically seeking the reason for her disappearance. Her father, a local judge, eventually penned this short but imperious response: “Your brother told my Elizabeth that she was a saint for such charity, such an extraordinary girl living with a man of little repute. Elizabeth realized that pity is not love. I’ll suffer no more letters, now that you’ve your answer.” And so, Ishmael’s campaign grew more apparent.

That was the beginning of Herman’s decline. As his hours in bars grew longer and more regular, those at the dealership grew shorter and more irregular, and soon enough Herman held in his hands a paycheck with “Last one!” scrawled angrily upon the reverse side. When he tried to move back in with his parents, they told their lesser son that they had heard how Ishmael (who called frequently, they mentioned) had tried to save Herman’s marriage. They told Herman that he needed to be more like his brother. Herman never even unpacked his bags. His brother, with his spite and charm, his cunning and cupidity, had won the day. Two days later, Herman was on a bus to Texas.

And now he flips burgers in a truck stop. Seven years over a grill have latticed his arms with burns, and most of his shirts have grease spots on them. His eyes are worse than ever, and the long hours of the dinner shift have taken their toll on his feet. Herman still paints - landscapes and portraits that are buried in a crowded closet upon completion, never to be seen again. And yet, despite his aching soles and scarred arms, he finds himself smiling. In Texas, at least, he is not the dour reflection of Ishmael. He is content at last; or at least as content as any younger brother could be.

1

As it is used in line 1, “blood” most nearly means

- A) animating spirit.
- B) familial ties.
- C) common temperament.
- D) long-standing animosity.

Reading | Practice

2

The author's intent in lines 2-4 ("It was . . . infant") is to

- A) foreshadow the troubled nature of the brothers' relationship.
- B) utilize personification to paint an image of the infant.
- C) liken Ishmael to a candle to signify how he has always radiated light and goodness.
- D) describe Herman's penchant for deep unhappiness.

3

The passage's characterization of Ishmael can best be described as

- A) nondescript.
- B) whimsical.
- C) fabulous.
- D) notorious.

4

Which of the following provides the best evidence for the answer to the previous question?

- A) Lines 7-8 ("Ishmael . . . chin")
- B) Lines 22-24 ("Ishmael . . . works")
- C) Lines 39-41 ("It is . . . dissatisfaction")
- D) Lines 63-64 ("They . . . brother")

5

What is the primary significance of the brothers' shared jawline?

- A) It displays the hatred that existed between the two brothers.
- B) It represents the only physical trait that the brothers shared.
- C) It reflects the similar careers the brothers pursued.
- D) It provides an example of their attractive facial features.

6

The statements in lines 27-32 ("And . . . apartment") provide examples of

- A) Ishmael's early years in the workplace.
- B) ambitious endeavors Herman undertook.
- C) Herman's comparatively ordinary nature.
- D) the aspects of Herman's life that impressed his neighbors.

7

As it is used in line 48, "imperious" most nearly means

- A) apologetic.
- B) curt.
- C) arrogant.
- D) cruel.

8

The "campaign" mentioned in line 53 was "apparent" to

- A) Herman.
- B) Elizabeth's father.
- C) Herman's parents.
- D) Elizabeth.

9

Based on the information in the passage, which of the following is true about younger brothers?

- A) They hardly reveal their true feelings.
- B) Their paintings express their true emotions.
- C) They are often predisposed to be dissatisfied.
- D) Those that are most notable must outstrip their siblings.

10

Which of the following statements most accurately expresses Herman's feelings concerning his paintings in the last paragraph?

- A) He is full of shame at the poor quality of his paintings.
- B) His painting skill has diminished as a result of his recently impaired eyesight.
- C) He has improved his painting technique over seven years and has a sense of satisfaction in his work.
- D) He paints for personal reasons and has no desire to exhibit his work.

Reading | Practice

This passage is excerpted from a 1992 article about the perception of philosophy and logic.

Mankind shows a remarkable propensity to accept conclusions without proof. This capability of our species, most typically called faith, exhibits itself in many aspects of our thought. We have faith in our family and friends
 5 that they will not betray us or wrong us. Governments have faith in their people, and likewise, people trust in their government, in the hopes that it will act in the interest of its citizens. Believers of cultural norms are often dogmatically faithful, stalwartly trusting that the
 10 attire, music, and food that they have grown accustomed to are “normal.” However, perhaps the most ubiquitous form of faith is what we conceive of as its diametric opposite: logic.

We rely on logic to validate nearly every decision.
 15 Even when we make emotional decisions, they may be traced back to logic based on flawed premises. When confronted with obstacles, we wield that uniquely human weapon, logic, with varying degrees of skill. Faith, we are told, is not kin but the direst opponent of logic;
 20 logic demands proof to reach conclusions, and therefore cannot depend on faith. Doubting logic makes one seem foolish, and to do so is to disparage the only universal dogma humans share. However, logic relies on faith just as much as any intangible belief does since our beloved
 25 logic depends wholly upon our nebulous senses. Take, for example, our everyday existence. Our memories tell us that we existed yesterday, as well as the day before that, up until the moment of our birth. Nonetheless, we do not remember every day we have lived through; if we
 30 are lucky, one day in twenty stays stored in our fleshy, fallible memory banks. How, then, do we know that we have existed during the other nineteen days? We do this by simply making a jump of faith. Having no knowledge of experiencing gaps in our existence, we assume that it
 35 hasn’t happened.

And what of the days we do remember? Nobody can argue that his or her memory is infallible – every person has had proven wrong a vividly recalled memory. Our
 40 pasts must therefore be products of faith. What about our presents (and presence)? Do we have any way of knowing that what our eyes show us is what is truly before us? We can never know if the “green” that you see and the “green” that I see are identical. We know that light takes time to travel, as does sound, and as do the
 45 electrical impulses that convey sensory information to our brains. When we see a bird squawking, what we see and hear are not a bird and its noise, but their afterimages and echoes, lagging behind the bird itself. When we hold an apple, we feel old tactile information: not the apple,
 50 but what the apple was at some point in the past.

Faith rules supreme not only over individual life, but also over the fates of civilizations. The only reason that each citizen of a nation continues his or her daily routine (be it work, school, or play) and adheres to his or her
 55 duties and obligations is the faith-filled assumption that tomorrow will exist and will be much unchanged from today. Who would go to work on Tuesday if Wednesday might not exist? Indeed, for many people, Wednesday doesn’t exist, but even against the inevitability of death,
 60 we continue our life assuming that the reaper will not swing his mortal sickle at us on Thursday.

If we might generalize the character of human faith, it is that we believe that what happens in the present (or in the near past, given our senses’ delayed intake of our
 65 surroundings) will continue uninterrupted into the future. We do not tether ourselves to the ground, believing that gravity will fail; we do not worry that the sponge with which we wash dishes will suddenly become a piranha as it has never done so in the past. “Logic” involves
 70 drawing conclusions from the past to predict the future. Ultimately, though, it is no more guaranteed than a soothsayer’s crystal ball.

11

The passage suggests that the relationship between logic and faith is that of

- A) two concepts linked through intrinsic similarities.
- B) two distinct tools used to solve everyday problems.
- C) similarly overvalued ways of reaching a conclusion.
- D) ultimately incompatible systems of thought.

12

As it is used in line 1, “propensity” most nearly means

- A) inability.
- B) gift.
- C) disposition.
- D) enthusiasm.

Reading | Practice

13

The author suggests that to question logic is to risk being considered

- A) insincere.
- B) progressive.
- C) emotional.
- D) heretical.

14

The main purpose of the second paragraph is primarily to

- A) emphasize the power of logic in helping us make informed decisions.
- B) exhibit the infallibility of faith.
- C) challenge a commonly held belief.
- D) point out the flaws in faith that make it inferior to logical reasoning.

15

The author views human memory as

- A) a powerful tool for making logical decisions.
- B) imperfect and lacking in detail.
- C) a source of faith.
- D) not subject to the rules of logic.

16

Which of the following provides the best evidence for the answer to the previous question?

- A) Lines 4-5 (“We . . . us”)
- B) Lines 26-31 (“Our . . . banks”)
- C) Lines 40-43 (“Do we . . . identical”)
- D) Lines 62-65 (“If . . . future”)

17

As it used in line 49, “tactile” most nearly means

- A) fragile.
- B) stirring.
- C) cranial.
- D) sensory.

18

The author would most likely describe the “daily routine” (line 53) as

- A) ultimately based on an assumption.
- B) unnecessary accoutrements of faith.
- C) the unfortunate result of following logic.
- D) evidence of the wholly positive power of faith-based thought.

19

The main function of the fourth paragraph in relation to the passage as a whole is most likely to

- A) expand the scope of the point made in the previous paragraph.
- B) transition between the two main points discussed in the passage.
- C) provide an example to support the author’s claim on memory.
- D) conclude the author’s discussion about logic.

20

The author mentions “a soothsayer’s crystal ball” (lines 71-72) most likely in order to

- A) exemplify how one can be guided by faith.
- B) symbolize the limits of logic.
- C) present an example of prophecy.
- D) illustrate the speculative nature of logic.

Reading | Practice

The following passage is excerpted from a scientific journal concerning chimpanzees.

There is a tendency in popular consciousness to differentiate humans from other animals by regarding our social rules and hierarchies as uniquely human, but in fact, the pre-human species from which we descend must also have been social. In other words, we were social before we were human. The chimpanzee, our 98.5% identical genetic relative, has a sophisticated set of social rules and habits, as do the more distantly related gorilla and orangutan, and the still more distant monkey.

As virtually all primates have complicated social rules, the common ancestor of humans and chimps, which lived more than five million years ago, must surely have had them, too. Human beings may be uniquely self-conscious, but they did not start with social blank slates. One of the most conspicuous aspects of human society is power. Of the numerous ways to quantify power, one such measure is the capacity of one in power to reward oneself with privileges not afforded to those lacking power. Consider the following scenario: an older sister petitions her parents for a raise in her allowance so that it is bigger than her younger brother's, on the grounds that she has more responsibility and greater expenses. The parents, persuaded, raise her allowance. In the simplest sense, the older sister is more powerful than the younger brother because she is able to position herself to receive privileges that the younger brother, due to his age, is not. In this instance, the sister's age places her higher in the social order than her brother, and her resultant greater power is evidenced by her ability to gain financial reward.

Chimpanzee society has no concept of wealth, but it clearly has identifiable privileges, and power as access to such privileges is demonstrated with alarming consistency in the chimpanzee social order. Indeed, chimpanzee society can often seem remarkably like human society. Males compete for dominance and dispense patronage; females build networks and smooth their sons' paths to power. Chimpanzee fights are not usually won, as are monkey fights, by brute force, but by coalitions.

So the alpha male may not be the strongest so much as the one who is best at making helpful friends. In the Mahale mountains of Tanzania, for example, there lives an alpha male chimp named Ntogi. He shares the monkey meat he catches not only with his mother and his girlfriends, but also with older, middle-ranking males. He never gives meat to younger males or to his most senior rivals. Careful to maintain the relationships most

advantageous to his status, he cultivates his most reliable but least threatening constituents, who in turn help him to stay in power.

Complicated human power schemes have been mirrored by the sophisticated tactics of a certain well-studied chimpanzee. The career of another chimpanzee male, named Yeroen, in a colony at Arnhem zoo in the Netherlands, is reminiscent of the role Richard Neville played in the Wars of the Roses. Neville, aptly termed the “Kingmaker,” attempted to wield power through the weaknesses of both Yorkist and Lancastrian competitors vying for the throne of England: he first allied himself with the Yorkists, secured their victory, but then promptly joined the efforts of his one-time ally's rival to seize power. Just as Neville the Kingmaker shifted his support between the houses of York and Lancaster so as to keep each one weak enough to be manipulated for his own purposes, so the alpha male's “right-hand man” Yeroen alternated between two contending alpha males to ensure that neither held the top job for long. As soon as one alpha felt secure enough to interfere with Yeroen's privileges – principally his right to frequently mate with females in the troop – Yeroen would switch allegiance and begin building up the other. The resemblance between Yeroen's tactics and Neville's machinations to secure power is undeniable, and perhaps a tad unsettling—are human lust for power and the lengths taken to secure it irrevocably woven into the fabric from which we are sewn?

21

“Social” as it is used in the first paragraph most nearly means

- A) friendly and talkative.
- B) popular with others.
- C) organized in a cooperative group.
- D) distinct from other animal species.

22

The mention of “our 98.5% identical genetic relative” (lines 6-7) serves to emphasize

- A) how different humans are from chimpanzees.
- B) impressive statistical accuracy.
- C) genetic reasons for behavioral resemblance.
- D) the belief that human behavior is inherently distinct from that of other animals.

Reading | Practice

23

According to the passage, which of the following would represent a shift in the balance of power between the older sister and the younger brother described in the second paragraph?

- A) The younger brother is not allowed to watch T.V., while the older sister is allowed.
- B) The older sister gets the largest piece of dessert.
- C) The younger brother is able to play with his friends while the sister has to stay home and clean her room.
- D) The older sister gets a new CD player because of good grades on her report card.

24

Within the context of the passage as a whole, the third paragraph serves as

- A) a counter example to the author's central thesis.
- B) a continuation of the previous paragraph's consideration of human power structures.
- C) a transition from a discussion focused on human social dynamics to chimpanzee social dynamics.
- D) an introduction to the social hierarchies of a group of chimpanzees.

25

The statement on lines 38-40 ("Chimpanzee . . . coalitions") provides evidence to support that

- A) like humans, chimps rise to power by developing social networks, rather than relying on sheer brawn.
- B) monkeys use means other than physical force to establish dominance.
- C) disputes should be settled calmly and rationally.
- D) male chimps are instinctively more violent than females.

26

The "career" (line 54) of Yeroen and the "role" (line 56) of Richard Neville are analogous because of

- A) their primitive, hostile environments.
- B) their shared ancestry.
- C) their sharing the spoils with those in power.
- D) their capacity to shift allegiance for personal gain.

27

The author's attitude towards the statement in lines 72-73 ("The resemblance . . . machinations") could be best characterized as

- A) outraged.
- B) uneasy.
- C) euphoric.
- D) secure.

28

Which choice best supports the claim made in the first sentence of the passage?

- A) Lines 15-16 ("One of . . . power")
- B) Lines 24-27 ("In the . . . is not")
- C) Lines 42-44 ("In the . . . Ntogi")
- D) Lines 52-54 ("Complicated . . . chimpanzee")

29

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- D) Lines 52-54 ("Complicated . . . chimpanzee")

31

Which of the following best states what the passage is about?

- A) How power dynamics within human society have changed over the course of history
- B) How human tendencies to serve and prioritize power are reflected in other species
- C) The alpha males of Tanzania
- D) The difference in power relations among chimpanzees, monkeys, and apes

Reading | Practice

This passage is adapted from Thomas Paine, *Common Sense*. Originally published in 1776.

Some writers have so confounded society with government, as to leave little or no distinction between them; whereas they are not only different, but have different origins. Society is produced by our wants, and government by our wickedness; the former promotes our happiness positively by uniting our affections, the latter negatively by restraining our vices. The one encourages intercourse, the other creates distinctions. The first a patron, the last a punisher.

Society in every state is a blessing, but government even in its best state is a necessary evil, in its worst state an intolerable one, for when we suffer, or are exposed to the same miseries by a government, which we might expect in a country without government, our calamity is heightened. Government, like dress, is the badge of lost innocence; the palaces of kings are built on the ruins of paradise. For were the impulses of conscience clear, uniform, and irresistibly obeyed, man would need no other lawgiver. But that not being the case, he finds it necessary to surrender a part of his property to furnish means for the protection of the rest. This he is induced to do by the same prudence that advises him out of two evils to choose the least. Wherefore, security being the true purpose of government, it follows that whatever form appears most likely to ensure it to us, with the least expense and greatest benefit, is preferable to all others.

In order to gain a clear idea of the design and end of government, let us suppose a small number of persons settled in a sequestered part of the earth, unconnected with the rest, they will then represent the first peopling of a country. In this state of natural liberty, society will be their first thought. The strength of one man is so unequal to his wants, and his mind so unfitted for perpetual solitude, that he is soon obliged to seek assistance from another, who in his turn requires the same. Four or five united would be able to raise a dwelling in the midst of a wilderness, but one man alone might labor without accomplishing anything. When he had felled his timber, he could not remove it, nor erect it after it was removed. Hunger in the meantime would urge him from his work.

Thus necessity, like a gravitating power, would form our newly arrived emigrants into society, the reciprocal blessings of which, would supersede, and render the obligations of law and government unnecessary while they remained perfectly just to each other. However, as nothing but heaven is impregnable to vice, it will unavoidably happen, that as they surmount the first difficulties of emigration, which bound them together in a common cause, they will begin to relax in their duty and attachment to each other, and this remissness will

point out the necessity, of establishing some form of government to supply the defect of moral virtue.

I draw my idea of the form of government from a principle in nature, which no art can overturn, that the more simple anything is, the less liable it is to be disordered, and the easier repaired when disordered. As a result, I offer a few remarks on the much boasted constitution of England. That it was noble for the dark and slavish times in which it was erected, is granted.

When the world was overrun with tyranny the least remove therefrom was a glorious rescue. But that it is imperfect and incapable of producing what it seems to promise, is easily demonstrated.

Absolute governments have this advantage with them, that they are simple. If people suffer, they know the head from which their suffering springs, the remedy, and are not bewildered by a variety of causes and cures. But the constitution of England is so exceedingly complex, that the nation may suffer for years without being able to discover in which part the fault lies, and every political physician will advise a different medicine.

There is something exceedingly ridiculous in the composition of monarchy; it first excludes a man from the means of information, yet empowers him to act in cases where the highest judgment is required. The state of a king shuts him from the world, yet the business of a king requires him to know it thoroughly; wherefore the different parts, by unnaturally opposing and destroying each other, prove the whole character to be absurd and useless.

32

The central purpose of the passage is to

- A) argue against the establishment of democracies.
- B) examine the effects of human behaviors.
- C) discuss the function of a certain social institution.
- D) call for the abolition of monarchies.

33

The main argument of the passage is that

- A) humanity can achieve the most when working without the burden of others.
- B) government is an imperfect, yet necessary condition.
- C) society is the highest form of civilization.
- D) constitutions are the best way to promote freedom in a country.

Reading | Practice

34

Paine states that the distinction between society and government is that

- A) one seeks to harm humankind while the other tries to safeguard it.
- B) one represents the good aspects of humankind while the other controls the evils.
- C) one attempts to explain specific human conventions while the other defends their practice.
- D) they both are separate parts that contribute to the formation of a civilization.

35

Paine contends that people join into social unions

- A) to protect against the potentially negative motives of others.
- B) because it is impossible for one to achieve all he wants to on his own.
- C) to enjoy the personal status that one can only have in a group.
- D) to have a single source of authority ruling over them.

36

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 1-3 (“Some writers . . . them”)
- B) Lines 17-19 (“For were . . . lawgiver”)
- C) Lines 32-35 (“The strength . . . another”)
- D) Lines 41-45 (“Thus necessity . . . each other”)

37

According to Paine, the essential duty of government is to

- A) provide for the security of its citizens.
- B) supply a source of aid when building shelter.
- C) serve as a sign of advancement of a culture.
- D) be as uncomplicated as possible.

38

The role of the third paragraph in the passage is to

- A) warn of the dangers of a society without government.
- B) provide a metaphor for tyrannical rule.
- C) compare two systems of government.
- D) offer a real-world illustration of Paine’s main point.

39

The phrase “defect of moral virtue” in line 52 most likely refers to

- A) the lack of integrity displayed by most people.
- B) the act of demanding help from another without returning the favor.
- C) the tendency of people to grow negligent over time.
- D) the inability of humanity to form lasting bonds with each other.

40

Paine’s feelings toward kings can best be described as

- A) bafflement at their incompatible positions in society.
- B) contempt for their puzzling decisions.
- C) apprehension of the tremendous power they wield.
- D) curiosity about how they attained their high rankings.

41

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 60-63 (“When the world . . . demonstrated”)
- B) Lines 64-65 (“Absolute governments . . . simple”)
- C) Lines 72-73 (“There is . . . monarchy”)
- D) Lines 75-80 (“The state . . . useless”)

Reading | Practice

The following passage is adapted from an essay entitled “Labor’s Martyrs” by Vito Marcantonio.

“These are my ideas. If you think that one can crush these ideas that are gaining ground more and more every day; if you think you can crush them by sending us to the gallows; if you would once more have people suffer the penalty of death because they have dared to tell the truth—and I defy you to show that we have told a lie—if death is the penalty for proclaiming the truth, then I will proudly and defiantly pay the costly price.” -August Spies, just before he was sentenced to death on October 9, 1886.

The man who spoke these words had no illusions. He knew the court he was facing was determined to stamp out all he stood for and believed in. He knew, also, that the movement he represented was bigger than the forces which were trying to crush it and that it would survive.

And survive it did. It became one of the most powerful factors on the American scene in the extension and preservation of democracy. Spies’s fight laid the foundation for the American labor movement of the present day.

One of the main issues around which Spies, a metal worker by trade, and his fellow activists rallied was the fight for the eight-hour day. A contemporary of Spies, Albert Parsons, was only 36 when he was executed. He had spent more than ten years actively organizing American workers. He was a printer, a member of the powerful International Typographical Union which had over 60,000 members. An able orator, he toured the United States, lecturing and recruiting supporters for the movement.

Spies carried the fight to the Central Trades Body of Chicago to which he was a delegate. His efforts bore fruit and the movement for the eight-hour day gained momentum. Union after union discussed the problem and went on record in favor of fighting for it, until finally the slogan became: General Strike for the eight-hour day.

The date set for the strike was May 1, 1886, a day that has now become the international fighting holiday of labor. In Chicago, the May Day strike was a great success. Thousands of workers filled the streets. Some paraded, others gave out handbills, others went in committees from factory to factory calling the workers out on strike. Despite all the efforts of a hostile press to whip up hatred for the workers, to alienate the middle class, to spread the fear of disorder and raise the bogey of revolution, the day passed in absolute peace.

In many industries the workers decided to stay on strike after May 1. One of these was the McCormick Reaper Plant in Chicago. On May 3, August Spies was invited by the strike committee to address the pickets at the factory gate. Just as he finished speaking, the police

charged down upon the assembled workmen with clubs and guns. Chicago papers were quick to point out that only two had lost their lives, but this was untrue.

That same evening a committee of trade unionists decided to hold a protest meeting in Haymarket Square in Chicago. Several thousands of people attended. Spies opened the meeting and stated its purpose: to discuss the question of the eight-hour day and to protest the police shootings at the McCormick plant. Parsons, who had just returned to the city from a speaking tour was hurriedly sent for and rushed over to lend a hand.

The speakers addressed the crowd for about two hours. In the audience was the mayor of Chicago, Carter Harrison, who was quickly satisfied by its peaceful nature and went to telephone Police Captain Bonfield with instructions to call off police reserves and send his men home as they would not be needed.

Just as the last speaker, Samuel Fielden, was saying, “In conclusion...”, a squad of armed police descended upon Haymarket Square, despite having been instructed not to come, and yelled at protesters to disperse. The police then fell upon the assembled men and women with clubs and guns. At that moment, someone threw a bomb into the midst of the meeting, killing one policeman outright and wounding scores of people.

42

The main purpose of the first paragraph is to

- A) question an ideology.
- B) analyze a reaction.
- C) introduce a conflict.
- D) describe a historic setting.

43

The phrase “the movement he represented” (line 13) most likely refers to

- A) the labor rights movement.
- B) the Haymarket Socialist movement.
- C) the May Day strike.
- D) the International Typographic Union.

44

Which choice provides the best evidence for the answer to the previous question?

- A) Line 10 (The man . . . illusions)
- B) Lines 17-19 (Spies’s . . . day)
- C) Lines 25-27 (He was . . . members)
- D) Lines 47-48 (One . . . Chicago)

Reading | Practice

45

As it is used in line 27, “orator” most likely means

- A) operator.
- B) speaker.
- C) writer.
- D) organizer.

46

The author uses the phrase “bore fruit” in lines 31-32 to indicate that the protester’s tireless efforts

- A) were beginning to produce tangible results.
- B) led to working class people receiving more food to eat.
- C) had very small positive effects preceding an onslaught of violence.
- D) led to workers immediately earning the right to an eight hour work day.

47

According to the passage, the “press” in line 42

- A) was somewhat unsupportive of the workers.
- B) was openly antagonistic towards the workers, deliberately spreading misinformation and fear.
- C) sided with the workers and helped spread pamphlets campaigning for the 8 hour workday.
- D) hid the news of the strikes from the middle class.

48

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 33-35 (“Union . . . day”)
- B) Lines 39-41 (“Thousands . . . strike”)
- C) Lines 42-45 (“Despite . . . peace”)
- D) Lines 50-52 (“Just . . . guns”)

49

The author includes the Mayor’s opinions of the worker’s speeches and actions in order to

- A) analyze the communication between the Mayor, the protesters, and the police.
- B) establish the context for the upcoming violence.
- C) demonstrate the strong moral character of the Mayor of Chicago.
- D) criticize the Mayor for not protecting his constituents.

50

As it is used in line 71 “disperse” most nearly means

- A) dissuade.
- B) leave.
- C) quiet.
- D) freeze.

51

The main purpose of the passage is

- A) provide the historical background of an issue.
- B) stress the current importance of an issue.
- C) highlight the danger of free speech.
- D) question the validity of journalism.

Reading | Practice

Passage 1 is adapted from *Curiosities of Civilizations* ©1860 by Andrew Wynter. Passage 2 is adapted from *The Complete Story of the San Francisco Horror* ©1908 by Hubert D. Russell.

Passage 1

Among the more salient features of the metropolis which instantly strike the attention of the stranger are the stations of the Fire Brigade. Whenever he happens to pass them, he finds the sentinel on duty, he sees the “red artillery” of the force; the polished axle, the gleaming branch, and the shining chain, testify to the beautiful condition of the instrument, ready for active service at a moment’s notice.

No sooner comes the alarm, than one sees with a shudder the rush of one of these awe-inspiring engines through the crowded streets, the heavy vehicle swerving from side to side, and the black helmeted attendants swaying to and fro. The wonder is that horses or men ever get safely to their destination: the wonder is still greater that no one is ridden over in their furious drive as they race to save the day.

The scene which a London fire presents can never be forgotten: the shouts of the crowd as it opens to let the engines dart through it, the foaming head of water springing out of the ground, the black, snake-like coils of the leather hose rising and falling like things of life whilst a hundred arms work at the pump, the applause of the people watching that rings out clear above the roaring flame as the adventurous band throw the first hissing jet.

Suddenly there is a loud shrill cry, and the bank of human faces is upturned to where a shrieking person hangs frantically to an upper windowsill. A deafening shout goes forth, as the huge fire-escape comes full swing upon the scene: a moment’s pause, and all is still, whilst every eye is strained towards the fluttering garments flapping against the wall. The blood in a thousand hearts runs cold, and then again break forth a thousand cheers to celebrate a daring rescue. Such scenes as this are of almost nightly occurrence in the great metropolis.

Passage 2

Only the outer fringe of the city was left, and the flames which swept unimpeded in a hundred directions were swiftly obliterating what remained. Nothing worthy of the name of building in the business district and not more than half of the residence district had escaped. Of its population of 400,000 nearly 300,000 were homeless.

Gutted throughout its entire magnificent financial quarters by the swift work of thirty hours and with a black ruin covering more than seven square miles out into her very heart, the city waited in a stupor. All the hospitals except the free city hospital had been destroyed, and the authorities were dragging the injured, sick and dying from place to place

for safety.

All day the fire, sweeping in a dozen directions, irresistibly completed the desolation of the city. Nob Hill district, in which were situated the home of Mrs. Stanford, the priceless Hopkins Art Institute, the Fairmount hotel, a marble palace that cost millions of dollars and homes of a hundred millionaires, was destroyed. It was not without a struggle that Mayor Schmitz and his aides let this, the fairest section of the city, suffer obliteration. Before noon when the flames were marching swiftly on Nob Hill, but were still far off, dynamite was dragged up the steep debris laden streets. For a distance of a mile every residence on the east side of Van Ness Avenue was swept away in a vain hope to stay the progress of the fire.

The stricken people who wandered through the streets in pathetic helplessness and sat upon their scattered belongings in cooling ruins reached the stage of dumb, uncaring despair. The city dissolving before their eyes had significance no longer.

After sucking dry even the sewers the fire engines were either abandoned or moved to the outlying districts. They were of no help. Water was gone, powder was gone, hope even was a fiction. The fair city by the Golden Gate was doomed to be blotted from the sight of man.

52

The author of Passage 1 includes the information in lines 3-7 (“He finds . . . notice”) primarily to

- A) illustrate the importance of the Fire Brigade in London.
- B) highlight the unique features of the Fire Brigade.
- C) reverently describe the scene at a Fire Brigade station.
- D) explain why the Fire Brigade strikes the attention of all strangers.

53

What function does the third paragraph serve in Passage 1?

- A) It examines the reasons why fires are so prevalent in London.
- B) It describes a memorable nightly scene in the metropolis.
- C) It analyzes the causes and effects of fires.
- D) It explains the importance of fighting fire effectively.

Reading | Practice

54

As used in line 14 “furious” most nearly means

- A) belligerent.
- B) boisterous.
- C) angry.
- D) hurried.

55

The author of Passage 1 indicates that fires in London

- A) happen infrequently.
- B) are more dangerous because they are in a metropolis.
- C) occur often.
- D) are always safely extinguished by the Fire Brigade.

56

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 8-10 (“No sooner . . . streets”)
- B) Lines 15-16 (“The scene . . . forgotten”)
- C) Lines 29-31 (“The blood . . . rescue”)
- D) Lines 31-32 (“Such . . . metropolis”)

57

The tone of Passage 2 can best be described as

- A) despondent.
- B) sanguine.
- C) nostalgic.
- D) deafening.

58

As used in line 40, the phrase “black ruin” most nearly means

- A) helplessness.
- B) urban sprawl.
- C) inferno.
- D) ashes.

59

Which statement best describes the relationship between the passages?

- A) Passage 2 illustrates the effects of an event described in Passage 1.
- B) Passage 2 provides an example of why an event from Passage 1 occurs.
- C) Passage 2 and Passage 1 describe a similar type of event with vastly different outcomes.
- D) Passage 2 contradicts a central claim made in Passage 1.

60

The author of Passage 2 would most likely respond to the description of fire engines in Passage 1 in lines 8-14 by claiming that such a description

- A) rightfully glorifies an integral piece of technology.
- B) wrongfully diminishes the role of people on the engine itself.
- C) correctly portrays the role of fire engines in a metropolis.
- D) overstates the value of fire engines.

61

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 39-42 (“Gutted . . . stupor”)
- B) Lines 46-47 (“All day . . . city”)
- C) Lines 56-58 (“For a . . . fire”)
- D) Lines 65-66 (“They . . . help”)

62

How do the “people” in Passage 2 (Line 59) differ from the “people” in Passage 1 (Line 20)?

- A) In Passage 1 they are expressing despair, while in Passage 2 they are celebrating.
- B) In Passage 1 they are watching an event unfold and in Passage 2 they are reacting to the effects of an event.
- C) In Passage 1 they are fire fighters and in Passage 2 they are residents of the city.
- D) In Passage 1 they are excited by the fire and in Passage 2 they are afraid of it.

Reading | Practice

The following passage is an excerpt from a book, published in 1997, about the preservation of the English language.

While the English language may have to its credit the elegance of Shakespearean drama and the noble verse of Tennyson, even the most well-turned phrase would not be able to halt the storm cloud which now overshadows it. Once, English flourished in its most refined form; from simple letters to eloquent exchanges of the gentry, English speakers paid dutiful heed to the conventions of the language. Now, however, ignorance of English's rules has relegated proper grammar to only the strictest of academic and literary settings. The cause of this neglect seems obvious. English is the world's most ubiquitous language, but with this popularity comes the host of linguistic misunderstandings introduced by those to whom English is not a native language. Furthermore, the increasing popularity of “quick and dirty” communication, whether through instant messages, text messages, or social networking websites, has made commonplace the brusque sacrifice of correct spelling and grammar on the bloody altar of efficiency. That the younger generations, in whose hands the fate of our language rests, are the primary users of this electronic shorthand, so-called “netspeak,” seems to virtually guarantee the decay of our language.

Professors and editors are among those who complain about the abuse of English, blaming grammatical errors on poor education, as well as the aforementioned “netspeak.” However, some linguists have commented on the lack of flexibility in formal, academic English, attributing its decline to its rigid and uncompromising nature. They claim that most people, not knowing the complex and seemingly arbitrary rules, find it easier to write what seems natural. These linguists claim that the inevitable, and indeed desirable, future for the language involves the organic incorporation of new conventions and idioms, although they may currently seem casual and slang-like. For example, when Latin was in its heyday, Roman noblemen criticized the bastardization of their native tongue. However, these barbaric-sounding dialects evolved into the Romance languages: French, Spanish, and Italian. While “proper” Latin stagnated and withered away, linguists claim that English is a thriving language because of the constant flood of new linguistic material.

The implications of this debate reach beyond the English language, as its outcome will likely be a decisive blow struck in a war between those who wish to preserve culture and those who see its evolution as something to be encouraged. Governments have taken stances on this issue by disallowing signs which have their messages translated into multiple languages. Governments are

infamous for banning content they deem unsuitable. While those who encourage preservation do so fearing the dilution and destruction of their native cultures, proponents of change are wary of preservationists who would freeze culture in time. Should this happen, the culture would gradually lose relevance, like a language which refuses to admit a word for “email.”

Linguists who oppose preservation point out that many users of social networking sites avoid in other settings the slang they use online. These linguists insist that “netspeak” is not an accurate measure of the health of English. They cite evidence, such as the increasing levels of literacy worldwide, or that students today can still understand the English of Chaucer and Shakespeare, writers whose English hails from centuries ago. Their argument disregards examples pulled from the internet and literature in favor of more comprehensive statistics. Furthermore, it calls into question the terms of the argument, such as what “proper language” is. The process by which languages evolve and change is a strange one, with factors pulling the language in various directions. Perhaps the debate should not be centered on whether the language should change. Instead, these researchers say, we should focus on what causes it to change.

The English language's fate will rely less on the rules which have governed it in the past than on the influences which will mold its future. Perhaps today's youth could be made to understand that the future of the language rests in their hands. This sense of responsibility may be enough to drive these unwitting molders and shapers towards a more careful use of English. While education and outside factors have large roles in shaping a language, one must not disregard the roles of pride and respect. These are what cause us to mind our words more carefully around our elders, and to painstakingly choose our words when writing letters to our sweethearts. If we could treat everyday words with equal respect, regardless of who is receiving them, perhaps our language will enter a new age of measured change.

Which hypothetical approach is most similar to the author's proposal for the language?

- A) Instilling in people a sense of duty to preserve the environment and stop littering
- B) Teaching citizens of impoverished countries more efficient farming practices
- C) Placing limits on gas usage to preserve fossil fuels
- D) Funding bilingual signs in communities which have more than one commonly spoken language

Reading | Practice

64

Which choice provides the best evidence for the answer to the previous question?

- A) Lines 48-50 (“Governments . . . languages”)
- B) Lines 78-81 (“Perhaps . . . change”)
- C) Lines 85-89 (“Perhaps . . . English”)
- D) Lines 92-95 (“These . . . sweethearts”)

65

In the first paragraph, the English language is portrayed most directly as

- A) having a bleak future despite its rich past.
- B) a static institution which has been wrongly portrayed as changing.
- C) both honored and neglected by those who speak it.
- D) heir to magnificence and history that cannot counterbalance its flaws.

66

As it is used in line 18, “brusque” most nearly means

- A) civil.
- B) lively.
- C) final.
- D) abrupt.

67

The author mentions “some linguists” (line 27) to suggest that formal English is

- A) popular with the general public because it incorporates new conventions and idioms.
- B) inadequate according to those who desire to keep the language in its purest state.
- C) threatened by those who casually employ slang and “netspeak.”
- D) intimidating in its complexity, which leads to its decreased usage.

68

The aspect of the “debate” (line 44) that the author is most concerned with is

- A) the optimistic belief that linguists can save the English language.
- B) the validity of a language’s adherence to convention as a measure of its health.
- C) the greater linguistic flexibility of other languages as compared to that of English.
- D) the potential to do more harm than good by altering a language’s conventions.

69

The “evidence” (line 62) serves primarily to

- A) support a theory popularized by editors and professors.
- B) substantiate the examples provided by ‘netspeak.’
- C) support the theories of linguists who disagree with preservation.
- D) discourage the ambitions and goals of preservationists.

70

In lines 69-70 the author’s discussion of “the process by which languages evolve and change” suggests that

- A) an academic setting is an ineffective place to study linguistic changes.
- B) a focus on unimportant details have diverted linguists from their original goal.
- C) more needs to be learned about the factors that contribute to linguistic changes.
- D) linguistic research is essential to maintaining linguistic purity.

71

In lines 72-74, the researchers’ observation about the focus of the debate about language is best described as

- A) a misdirected narrative.
- B) a conventional assessment.
- C) a curt evaluation.
- D) an unambiguous refusal.

72

As it is used in line 89, “measured” most nearly means

- A) known.
- B) rated.
- C) quantified.
- D) deliberate.

Reading | Practice

The passage is derived from an article published in a bioethics journal in 2000.

As a scientist, I find the conventional reaction to genetic engineering really riles me up—the belief that it is in some way “unnatural,” a slap in the face of nature.

This is the argument: genetic engineering modifies the natural characteristics of an organism. It is proof of man seeking to rule over nature rather than accepting it. Thus, we should ignore this emerging technology and its potential benefits and regress to an earlier, more natural state of existence, one that would exclude enhanced organisms that benefit humanity.

There is an important assumption behind this idea that needs to be brought out and examined in order to be able to properly evaluate its downfalls. This assumption is that the genetic makeup of an organism, if left to itself, will remain balanced (an “equilibrium of genetics”) and the ethical role for us is to allow evolution to progress naturally. If one were to hold this belief, one would more than likely feel that scientific advancement since the successful production of insulin using genetically modified bacteria represents a disastrous event—a wrong turn, akin to the use of eugenics by the Nazi party. Genetic engineering, more specifically the modification of an organism’s genetic makeup (“DNA recombination”), is an instrument that destroys the balance of nature, and hence is a destructive presence on the planet.

What rankles me most about this belief is that it implies that genetic modification, on the theoretical level, is not a natural process. A “natural process,” to many non-scientists, is something that has not been manipulated by scientists. As soon as we start changing genes and proteins, the “natural process” ceases to exist and something abnormal is created.

I think that this discussion of genetic engineering needs to begin with understanding that it isn’t unnatural, any more than bacteria or viruses are unnatural. Bacteria and viruses are both organisms that thrive on maintaining their natural processes. As part of these natural processes, they alter and manipulate their genetic makeup. There is nothing “unnatural” about this.

Nor is there anything unnatural about using this technology for our own benefit. Yes, many types of food have been genetically modified to yield larger crops and provide insect and viral resistances: today most crops have been genetically modified in some manner. But this isn’t really unnatural. There are plenty of organisms that can modify their own genetic makeup—think of a bacterium that becomes resistant to an antibiotic. From this point of view, genetic engineering is simply the exchange of useless traits for valuable traits.

Look at the consequences of manipulating an organism’s traits. There is, obviously, the ability to

produce more bountiful crops. Moreover, this process can create crops that are more nutritious than unmodified ones for the same resources. Indeed, “golden rice,” a genetically modified strain of rice, contains many times the vitamin A that regular rice does—a crop that can cure millions of people with vitamin A deficiency.

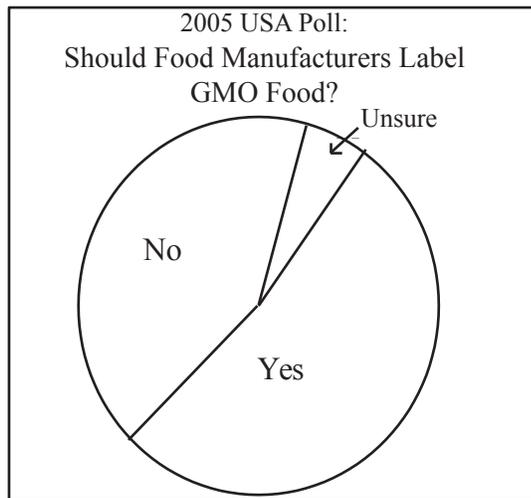
Gazing deeper into genetic engineering, in fact, shows that this process can be thought of as a natural process on at least three levels. At the most fundamental level, although typically ignored, all organisms can manipulate their own genetic material. Genetic manipulation functions with similar patterns in all types of organisms, with their own specific “helper” proteins. This approach to genetic manipulation has received highest academic praise—the creation of a subfield of biology, called “external genetic recombination,” devoted to understanding it.

At a somewhat more introspective level, internal genetic manipulation can serve as a model to aid in understanding how genetic engineering works. Both processes involve changes in an organism’s DNA, and both enhance certain traits, allowing an organism increased chances of survival. Both require biological methods to maintain the genetic manipulation, methods that are apparent and observable at all developmental stages: birth, maturity, and death.

Finally, genetic engineering is like any natural biological process; at the lowest level, it operates within the well-defined laws of biology. There is, for example, a limit to how many genes can be manipulated within an organism’s lifespan, set by different factors including the type and degree of the genetic manipulation. There is also a limit to how many genetic manipulations can be introduced into an organism—a limit that is influenced by those same factors.

So let me explicitly state: Genetic engineering is a natural process and we can observe and use it in the same way we observe and use any other natural logical process.

Reading | Practice



73

As it is used in line 2, “riles” most nearly means

- A) alarms.
- B) irritates.
- C) perplexes.
- D) muddies.

74

The author would most likely describe the more “natural state” (lines 8-9) as

- A) a complicated conclusion.
- B) a satisfactory solution.
- C) an understandable argument.
- D) a false supposition.

75

Which choice best provides the answer to the previous questions?

- A) Lines 4-6 (“This . . . it”)
- B) Lines 26-28 (“What . . . process”)
- C) Lines 33-34 (“I think . . . unnatural”)
- D) Lines 74-77 (“Both . . . death”)

76

According to the author, those who “hold this belief” (line 17) view the modification of bacteria as

- A) the beginning of an unfortunate trend in science.
- B) an example of science’s double-edged potential.
- C) a time when science was natural.
- D) an example of an important scientific achievement.

77

The author would most likely characterize the views of the “non-scientists” (line 29) as

- A) fallacious.
- B) unintelligible.
- C) legitimate.
- D) logical.

78

The author compares genetic engineering to the processes of bacteria and viruses in order to

- A) explain how DNA recombination works.
- B) point out the differences in genetic engineering.
- C) imply that gene manipulation occurs even without human intervention.
- D) suggest the potential obstacles to this process.

79

The author’s attitude toward the “subfield” (line 66) is best characterized as one of

- A) opposition.
- B) approval.
- C) uncertainty.
- D) surprise.

Reading | Practice

80

Which choice best provides the answer to the previous question?

- A) Lines 58-60 (“Gazing . . . levels”)
- B) Lines 62-64 (“Genetic . . . proteins”)
- C) Lines 65-66 (“This approach . . . praise”)
- D) Lines 87-89 (“Genetic . . . process”)

81

In the second to last paragraph, the author mentions limits to suggest that

- A) genetic engineering is fixed by certain natural principles.
- B) genetic engineering can change an organism’s genetic makeup.
- C) changes in an organism’s genetic makeup must be self-regulating.
- D) genetic engineering is often done unnecessarily and unethically.

82

As it is used in line 87, “explicitly” most nearly means

- A) subtly.
- B) unequivocally.
- C) graphically.
- D) lastly.

83

Does the accompanying pie graph enhance the author’s point?

- A) Yes, because the data insinuates mass distrust of GMO food products, therefore supporting the author’s claim that people fear genetic modification.
- B) Yes, because the data insinuates a split of opinion on the safety of GMO foods, indicating the author’s position is widely supported.
- C) No, because the data only provides information regarding opinions on food labeling, not on all genetic manufacturing.
- D) No, because the data only represents Americans polled, leaving out other countries and cultures.

84

Based on the data in the pie graph, approximately what percent of those polled do not believe genetically modified food products should be labeled?

- A) 12%
- B) 27%
- C) 41%
- D) 53%

Reading | Practice

Passage 1 is from Ulysses S. Grant’s personal memoirs. Passage 2 is from letters written by the famous poet Walt Whitman to his mother during the Civil War.

Passage 1

From an early period in the war I had been impressed with the idea that active and continuous operations of all the troops that could be brought into the field, regardless of season and weather, were
5 necessary to a speedy end of the war. The resources of the enemy and his numerical strength were far inferior to ours; but as an offset to this, we had a vast territory, and long lines of river and railroad communications to protect. Behind our own lines there were many bands
10 of guerrillas and a large population disloyal to the government, making it necessary to guard every foot of road or river used in supplying our armies.

In the South, a reign of military despotism prevailed, which made every man and boy capable
15 of bearing arms as a soldier; and those who could not bear arms in the field collected deserters and returned them. This enabled the enemy to bring almost his entire strength into the field.

From the first, I was firm in the conviction that no
20 peace could be had that would be stable and conducive to the happiness of the people, both North and South, until the military power of the rebellion was entirely broken. I therefore determined to use the greatest number of troops against the armed force of
25 the enemy, thereby preventing him from using the same force at different seasons against first one and then another of our armies. My goal was to hammer continuously against the armed force of the enemy and his resources, until there should be nothing left.

30 These views have been kept constantly in mind, and orders given and campaigns made to carry them out. Whether they might have been better in conception and execution is for the people, who mourn the loss of friends fallen, and who have to pay the
35 financial cost, to say. All I can say is, that what I have done has been done conscientiously, to the best of my ability, and in what I conceived to be for the best interests of the whole country.

Passage 2

I could not keep the tears out of my eyes. Many
40 of the poor young men had to be moved on stretchers, with blankets over them, which soon soaked as wet as water in the rain. Most were sick cases, but some badly wounded. I came up to the nearest hospital and helped. Mother, it was a dreadful night—pretty dark, the wind

45 gusty, and the rain fell in torrents. One poor boy—this is a sample of one case out of the 600—he seemed to be quite young, he was quite small (I looked at his body afterwards), he groaned some as the stretcher bearers were carrying him along, and
50 again as they carried him through the hospital gate. They set down the stretcher and examined him, and the poor boy was dead. They took him into the ward, and the doctor came immediately, but it was all of no use. The worst of it is, too, that he is entirely
55 unknown—there was nothing on his clothes, or any one with him to identify him, and he is altogether unknown. Mother, it is enough to rack one’s heart—such things. Very likely his folks will never know in the world what has become of him. Poor, poor child,
60 for he appeared as though he could be but 18.

Things get worse and worse, as to the amount and sufferings of the sick, and as I have said before, those who have to do with them are getting more and more callous and indifferent. Mother, when I see the
65 common soldiers, what they go through, I get almost frightened at the world. I find my hands full all the time, with new and old cases—poor suffering young men, I think of them, and do try, mother, to do what I can for them.

70 Dearest mother, hope you and all are well—you must keep a good heart. Still, the fighting is very mixed, but it seems steadily turning into real successes for Grant. The news today here is very good—you will see it in New York papers. I steadily
75 believe Grant is going to succeed, and that we shall have Richmond—but what a price to pay for it.

85

Grant states that his armies had to “guard every foot of road or river” (lines 11-12) because

- A) both the land and water were under attack.
- B) the guerrilla fighters fought primarily by boats and rafts.
- C) Grant and his troops are protecting the U.S. government’s land.
- D) the land and rivers provide necessary resources for the soldiers.

86

In line 13, “despotism” most nearly means

- A) obligation.
- B) tyranny.
- C) competence.
- D) absence.

Reading | Practice

87

Which of the following statements most accurately expresses Grant's opinions about his decisions in the war?

- A) Far too many soldiers died for an unjust war.
- B) He is completely confident in all of his military decisions, believing them inscrutable.
- C) He carried out actions he believed would be best for the future of the entire country.
- D) This war was greatly expensive, and he feels lucky not to, personally, owe debt.

88

Which choice best provides the answer to the previous question?

- A) Lines 27-29 ("My . . . left")
- B) Lines 30-32 ("These . . . out")
- C) Lines 32-35 ("better . . . say")
- D) Lines 37-38 ("what . . . country")

89

In lines 63-64, the author suggests that "those who have to do with them are getting more and more callous and indifferent" in order to

- A) express frustration that soldiers don't care about one another.
- B) implicate the actions of generals and other high ranking officials in the suffering of the soldiers.
- C) reflect on the fact that he, too, used to be indifferent to the pain of injured.
- D) blame the opposing rebel forces for all that have died.

90

The "price to pay" in line 76 most likely refers to

- A) the large number of lives lost in wartime.
- B) the financial cost of weapons and food.
- C) the emotional toll working at a hospital has taken on the author.
- D) the many months the author must spend away from his mother.

91

The primary purpose of Passage 2 is to convey

- A) the intimate bond between Walt Whitman and his mother.
- B) the tragedy of the young poor boy's death.
- C) the exhausting nature of hospital work during a war.
- D) the horrific amount of death and pain endured by soldiers in war.

92

Which of the following statements best accurately portray the prime distinction between the two perspectives on the Civil War?

- A) The first passage regards soldiers and their deaths as trivial, whereas the second passage bemoans the amount of death inherent in wartime.
- B) The first passage is written from the perspective of one who was responsible for making many of the decisions that are affecting the author of the second passage.
- C) The first passage is written in a letter to a family member, while the second passage is written in a personal diary.
- D) The first passage is written by a General who is proud of the war, while the second passage is written by a poet who despised the Civil War.

93

Based on the depictions of the Civil War battles in both passages, the reader can infer that

- A) Grant was often in the news.
- B) Grant was a reckless leader.
- C) Grant was a successful general in the war.
- D) Grant used Southern deserters in his armies.

94

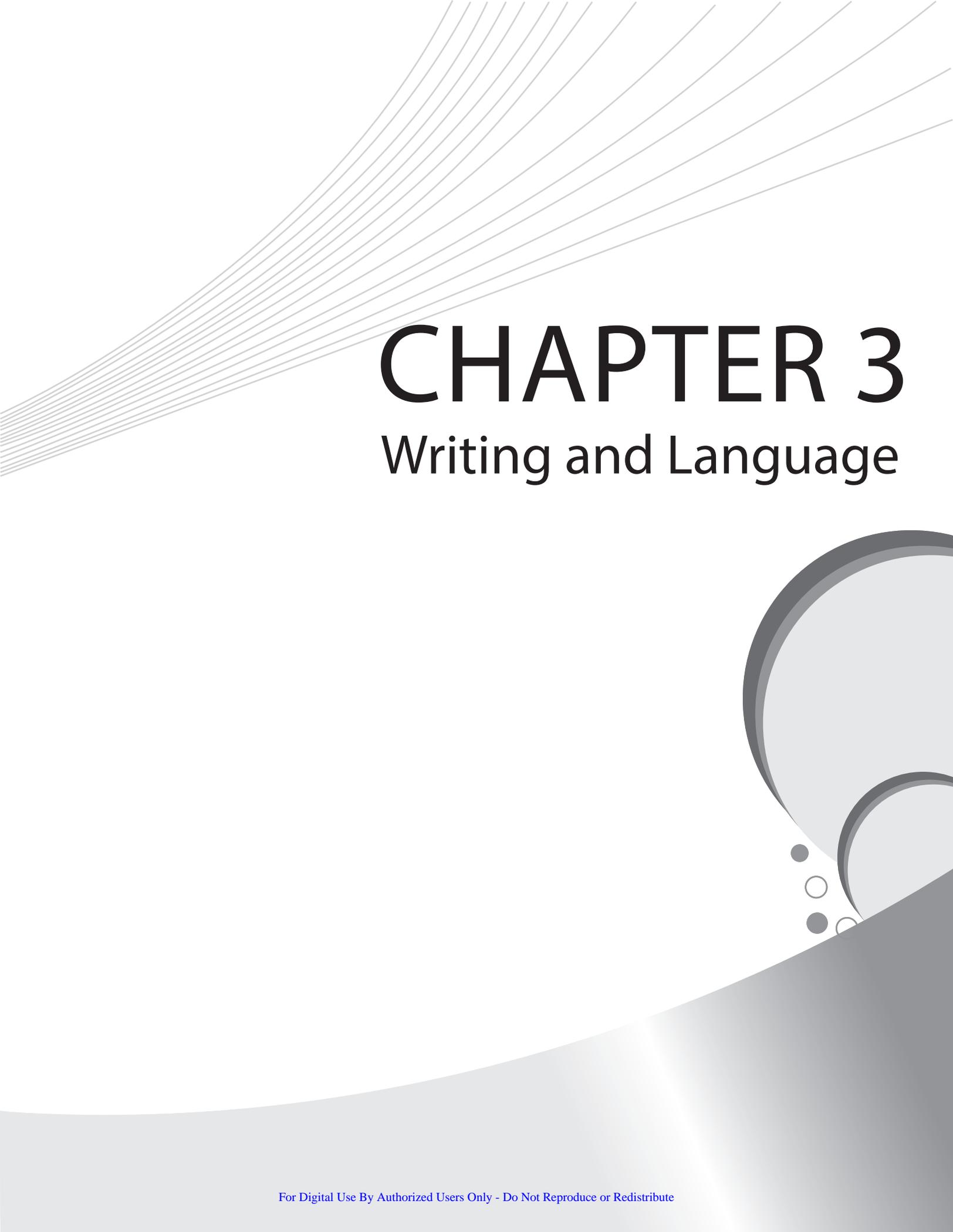
Which of the following statements from Passage 1 would resonate most strongly with the author of Passage 2?

- A) Lines 13-15 ("In the . . . soldier")
- B) Lines 17-18 ("This enabled . . . field")
- C) Lines 27-29 ("My goal . . . left")
- D) Lines 32-34 ("Whether . . . fallen")

95

Which choice best provides the answer to the previous question?

- A) Lines 39-42 ("Many . . . rain")
- B) Lines 58-59 ("Very . . . of him")
- C) Lines 63-64 ("those . . . indifferent")
- D) Lines 72-75 ("Still . . . good")



CHAPTER 3

Writing and Language

College Knowledge

Turning the Tables

Sample Students

	SAT Evidence-Based Reading and Writing	SAT Math	GPA	Misc.	AP & Honors Classes	Verdict
Max	600	510	3.4	Debate Team	Honors English	
Selena	470	490	3.3	n/a	Honors History	
Noreen	550	540	3.8	Yearbook Editor, Class Secretary, Track	AP English, Honors Math	
Emilia	550	420	2.8	n/a	n/a	
Kurt	530	590	3.3	n/a	Honors Physics, Honors Math	
Karina	600	590	3.0	Works Two Jobs, Hospital Intern	Honors Math	
Cody	720	700	2.7	Didn't Visit Any Colleges	n/a	
Lakisha	630	700	3.4	Father Is Cooper Union Alumnus	AP Calculus, AP Biology, AP English	
Benita	330	340	3.6	Expert Violinist, Tortolian	n/a	
Laura	480	470	2.9	Yearbook Staff, Political Volunteer, Drama Club	Honors History	

The Verdict

Which of the students above would you admit to your school? Which would you defer, waitlist, or reject? Why?

Writing and Language | Format

What is the Writing and Language Section?

The Writing and Language section asks you to revise and edit portions of passages using the conventions of standard written English. You will be tested on grammar rules and the style and organization of the passage. You will not be tested on spelling or vocabulary specifically, though having a strong vocabulary may aid you in answering some questions.

What is the Format?

The Writing and Language section consists of 4 passages, each accompanied by 11 questions, for a total of 44 questions. You'll be given 35 minutes to complete the section.

Question: 1 11 22 33 44

Passage 1	Passage 2	Passage 3	Passage 4
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The section will be made up of questions from two general categories:

Grammar

<p>After days of no 41 <u>improvement I</u> <u>removed</u>, Joe from the group to speak to him.</p>	<p>41. A) NO CHANGE B) improvement, I removed, C) improvement, I removed D) improvement I removed</p>
---	---

Grammar questions refer to a specific underlined segment of the passage and may ask you to

- Revise ineffective sentences
- Determine the appropriate word or phrase in context
- Fix errors in punctuation, word usage, and grammar

Style/Organization

<p>15 <u>Slowly, I too gained the confidence needed to solve the problem.</u></p>	<p>15. Which of the following true sentences, if inserted here, would best conclude the essay and maintain the tone established in this essay?</p> <p>A) Chelsea and I each learned a lot, but only the future will tell what happens next.</p> <p>B) I hope I don't meet anyone else who hates math as much as Chelsea did.</p> <p>C) Thank you Chelsea, for teaching me such an important lesson!</p> <p>D) I learned that tutoring is really hard work.</p>
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Style/Organization questions usually refer to a larger portion of the passage or to the passage as a whole and ask you to

- Logically advance the passage
- Organize ideas in a coherent manner
- Maintain the proper tone and intent of the passage

Writing and Language | Scoring

The Writing and Language Test makes up one quarter of your overall SAT total score, as it accounts for half of the Evidence-Based Reading and Writing score.

The number of questions you get correct on this section will be converted into a test score, as shown in the chart below. Remember, the exact conversion chart changes for each exam, but these scores are a reasonable approximation. The highest possible test score is a 40.

Raw Score	Test Score	Raw Score	Test Score	Raw Score	Test Score
0	10	15	19	30	29
1	10	16	20	31	30
2	10	17	21	32	30
3	10	18	21	33	31
4	11	19	22	34	32
5	12	20	23	35	32
6	13	21	23	36	33
7	13	22	24	37	34
8	14	23	25	38	34
9	15	24	25	39	35
10	16	25	26	40	36
11	16	26	26	41	37
12	17	27	27	42	38
13	18	28	28	43	39
14	19	29	28	44	40

This test score is then added to your Reading Test score and the sum is multiplied by 10 to yield your scaled Evidence-Based Reading and Writing score, the highest score on which is an 800.

Writing and Language | Overview

Pacing

The Writing and Language section consists of 4 passages and 44 questions that must be completed in 35 minutes. This works out to be **a little under 9 minutes per passage** or approximately 45 seconds per question. As you work your way through the section, be aware of how much time you have left for the remaining passages. If you are running out of time, attempt questions that can be done with the least amount of reading possible. Remember, you only score points from questions answered, not from reading the passage.

Literary Style

The passages will cover a diverse set of topics and will approach these topics with different formal styles. Make sure that as you are reading the passages, you are not only paying attention to what the author is saying but also to *how* the author is saying it. A passage about a new scientific breakthrough will likely have a much more serious tone than a passage about the author's grandparents, which is likely to be more personal. Keep in mind the style in which the passage is written, as this can help you answer some question types.

Context and Connotations

Context clues are key to answering many questions in the Writing and Language section. Questions that can seemingly be answered by reading just the underlined portion may actually require you to read sentences before and/or after, as well, in order to answer correctly. Ensure that you have read “around” that underlined portion to fully understand the context. It is also important to pick up on the connotations of words used by the author. Understanding the connotation of a word can be the difference between getting an answer right or wrong.

Writing and Language | Definitions

To effectively discuss the Writing and Language section, we must first understand how words function in a sentence. Here is a quick review of parts of speech and grammar terms.

Part of Speech	Definition	Examples	Common Suffixes
Noun		<i>Nation, sadness, personality, justice, woman, Columbia, etc.</i>	-ness, -ity, and -tion
Pronoun		<i>I, we, you, thou, he, she, it, they, this, these, that, those, who, which, each, all, everyone, either, one, both, any, such, somebody, who, my, your, his, her, our, their, etc.</i>	
Verb		<i>to go, to be (was, were, are), to exist, to teach, to run, to decompose, to seem, etc.</i>	
Adjective		<i>Gracious, fastest, smarter, shy, blue, rotten, four, horse's, another, etc.</i>	-able, -ous, -er, and -est
Adverb		<i>so, very, truly, well, quite, more, deeply, rapidly, etc.</i>	-ly
Preposition		<i>at, by, in, on, of, to, for, into, with, from, in regard to, about, behind, toward, above, etc.</i>	
Conjunction		<i>and, but, as, or, because, etc.</i>	

Agreement: Grammatical correspondence in gender (i.e., male pronoun agreeing with male noun) or number (i.e., singular pronoun referring to singular noun).

Parallelism: The use of grammatically equivalent (structurally similar) constructions in corresponding clauses or phrases.

Example: SAT teachers generally like running and swimming. (The things that the teachers like are both activities that are expressed as -ing words.)

Phrase: A group of words that does not contain a finite verb and its subject.

Clause: A group of words that contains a subject and a verb. Clauses form sentences and parts of sentences.

Complete Sentence: A complete sentence **must** include both a subject and a verb.

Complete Sentence Example: He sat.

Incomplete Sentence Example: The boy with the short brown hair. (This sentence lacks a verb.)

Writing and Language | Grammar

The Writing and Language section will require you to be familiar with the following grammar rules and how they are properly used.

- **Punctuation**
(Rules for: Commas, Periods, Semicolons, Colons, Apostrophes, Dashes)
- **Verbs**
(Agreement, Tense, and Form)
- **Pronouns**
(Number, Case, and Form)
- **Modifiers**
(Misplaced, Comparative/Superlative)
- **Lists & Comparisons**
(Parallelism)
- **Conjunctions**
(Logical Connectors)
- **Run-ons and Fragments**
(Subordinate/Dependent and Independent Clauses)
- **Redundancy**
- **Idioms**
(Corresponding Verbs, Diction)

Writing and Language | Grammar Action Plan

The majority of questions in the Writing and Language section focus on grammar rules and errors. How you approach these questions will greatly impact your overall Writing and Language score. The following Action Plan will keep you on the lookout for any violations of standard English conventions. Style and organization questions have their own individual Action Plans which we will look at later.

1. Read the passage.

Begin skimming the passage until you reach the first designated question. When you reach the specific line that includes the question, read it carefully.

2. Identify the error being tested.

Look at the answer choices and use the differences between them to identify what the question is testing. Are words changing? Are punctuation marks changing?

3. Start with the easiest answer choice.

Select the easiest answer choice to test first. (This will depend on the individual question type, and we will get into what makes an answer choice “easiest” for a specific question type as we go through this chapter.) Once you have identified the easiest choice, check to see whether it meets the requirements for the specific grammar rule you are testing. For example, if you are testing to see whether a period can be used, ask yourself whether inserting a period actually divides two complete sentences. If it does not follow the tested grammar rules, eliminate the choice.

4. Repeat the process with the next easiest choice.

If the easiest choice did not work, try the next easiest, and so on. If you are unsure whether something is correct or not, compare it to the remaining choices, two at a time, and focus on the differences. These will help you spot additional errors. Eliminate any choice that introduces a new error.

5. Reread and choose.

Take the remaining answer choice and plug it back into the sentence. Reread the entire sentence to ensure that there are not any errors you have overlooked.

6. Repeat.

Work your way through the rest of the passage following the Action Plan.

Writing and Language | Sentence Structure

Being able to recognize what constitutes a complete sentence is a vital skill on the Writing & Language section. A complete sentence **must contain a subject and a verb**. If it does not contain both of these elements, it is a sentence fragment. If a sentence consists of two independent clauses (each with a subject and verb) joined by only a comma or nothing at all, it is a run-on. A good way to test if a sentence is a run-on is to put a period between the clauses and see if they could stand as complete sentences on their own. If a clause cannot stand on its own, it is known as a dependent clause.

Questions that test your understanding of sentence structure will often show up within various categories, including verb use and punctuation. However, before we get into those topics in a little more depth, it's important to make sure that you are able to identify the differences between complete and incomplete sentences. To do so effectively, ask yourself "What is the main verb and who or what is doing that action, or in other words, who or what is the subject?"

Identify the subject and verb in each of the sentences below.

1. When she was thirteen, Joan of Arc began seeing visions of Saint Michael, Saint Catherine, and Saint Margaret.

Subject: _____

Verb: _____

2. Animals that consume a meat-based diet typically have sharper teeth and shorter digestive tracts than animals that consume mostly plants.

Subject: _____

Verb: _____

3. The word chemistry comes from the word alchemy, which referred to an earlier set of practices that encompassed a variety of sciences.

Subject: _____

Verb: _____

4. Manhattan, home to 1.665 million people, is the most densely populated of the five boroughs of New York City.

Subject: _____

Verb: _____

5. Walking at least half an hour a day may help prevent certain diseases and even prolong life.

Subject: _____

Verb: _____

Writing and Language | Sentence Structure Drill

Rewrite the sentences below, fixing any errors in sentence structure.

1. Robert Nester Marley, a music legend born in Jamaica, breaking music barriers with his activist lyrics.

Rewrite the sentence: _____

2. We discovered the largest deposit of diamonds in the country it was amazing to see.

Rewrite the sentence: _____

3. Andrew arrived at the party late, he was delayed by the weather.

Rewrite the sentence: _____

4. After an extremely long day at work; Samuel wanted to go home.

Rewrite the sentence: _____

Writing and Language | Punctuation

Punctuation is one of the most important elements of writing a sentence and is one of the most frequently tested areas on the SAT. Let's review the most important punctuation.

Punctuation	Usage	Example
Period (.)	Used to end a complete sentence A complete sentence must have a subject and a verb.	<i>My favorite teams are the New York Mets and the Duke Blue Devils.</i>
Apostrophe (')	1. Used to show possession 2. Used in contractions	1. <i>Grandma Betty is my dad's mother.</i> 2. <i>She's not a very nice person.</i>
Semicolon (;)	Used to connect two complete sentences that are closely tied in meaning <i>* On the SAT, a semicolon and a period can be used interchangeably.</i>	<i>I love the Lord of the Rings trilogy; I have read all the books and seen all the movies.</i>
Colon (:)	What comes before the colon must be a complete sentence. What comes after a colon can be a word, phrase list, clause, etc. 1. Used to indicate that a list is to follow (If a phrase like "including" or "such as" comes before the list, no colon is used.) 2. Used to introduce a quote 3. Used to restate or elaborate on an idea within a sentence	1. <i>I have three things to do today: fold the laundry, sweep the floor, and take a nap.</i> 2. <i>As the saying goes: "If you can't beat 'em, join 'em."</i> 3. <i>The team was poorly coached: it lacked cohesiveness and determination.</i>
Comma (,)	1. Used in a list 2. Used in a compound sentence 3. Used to set off a phrase 4. Used to directly address someone 5. Used to tag questions 6. Used to set apart transition words 7. Used to set apart modifying phrases at the beginning of sentences 8. Used to set up contrasting phrases 9. Used to separate coordinate adjectives	1. <i>My courses this year include history, math, science, and English.</i> 2. <i>After school I went to basketball practice, but I really wanted to go home and take a nap.</i> 3. <i>Jill, my best friend, has blonde hair.</i> 4. <i>"Wesley, fetch me that pitcher."</i> 5. <i>You don't mind, do you?</i> 6. <i>I am tired. However, I don't like to sleep.</i> 7. <i>After eating dinner, Bill did his homework.</i> 8. <i>Mary was ready to climb another mountain, while Jim was too tired.</i> 9. <i>In order to get home, we must travel over several narrow, winding, treacherous roads.</i>
Dash (-)	Dashes and commas are basically interchangeable on this test. If a phrase is set off with a dash, it has to end with a dash or period.	<i>Jimmy — a native of the area — expertly knew the local roads.</i>

If one of the above punctuation marks is in the underlined portion of the sentence, double check that it is being used correctly.

Writing and Language | Punctuation

Apostrophes

As we've discussed, apostrophes are used to denote a contraction or to show possession.

What is a Contraction?

A contraction is when you join two words together into a shortened form and some of the letters drop out. Apostrophes show up in contractions to mark the place where the letter dropped out:

Do Not = Don't
Are Not = Aren't

Possession

A possessive is a form of a noun that shows ownership. For example, if you say Sam's cup, the word Sam's is the possessive form of the name Sam, showing that the cup belongs to Sam.

If you're making the possessive form of a singular noun, add "apostrophe s" to the end of the noun:

Liza's brain = The brain that belongs to Liza
Jess's voice = The voice that belongs to Jess

If you're making the possessive of a plural noun that ends in "s," only add an apostrophe to the end of the noun:

The three boys' dog = The dog that belongs to the three boys
The sofas' pillows = The pillows that belong to the multiple sofas

What is the difference between: The shoe's laces and the shoes' laces? _____

It's vs. Its vs. Its'

One of the trickiest ways that the exam will test apostrophes is through the word "it." Let's make sure you feel completely comfortable with what each form means:

The apostrophe in **it's** is used to denote a contraction. Therefore, **it's** means _____.

An apostrophe at the end of a word means that the word is plural. Can the word "it" ever be plural? _____.

Therefore **its'** _____.

The remaining version, **its**, must therefore be _____, even though there is no apostrophe.

We will talk more about the use of "its" versus "their" when we get to the pronoun section.

Circle the word that best fits in each of the following sentences.

1. The dog ate (**its** / **its'** / **it's**) bone while laying on the couch.
2. (**Its** / **Its'** / **It's**) a shame that (**its** / **its'** / **it's**) raining today.
3. I don't understand why (**its** / **its'** / **it's**) so cold outside in the middle of May.
4. The class voted that (**its** / **its'** / **it's**) favorite book was *Catcher in the Rye*.

Writing and Language | Punctuation

Commas

As we saw in the punctuation chart, commas can be used in a variety of ways. Let's go over the uses most commonly tested on the SAT.

Lists

Commas are used to separate items in a list. Lists can include nouns, verbs, and coordinate adjectives. Coordinate adjectives are adjectives that appear in sequence and describe the same noun. Most lists consist of at least three items. For coordinate adjectives, however, a comma can be used to separate as few as two items.

Incorrect Example: The skinny black cat would not stop meowing purring and seeking attention.

Corrected Example: The skinny, black cat would not stop meowing, purring, and seeking attention.

Compound Sentences

A compound sentence is a sentence made up of two independent clauses (each with a subject and verb) separated by **a comma and a conjunction**. You must have both pieces in order to successfully separate the two clauses. A sentence with two independent clauses separated with just a comma or just a conjunction is considered a run-on sentence.

Incorrect Examples: The dog barked and the bird chirped.

Incorrect Examples: The dog barked, the bird chirped.

Corrected Example: The dog barked, and the bird chirped.

Non-essential Phrases

Some sentences include extra words or phrases that provide the reader with helpful, but non-essential, information. These can appear at the beginning, middle, or end of a sentence and must be separated from the rest of the sentence with commas. A good way to check if commas are needed is to read the sentence without the piece you believe to be a non-essential phrase. If the sentence can still be read as a complete sentence, the piece is non-essential and should be set apart with commas.

Incorrect Example: Janie my youngest sister asked for a cherry pie for her birthday party.

Corrected Example: Janie, my youngest sister, asked for a cherry pie for her birthday party.

Identify the non-essential phrase that should be set apart with commas in each of the following sentences.

1. The performance which lasted three hours contained two intermissions.
2. After giving the family cat a bath Mario took a long nap.
3. Analise had never been to Chicago the third most populous city in the United States.
4. Kevin's favorite children's show *Mr. Rogers' Neighborhood* was to be featured in a new documentary.

Writing and Language | Punctuation Drill

Punctuation Review

Each of the sentences below has been written without any punctuation. Rewrite each sentence in the space provided using the appropriate punctuation.

1. Did you know that chocolate a favorite delicacy around the world is created from the cacao bean

2. Cacao beans are primarily grown in South and Central America especially in Mexico and Brazil

3. The beans grow on little shrubs in tropical areas these shrubs are actually relatives of North American evergreen trees

4. Once harvested the beans are cleaned dried and stored for future shipment

5. In many cases the cacao beans potency is enhanced through slow roasting

Writing and Language | Punctuation Drill

6. The cacao bean has a distinctive smell and taste and is therefore used in both food and non-food products

7. Although many people associate chocolate with dessert chocolate is also found in unique dishes such as Mexican mole

8. Nevertheless I prefer my chocolate in desserts my favorites are chocolate ice cream chocolate tortes and chocolate chip cookies

9. My mothers recipe for chocolate chip cookies has been handed down in my family for generations

10. Its incredible that some people don't like chocolate

Writing and Language | Punctuation Drill

11. In the United States the two biggest chocolate companies are Mars which makes M&Ms and Hershey which makes Kisses

12. Many people believe that the best chocolate in the world is found in European countries such as Belgium Germany France and England

13. In England Cadbury is the biggest candy company it produces a number of excellent chocolate bars such as the Aero the Double Decker and the Toffee Crisp

14. If you had to choose whats your favorite use for chocolate

Writing and Language | Punctuation Approach

Remember, the first step of the Grammar Action Plan once you've begun reading is to identify what a question is testing. Once you recognize that a question is testing punctuation, start by testing the **easiest answer choice first**. Avoid simply trusting your ear. That is a surefire way to head down the wrong path! Below is a list of what to test, when, and how to test it. Make sure to memorize and practice these approaches so they become second nature.

The first answer choices to test are any that include a **period**.

When testing a period, check whether the clause that comes before it and the clause that comes after it are each complete sentences. If either is not a complete sentence, a period is incorrect.

If any answer choice with a period works, confidently choose it and move on. If none of the choices include a period, or if any that did were incorrect, move on.

The second answer choices to test are any that include a **semicolon**.

When testing a semicolon, follow the same approach as you did for a period, as on this test, these two are used in the exact same way. (As a result, if you have two answer choices that are identical, though one contains a period and the other a semicolon, cross them both off immediately since one cannot be right while the other is wrong, as it's impossible to have two right answers.)

If any answer choice with a semicolon works, confidently choose it and move on. If none of the choices include a semicolon, or if any that did were incorrect, move on.

The third answer choices to test are any that include a **colon**.

When testing a colon, check whether the clause that follows the colon is a list and that words like "such as" or "including" are not also used. If it does not introduce a list, check to see whether the clause that follows the colon is restating or elaborating on information introduced earlier in the sentence.

If any answer choice with a colon works, confidently choose it and move on. If none of the choices include a colon, or if any that did were incorrect, move on.

The fourth answer choices to test are any that include a **comma**.

When testing a comma, start by checking whether it separates items in a list. If not, check whether it separates a clause in a sentence that can be removed from the sentence. NEVER check whether you paused when reading it. That is not a good enough reason to use a comma. Most students get into trouble by putting extra commas where they do not belong.

If any answer choice with a comma works, confidently choose it and move on. If none of the choices include a comma, or if any that did were incorrect, move on.

The final answer choices to test are any that include a **dash**.

When testing a dash, check to see whether there are two dashes separating a clause in a sentence that can be removed. It is very similar to the test for commas. If a clause comes in the middle of the sentence, you must either separate it with two commas or two dashes, never one of each.

If any answer choice with a dash works, confidently choose it and move on. If none of the choices include a dash, or if any that did were incorrect, test or select any remaining answer choice(s) with no punctuation.

Writing and Language | Punctuation Practice

Answer the questions below following the Grammar Action Plan, the information in the Punctuation Chart, and your knowledge of sentence structure.

Evaporation is the transformation of matter – most commonly liquid water, from a liquid to a gaseous state. Although easy to forget, evaporation and the water cycle may very well be the most crucial part of our planet’s ecosystem.

- A) NO CHANGE
 B) matter, most commonly liquid water – from
 C) matter – most commonly liquid water – from
 D) matter, most commonly liquid water from

The fifth century B.C., known as the Golden Age, or High Classical Period, was a period of cultural, artistic, and philosophical growth in Athens. Home to Plato and the Parthenon, this small, democratic city-state firmly entrenched Greece as the cornerstone of Western civilization thanks to it’s many achievements.

- A) NO CHANGE
 B) planets ecosystem
 C) planets’ ecosystem
 D) planets, ecosystem
- A) NO CHANGE
 B) a period of cultural artistic and philosophical growth, in
 C) a period of cultural, artistic, and philosophical growth, in
 D) a period of cultural artistic, and philosophical growth in

The consensus within the scientific community seems to be that eventually we will find intelligent extraterrestrial life in distant parts of the galaxy. While the discovery of alien forms of life in other solar systems, if not in our own seems likely, I find it most unlikely that myriad advanced technological civilizations are out there, waiting to be discovered.

- A) NO CHANGE
 B) its’ many achievements
 C) its many achievements
 D) it is many achievements

Like the Chinese, the Mayans occasionally decorated their buildings with carvings made out of stone. Used on the exterior of the buildings, the carvings were placed on broad murals and ramps along stairs, as well as in the fronts of the immensely, elaborate entrances.

- A) NO CHANGE
 B) if not in our own seems likely. I find
 C) if not in our own, seems likely, I find
 D) if not in our own seems likely, I find
- A) NO CHANGE
 B) Like the Chinese the Mayans
 C) Like the Chinese – the Mayans –
 D) Like the Chinese, the Mayans,
- A) NO CHANGE
 B) immense elaborate
 C) immense, elaborate
 D) immensely elaborately

Writing and Language | Punctuation Practice

The American 8 bison, an animal that typically symbolizes the Wild, West is the heaviest land mammal in North America. Also called the American buffalo, the bison has a large head with small, crescent-shaped horns and a shaggy coat of brown hair on its shoulders and legs.

Historically, the process of cutting trees to make paper has caused great harm to the environment. Since an area that has been cleared of trees can take more than 50 years to 9 regrow – the ecosystem that relies on those trees will likely perish before the trees grow back. 10 Today, however, many woodcutters recognize the harm such practices cause, and thus the practice of reforestation is becoming increasingly commonplace.

With today's cloning technology, 11 its conceivable that a woolly mammoths' DNA could be injected into a living cell and perhaps an actual prehistoric woolly mammoth could be brought to life in a science lab. Science might soon be faced with the ethical question of whether to take a cell sample from a creature that has been dead for 20,000 12 years, and use it to bring back an extinct species.

One does not have to go far from the door of any educational institution to find people who look on reading and 13 writing – to say nothing of higher forms of education – as luxuries rather than necessities. There are parents willing to take their children out of school for the sake of the wage the child can earn. There are negligent parents, often illiterate themselves, who are wholly unconcerned about the education of their children.

8. A) NO CHANGE
 B) bison, an animal that typically symbolizes the Wild West is
 C) bison, an animal that typically symbolizes the Wild, West, is
 D) bison, an animal that typically symbolizes the Wild West, is

9. A) NO CHANGE
 B) regrow, the
 C) regrow; the
 D) regrow: the

10. A) NO CHANGE
 B) Today, however
 C) Today however
 D) Today however;

11. A) NO CHANGE
 B) its' conceivable that a woolly mammoth's DNA
 C) it's conceivable that a woolly mammoth's DNA
 D) it's conceivable that a woolly mammoths DNA

12. A) NO CHANGE
 B) years and use it
 C) years' and use it
 D) years; and then use it

13. A) NO CHANGE
 B) writing – to say nothing of higher forms of education – as luxuries,
 C) writing, to say nothing of higher forms of education – as luxuries
 D) writing to say nothing of higher forms of education, as luxuries

Writing and Language | Punctuation Practice

I had been watching the birds for a couple of hours, sitting quite still on a tuft of grass. The prettiest and the boldest was a male, and it was this bird that in the end flew to a bush within twelve yards of where I sat. Perching on a branch about level with my eyes, he exhibited himself to me in his characteristic manner, ¹⁴ the long tail raised, crimson eyes sparkling and throat puffed out with his little scolding notes.

There is something about the word Italy that causes a glow in the hearts of most Americans. Italy is the cradle of modern ¹⁵ civilization, and the land where modern literature and science took their faltering first steps, the garden where the flowers of art first bloomed, then reached a magnificence that has never been equaled.

Two arts have altered the face of the earth and given shape to the life and thought of man, Agriculture and Architecture. ¹⁶ Of the two, it would be hard to know which has been the more intimately interwoven with the inner life of humanity. Our present study has to do with the second of these arts, which has been called the matrix of ¹⁷ civilization, when we inquire into origins and seek the initial force which carried art forward, we find two fundamental factors – physical necessity and spiritual aspiration.

The conditions under which alpine plants live may be summed up ¹⁸ as follows: a long cold winter, a short summer, great exposure, and scarcity of food-supply. The modifications which plants have undergone to meet these conditions are very remarkable.

14. A) NO CHANGE
 B) the long tail raised crimson eyes sparkling and throat puffed out
 C) the long tail raised crimson eyes sparkling, and throat puffed out
 D) the long tail raised, crimson eyes sparkling, and throat puffed out

15. A) NO CHANGE
 B) civilization and
 C) civilization; and
 D) civilization. And

16. A) NO CHANGE
 B) Of the two it
 C) Of the two it,
 D) Of the two – it

17. A) NO CHANGE
 B) civilization – when
 C) civilization when
 D) civilization. When

18. A) NO CHANGE
 B) as follows, a long cold winter, a short
 C) as follows. A long cold winter, a short
 D) as follows including: a long cold winter, a short

Writing and Language | Punctuation Practice

People who use banter as a form of humor are usually agreeable companions that do not aim to hurt the target of their ¹⁹ teasing although their words may be provocative, the corners of their mouths are always turned up in a smile.

19. A) NO CHANGE
 B) teasing, although their
 C) teasing; although, their
 D) teasing. Although their

The old-fashioned school building was copied from the ²⁰ church, in its externals it often reflected its predecessor by the tower and steeple, which sometimes housed the bell and sometimes served merely as an ornament.

20. A) NO CHANGE
 B) church; in its externals
 C) church. In it's externals
 D) church, in it's externals

If one goes back to the beginnings of any school system, it will always be found that the original courses of study grow directly out of the intellectual ideals of the times. ²¹ For example if one goes back to the beginnings of medieval universities, one finds that these institutions grew up because there was an interest in certain well-defined bodies of ideas.

21. A) NO CHANGE
 B) For example, if one goes back to the beginnings of medieval universities
 C) For example, if one goes back to the beginnings of medieval universities,
 D) For example, if one goes back to the beginnings of medieval universities –

Coach Nadeau showed her lack of professionalism by walking out of the gymnasium in the middle of the ²² match. Leaving her student athletes at a time when they needed her.

22. A) NO CHANGE
 B) match leaving her
 C) match; leaving her
 D) match, leaving her

He added phrases to the works of others when it sounded right to ²³ his ear, changed tempos, when it suited him.

23. A) NO CHANGE
 B) his ear and changed tempos
 C) his ear changed tempos,
 D) his ear, changed tempos

Writing and Language | Punctuation Practice

The only question left to be settled now is, “Are women persons?” And I hardly believe any of our opponents will have the boldness to say they are not. Being persons, then, women are citizens no state has a right to make any law, or to enforce any old law, that shall abridge their privileges or immunities.

24. A) NO CHANGE
 B) women are citizens; no state
 C) women are citizens, no state
 D) women are citizens, and, no state

Every December, there’s a contest in my village to see who can put up the most elaborate holiday decorations, this year, I’m going to enter.

25. A) NO CHANGE
 B) decorations this
 C) decorations. This
 D) decorations. Because this

“It seems to me that, for the nation as for the individual, what is most important is to insist on the vital need of combining certain sets of qualities, which separately are common enough, and, alas, useless enough.” - Theodore Roosevelt, 1913

26. A) NO CHANGE
 B) that for the nation, as for the individual what
 C) that, for the nation, as, for the individual, what
 D) that for the nation, as, for the individual what

Among the most formidable of the obstacles the new Constitution will have to encounter may be the obvious interest of a certain class of men in every State to resist all changes which may cause a decrease of the power, salary, and, consequence of the offices they hold under the State establishments. It also faces challenges from the ambition of another class of men, who will hope to increase their own power to the detriment of their country.

27. A) NO CHANGE
 B) the power, salary, and consequence of the offices
 C) the power, salary, and consequence, of the offices
 D) the power salary, and consequence of the offices,

Writing and Language | Subject-Verb Agreement

As we discussed earlier, verbs are the action words in a sentence, and if a sentence does not have one, it cannot be complete. Most verbs are easy to pick out, like “run,” “jump,” or “play.” However, other verbs are what are called “state of being verbs,” and may be a little trickier to identify. State of being verbs include words like “is,” “am,” “are,” “was,” and “were.”

Subject-Verb Agreement

Subject-verb agreement means that nouns and verbs *must* agree in number. If a subject is singular, then the verb must be singular. If a subject is plural then the verb must be plural.

In order to successfully test agreement, the first step is to identify the noun that is doing the action. Sometimes this can be simple, as in the example below:

Example: The student (**study / studies**) for the upcoming test.

Note: Singular present tense verbs with third person singular subjects end in “s.”

Example: The singer sings. The dancer dances. The doctor operates.

Sometimes it can be trickier to identify the subject. Take a look at the example below:

Example: The keys on Samantha’s very new laptop computer (**is / are**) in need of a cleaning.

Collective Nouns

A *collective noun* is a word that refers to a collection of things taken as a whole. Collective nouns are singular, even though they are made up of multiple things.

Example: The committee (**vote / votes**) on matters of policy and administration.

Examples of Collective Nouns		
Jury	The United Nations	Amount
Class	The Knicks	Majority
Audience	The United States	Every
Team	The Netherlands	Public
Group	(The name of any country)	Family

Conjunctions

The conjunctions used in a sentence can also give you a clue as to whether you need to use a singular or plural verb. For example, the word *and* within the subject indicates that you must use a plural verb even if each item connected by the conjunction is singular.

Example: The cat *and* the dog (**run / runs**) very quickly.

However, if the sentence has two subject nouns connected by *neither...nor* or *either...or*, the verb should agree with whichever noun is closest to it.

Example: *Neither* the cat *nor* the dog (**run / runs**) very quickly.

Writing and Language | Subject-Verb Agreement Drill

Subject-Verb Agreement Review

Rewrite the sentences below, fixing any agreement errors.

1. The Netherlands were part of the band of countries that signed the Treaty of Rome.

Rewrite the sentence: _____

2. The newly elected president, to the dismay of her opponents, have argued to phase out the electoral college.

Rewrite the sentence: _____

Circle the word that best fits in each of the following sentences.

3. Neither my grandparents nor my mother (**like / likes**) rap music.
4. A witty, rapid-fire freestyle ability and a lyrically complex rhyming style (**explains / explain**) why Christopher Wallace is arguably one of the greatest freestyle rappers of all time.
5. An easy-to-understand yet complex flow (**was the trademark / were the trademarks**) of Christopher Wallace.
6. During recent years the demand for a thorough and comprehensive study of schools by scientific methods (**has led / have led**) to a number of investigations which can be offered as an optimistic beginning of a science of education.
7. One very impressive difference between the schools of the United States and the schools of Europe (**is / are**) to be found in the fact that class exercises in our schools are commonly based on assignments in textbooks, while in Europe the chief method of instruction is oral exposition by the teacher.

Writing and Language | Verb Tense

Verb Tense

Verb tense refers to the time frame in which the sentence is taking place (past, present, or future). To maintain clarity in a sentence or paragraph, the verb tenses should reflect appropriate time frames.

Example: In the 1870s, the French sculptor Frederic Auguste Bartholdi (**is commissioned / was commissioned / are commissioned / were commissioned**) to design the Statue of Liberty.

In order to make sure you are choosing the correct tense, rely on the context clues surrounding it. These may include the mention of certain years as in the example above, or the tense of other verbs in the sentence or previous sentences.

Circle the word that best fits in each of the following sentences.

1. Thomas Jefferson was born upon a frontier estate in Albemarle County, Virginia, April 13, 1743. His father, Peter Jefferson, was of Welsh descent. He was not of aristocratic birth, but rather of that yeoman class which constitutes the backbone of all societies. The elder Jefferson (**has / had / will have**) uncommon powers both of mind and body.
2. He is a good man who can receive a gift well. We (**are / were / will be**) either glad or sorry at a gift, and both emotions are unbecoming.
3. Because a federal order restricts either party from commenting on the case, Mr. Smith (**is / will be**) unable to hold a press conference tomorrow.
4. John (**eats / ate**) his food with his hands and that annoyed his mother.
5. During his press conference, the police commissioner (**stated / states / will state**) that the bridge (**is / was**) closed yesterday.
6. The study of human nature is always interesting, but to study a criminal (**is / was / are**) an engrossing task.
7. There is a growing political trend to set mandatory deadlines for fuel efficiency in automotive lines being proposed for future manufacture. While there are swaths of forward thinking constituencies petitioning their governments for fuel standards to be revised and energy conservation targets to be established, the real benefits of such legislation (**are / were / will be**) limited to a few, opportunistic organizations including very wealthy mega-corporations.

Writing and Language | Verb Form

Verb Forms

Verbs in the English language come in a variety of different forms. These varying forms are often used to express tenses, but they are not the same as tenses.

Example: We (**practice** / **were practicing** / **practiced**) outside when it started to rain.

Note: The -ing form of a verb cannot be the action in a full sentence unless it is accompanied by a helping verb, such as “were” in the corrected example above.

Below is a chart outlining the three forms of the three tenses in the English language:

Tense	Basic Form	Perfect Form	Progressive Form
Present	I Cook	I Have Cooked	I Am Cooking
Past	I Cooked	I Had Cooked	I Was Cooking
Future	I Will Cook	I Will Have Cooked	I Will Be Cooking

The *perfect form* of a verb is used to show a *completed action*. To create the perfect form of a verb:

helping verb “have/had” + past participle

The *progressive form* of a verb shows an *ongoing action in progress*. To create the progressive form of a verb:

helping verb “to be” + present participle (-ing form of the verb)

Circle the word that best fits in each of the following sentences.

1. (**Believed** / **Believing**) to be over 2,000 years old, the Rosetta Stone helped linguists finally translate Egyptian hieroglyphs.
2. Right now, you are probably (**wonder** / **wondering**) how much longer this will take.
3. Does the team (**understood** / **understand**) the new plays that the coach is (**working** / **worked**) on?
4. Lily (**has been working** / **is working** / **worked**) on her thesis for over a year, and there is still not an end in sight.

Writing and Language | Verb Tense & Form

Some verbs take unusual forms when in the past tense or in the perfect form. Below is a list of some common verbs that take on unique forms:

Verb	Basic Form	Past/Present Perfect Form (Had/Have + . . .)
To Arise	Arose	Arisen
To Awake	Awoke	Awoken
To Beat	Beat	Beaten
To Begin	Began	Begun
To Blow	Blew	Blown
To Break	Broke	Broken
To Choose	Chose	Chosen
To Come	Came	Come
To Do	Did	Done
To Draw	Drew	Drawn
To Drink	Drank	Drunk
To Drive	Drove	Driven
To Dwell	Dwelt	Dwelt
To Eat	Ate	Eaten
To Fall	Fell	Fallen
To Fly	Flew	Flown
To Forbid	Forbade	Forbidden
To Freeze	Froze	Frozen
To Give	Gave	Given
To Go	Went	Gone
To Grow	Grew	Grown
To Hide	Hid	Hidden
To Know	Knew	Known
To Leap	Leapt	Leapt
To Ride	Rode	Ridden
To Ring	Rang	Rung
To Run	Ran	Run
To See	Saw	Seen
To Shrink	Shrank	Shrunk
To Stink	Stank	Stunk
To Swear	Swore	Sworn
To Swell	Swelled	Swollen
To Swim	Swam	Swum
To Take	Took	Taken
To Weave	Wove	Woven

Writing and Language | Verbs Approach

Just as with punctuation questions, there is a specific approach to follow when you identify that a question is testing a verb:

The first step of the approach is to check the **subject-verb agreement**.

First, identify the noun that belongs with the verb being tested. Note that it may not be the noun directly next to the verb. Once you have identified the correct noun, make sure the noun and the verb agree in number.

Once you have eliminated any answer choices that do not have the correct subject-verb agreement, if you have more than one remaining, move on to the second step.

The second step of the approach is to check the **tense** of the verb (past, present, future).

Use time indicators and/or other verbs in the passage to help you determine the correct tense.

Once you have eliminated any answer choices that do not have the correct tense, if you have more than one remaining, move on to the third step.

The third step of the approach is to check the **form** of the verb (basic, perfect, progressive).

Ask yourself “Is the action in progress or completed?”

At this point you should be confidently able to select the correct answer!

Writing and Language | Verb Practice

Wilbur and Orville Wright was two of the most important figures in the history of aviation. In 1903, when the first airplane will take off from a beach in Kitty Hawk, North Carolina, it was a Wright brothers design, over 10 years in the making, with Orville in the cockpit.

1. A) NO CHANGE
B) are two of the most
C) have been two of the most
D) are being two of the most
2. A) NO CHANGE
B) has taken off
C) took off
D) had been taking off

The Pyramid of Giza is aptly listed among the Seven Wonders of the Ancient World. It is thirty times larger in volume than the Empire State Building, and its features were so large that they can be seen from the Moon.

3. A) NO CHANGE
B) It was thirty times
C) It has been thirty times
D) It was being thirty times
4. A) NO CHANGE
B) its features are
C) it's features are
D) it's features were

Yoga have served several mental and physical purposes for over 5,000 years.

5. A) NO CHANGE
B) has served
C) was served
D) are serving

Though no one know when or why the practice started, it certainly began before written history. Stone carvings of figures in Yoga positions has been found in Indus Valley archaeological sites dating back 5,000 years or more.

6. A) NO CHANGE
B) Though nobody know
C) Though no one knows
D) Though, no one knows
7. A) NO CHANGE
B) was being found
C) were found
D) was found

Writing and Language | Verb Practice

The Eiffel Tower was built in 1889 for the World Exhibition held in celebration of the 1789 French Revolution. The structure was meant to last only for the duration of the Exposition, but it still stand today, despite not only protests from contemporary artists who feared that the tower would be the advent of structures without individuality, but also despite the many people who feared that this huge “object” would not fit into the architecture of Paris.

8. A) NO CHANGE
B) was standing
C) standing today
D) stands today
9. A) NO CHANGE
B) who were fearing
C) fearing
D) who fear

The current availability of information, both from the Internet and from other sources, has created a cosmopolitan society that is better informed than ever before. However, the way in which people consume information has made them value quantity over quality.

10. A) NO CHANGE
B) are
C) was
D) were
11. A) NO CHANGE
B) have made them
C) are making them
D) have been making them

Imagine living during a time when the access to constitutional rights were limited because of the color of your skin. For almost 300 years, such was the case for African Americans in America.

12. A) NO CHANGE
B) constitutional rights are being limited
C) constitutional rights are limited
D) constitutional rights was limited

Many experts believe that the rapid decline in CD sales, fueled by the demise of boutique record stores and the increase in digital downloads, have permanently changed the music industry.

13. A) NO CHANGE
B) has
C) are
D) having

Writing and Language | Verb Practice

The Inca trail was originally part of the Inca Empire's road system. The 43-kilometer trail, passing through cloud forest and alpine tundra, leading to the Sun Gate on Machu Picchu Mountain.

14. A) NO CHANGE
B) led
C) has led
D) would of lead

Edward Abbey is perhaps the best example of a writer using fiction to effect political change. His iconic stories of the desolate but beautiful American Southwest documents a landscape under assault from the forces of development and industrialization.

15. A) NO CHANGE
B) does document
C) documenting
D) document

A long time ago, I read that a single wrong turn could set a person's life onto a completely different path. A recent experience confirmed this to be true. One afternoon, I will accidentally walk through the wrong door at my office building and into a completely unexpected situation that has reshaped how I think about the world.

16. A) NO CHANGE
B) accidentally walk
C) accidentally walked
D) am accidentally walking

The novel Verne created, *Twenty Thousand Leagues Under the Sea*, became an instant science fiction classic. Writing decades before long distance undersea travel had begun, Verne could fascinate readers with his portrayal of the enigmatic Captain Nemo.

17. A) NO CHANGE
B) has begun
C) have began
D) had began

If the colonists were not standing up for their beliefs by dumping tea into the Boston Harbor and renouncing King George III during the Revolutionary War, we would still be under the control of monarchic England.

18. A) NO CHANGE
B) have not stood up
C) had not stood up
D) are not standing up

Writing and Language | Verb Practice

Microwave cooking is truly a modern marvel.

Not since man's discovery of fire a million years ago have there been a new way to prepare food. Like most major inventions and new uses for currently existing technologies, the ability to use microwaves in a household appliance to cook food is a completely accidental discovery.

19. A) NO CHANGE
B) are there
C) is there
D) has there been

20. A) NO CHANGE
B) food was a
C) food has been a
D) food have been a

We rely on logic to validate nearly every decision we make. Even when we make emotional decisions, they may be traced back to logic based on flawed premises. When confronted with obstacles, we wield that uniquely human weapon, logic.

21. A) NO CHANGE
B) will rely
C) had relied
D) relied

Scientists had long debated the causes of global warming, but it has become increasingly clear that humans and their habits have played an important role. An increased burning of fossil fuels, for example, leading to more carbon dioxide in the atmosphere, one of the three major contributors to the greenhouse effect and global warming in general.

22. A) NO CHANGE
B) are debating long
C) were long debating
D) have long debated

23. A) NO CHANGE
B) was leading
C) leads
D) have been leading

Writing and Language | Pronoun Agreement

Pronouns are words like “he,” “she,” “they,” and “it.” Pronouns are used to take the place of nouns in a sentence. For example, it is much less clunky to say, “Fred washed *his* car” rather than “Fred washed Fred’s car.”

Pronoun Agreement

Pronouns must agree in number and gender with the nouns they replace. If the noun being replaced is singular, the pronoun must also be singular. The same goes for a plural noun.

Example: One thing everyone knows about news is that (**it is / they are**) biased.

Some questions involve using the possessive form of various pronouns. The agreement rule still applies: singular nouns need singular possessive pronouns, and plural nouns need plural possessive pronouns.

Example: The travelers did not want to forget (**their / his or her**) tickets.

Singular Pronouns	Plural Pronouns
He	We
She	Us
It	They
I	Them
Me	These
Her	Those
Him	Both
This	Many
That	Several
My	Our
Yourself	Yourselves
Mine	Their

One vs. You

One popular pronoun question asks whether to use the pronoun *you* or *one*. There is no “right” answer in simply comparing the two pronouns. To decide which to use in any given situation, you must look at the surrounding text. If the passage has been using the word *you*, stick with it. If it has been using *one*, stick with that.

Example: When one decides to attend a workout class, (**he or she / you / one**) should dress appropriately.

*They, them, and their are accepted in the English language as singular, gender-neutral pronouns. This, however, is not tested on the exam. For the purposes of the test, “they” will be a plural pronoun referring to a group of people or things.

Writing and Language | Pronoun Agreement Drill

Rewrite the sentences below, fixing the errors that exist.

1. Before boarding the boat, passengers must purchase his tickets at the counter so they are allowed to board.

Rewrite the sentence: _____

2. Because the chemical composition of wheatgrass juice is so similar to that of hemoglobin, people consume those to maintain good health.

Rewrite the sentence: _____

Circle the word that best fits in each of the following sentences.

3. When you first go to college, (**you / one**) may think that banks are giving away money because of the plethora of credit card offers.
4. If one is diligent about studying for the SAT, (**they / one / he / she**) will be able to improve (**their / one's**) score significantly.
5. The tired puppy and the kitten collapsed on the pillows after playing in the yard all day with (**his / her / their / its**) rubber toys.

Writing and Language | Pronoun Case

Pronoun Case and Form

Pronoun case refers to the form that a pronoun takes depending on its function in a sentence. English pronouns have three cases: subjective, objective, and possessive. Subjective pronouns perform the action. Objective pronouns receive the action. Possessive pronouns show that something (or someone) belongs to someone (or something). Below is a chart of subjective, objective, and possessive pronouns.

Subjective	Objective	Possessive
I	Me	My/Mine
You	You	Your/Yours
He	Him	His
She	Her	Her/Hers
They	Them	Their/Theirs
We	Us	Our/Ours
Who	Whom	Whose
It	It	Its

Example: Robert gave \$100 to Malik and (**I / me / mine**).

Is the pronoun the subject, object, or showing possession in the example above? _____

Example: For (**who / whom / whose**) am I buying this present?

Is the pronoun the subject, object, or showing possession in the example above? _____

One way to decide whether you want to use *who* or *whom* in a sentence is to check it with the words *he* or *him*. If *who* or *whom* shows up in a question, answer with *he* or *him*. If the word *he* fits best, then *who* is the correct word. If the word *him* fits best, then *whom* is the correct word. Another big clue that *whom* should be used instead of *who* is if the word follows a preposition, such as “for,” “to,” “of,” “with,” “from,” etc.

Additionally, the SAT will ask you to ensure that the author is using the correct form of the pronoun. Make sure you are familiar with how the common pronouns are used.

Example: The legends had been passed down to the children from (**there / their / they’re**) grandparents.

There means _____

Their means _____

They’re means _____

Example: The plant was losing (**its / it’s / its’ / their**) leaves.

Writing and Language | Pronoun Case Drill

Rewrite the sentences below, fixing the errors that exist.

1. Miss Fletcher gave the car keys to Mary and I.

Rewrite the sentence: _____

2. Kyle and me waited for Matt to finish class so that we could all go to lunch.

Rewrite the sentence: _____

Circle the word that best fits in each of the following sentences.

3. If you are interested in attending a particular university, (**your** / **you're**) best course of action would be to contact that school to find out its admission requirements.
4. John and (**I** / **me**) are going to the library to study for our midterm exam.
5. Ken wants to buy (**he and Tony** / **Tony and he** / **Tony and him**) a car.

Writing and Language | Pronouns Approach

In order to effectively tackle pronoun questions, you must **first identify exactly what noun the pronoun is replacing**. After you have done so, follow the steps below:

The first step is to test whether the pronouns in the answer choice have the correct **agreement**.

This is very similar to the agreement we discussed when testing verbs. Just as a singular verb can only be used with a singular noun, a singular pronoun such as “it,” “he,” or “she,” can only take the place of a singular noun.

Once you have eliminated any answer choices that have incorrect agreement, if there are still answer choices remaining, move on to the second step.

The second step is to test whether the pronouns are in the right **case**.

A pronoun’s case can be either subjective (they are the ones performing the action), objective (the action is being performed on them), or possessive. To determine the correct case, identify what the role of the pronoun is in the sentence.

Once you have eliminated any answer choices that have an incorrect pronoun case, you should be confidently able to select an answer and move on!

Writing and Language | Pronoun Practice

It's easier to buy truffles at a gourmet market than it is to dig them out of the ground, but it's not as fulfilling. Once you find your first truffle nestled between the roots of an old oak or pecan tree, one will be hooked on truffle hunting for life.

1. A) NO CHANGE
B) Its easier
C) Its' easier
D) It is easiest
2. A) NO CHANGE
B) a truffle hunter
C) you
D) a person

At first, Henry Ford made cars the traditional way, one at a time. However, he soon realized that the assembly line offered the potential to dramatically expand it's production of automobiles.

3. A) NO CHANGE
B) its
C) their
D) his

The Federal National Mortgage Association, known as Fannie Mae, was established in 1938 in the depths of the Great Depression. Over the years, Fannie Mae has been a great help to people of low or moderate income who would otherwise be unable to qualify for a home loan.

4. A) NO CHANGE
B) whom
C) whose
D) for whom

What vaulted Apple into the national spotlight and solidified their place as a legitimate competitor of Dell and Microsoft was not its software or even its ease of use, but rather the brightly-colored exteriors of the machines. Steve Jobs, the creator of Apple, seized upon the American public's desire for aesthetically-pleasing products, and in doing so, used their creativity to get ahead.

5. A) NO CHANGE
B) their places
C) its place
D) it's place
6. A) NO CHANGE
B) was using their creativity
C) used his creativity
D) will be using his creativity

Writing and Language | Pronoun Practice

In the early 1980s, the most popular guard dog in the U.S. was the German Shepherd, whose a fierce protector but a friendly pet. Today, however, the pit bull has become more popular. Pit bulls are known for their aggressive behavior which makes it well suited for guard duty.

7. A) NO CHANGE
B) who is
C) whom is
D) that is

8. A) NO CHANGE
B) which make them
C) which makes them
D) which make it

Many species of falcons are predatory and carnivorous. Rodents and rabbits are their primary source of food. A falcon's sight is one of its' greatest assets, second only to its' speed.

9. A) NO CHANGE
B) is one of its' greatest assets, second only to its' speed.
C) is one of their greatest assets, second only to their speed.
D) is one of its greatest assets, second only to its speed.

The reptile's scales help to protect it from its enemies and to conserve moisture in its body. Some kinds of lizards have fan-shaped scales that they can raise to scare away other animals. The scales can also be used to court a mate.

10. A) NO CHANGE
B) them
C) themselves
D) itself

Oftentimes, you'll wake up in the middle of the night with random images and thoughts lingering in your head. You know that you never left your bed, yet one feels like something has occurred; you have seen people and been to places. Dreams have intrigued scientists and psychoanalysts for centuries.

11. A) NO CHANGE
B) yet you feel like
C) yet one felt like
D) yet you felt as though

Writing and Language | Modifiers Drill

Modifying phrases describe words or other phrases. Modifiers help to provide accurate and informative descriptions that enhance a piece of writing.

When you add a modifying phrase to a sentence, you also add complexity, and with this complexity comes additional chances for confusion. To avoid such confusion, we must make sure that modifiers clearly describe what they're supposed to describe, which means that we must place a modifier as close as possible to the thing it's modifying.

Incorrect Example: Running to catch the train, *the heel* on Casey's shoe broke.

The modifying phrase, "Running to catch the train" should be describing Casey. However, the way it is written here, it is describing the heel on Casey's shoe.

Corrected Example: Running to catch the train, *Casey* broke *the heel* on *her* shoe.

Additionally, you may be asked to differentiate between comparative and superlative modifiers. *Comparative modifiers* are used when comparing only two items. *Superlative modifiers* are used when comparing three items or more.

Example: Samantha was the **(better / best)** of her five siblings at playing soccer.

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Rewrite the sentences below, fixing the errors that exist.

1. Dressed in an unappealing t-shirt and baggy jeans, it displayed a disrespectful and egotistical attitude when he arrived to escort his date to the prom and refused to pose for photos.

Rewrite the sentence: _____

2. Walking into the café, a cup of coffee was immediately brought to Maggie's favorite table.

Rewrite the sentence: _____

3. Between the two women, Linda was the most prepared to present at the meeting.

Rewrite the sentence: _____

Writing and Language | Modifiers Approach

Modifiers will often appear when something else is being tested, like punctuation, so many times you will not be thinking about approaching modifiers directly (though your knowledge of them can help you answer a comma or dash question correctly).

However, there are certain scenarios in which you should follow approaches specifically for modifiers:

The first scenario is when you recognize that a question is testing the **comparative versus superlative** form of a word.

To approach these questions, identify what the word is comparing. If it is comparing two things, select the comparative form of the word. If it is comparing three or more, select the superlative form of the word.

The second scenario is when you recognize that a question is testing **various ways to phrase a clause**, and that clause directly **follows a modifier at the beginning of a sentence**.

*These can sometimes be tricky to identify, but if you are able to, you will be rewarded with a fairly easy question that follows the rule we discussed on the previous page. Whenever a modifying phrase begins a sentence, whatever is being described **MUST** immediately follow the comma, such as in the example of Casey and her heel. To approach these questions, begin by identifying the subject being described in the modifying phrase and eliminate any answer choice that does not include that as the first word of the phrase. Please note that if Casey is the subject of the modifying phrase, “Casey’s heel” cannot begin the next phrase, as although the word Casey comes first, it is in the possessive form rather than the subjective.*

Writing and Language | Modifiers Practice

Work on The International Space Station began in 1998. Larger than any other manmade structure in orbit, astronauts at this experimental facility are given a unique opportunity to do research in a microgravity environment.

- A) NO CHANGE
 B) this experimental facility gives astronauts
 C) astronauts experimenting at this facility are given
 D) experimental astronauts at this facility are given

The Amazons, a legendary tribe of warrior women appear often in Greek mythology. Tales of these female fighters and their warrior exploits frequently show up in legends throughout Antiquity.

- A) NO CHANGE
 B) Amazons, a legendary tribe of warrior, women,
 C) Amazons a legendary tribe of warrior women,
 D) Amazons, a legendary tribe of warrior women,

Like many arts and sciences that are profound, beautiful, and powerful, society continues to trivialize Yoga.

- A) NO CHANGE
 B) and powerful society continues to trivialize Yoga.
 C) and powerful, society, continues to trivialize Yoga.
 D) and powerful, Yoga continues to be trivialized by society.

Worn from all the time she'd spent at various friends' weddings and parties, Erin's relief was enormous at having her summer free of social engagements.

- A) NO CHANGE
 B) weddings and parties, Erin was enormously relieved to have
 C) weddings and parties, Erin's enormous relief at having
 D) weddings and parties, enormous relief was Erin's at having

Anxiously anticipating Christmas morning, Tamika's presents were mainly what she was looking forward to.

- A) NO CHANGE
 B) looking forward to her presents was mainly what Tamika did.
 C) presents were mainly what Tamika was looking forward to.
 D) Tamika was mainly looking forward to presents.

Writing and Language | Transitions

Just as paragraphs need transitions to flow smoothly and coherently, sentences also need clear transitions in order to make sense. Conjunctions and prepositional phrases allow an author to clearly and effectively show the relationship between parts of a sentence or between one sentence and the next. Below is a list of common phrases that are used as transitions and may show up on the exam:

Common Transition Words & Phrases	
Words that Indicate an Oppositional (Contrastive) Relationship	Words that Indicate a Time Relationship
But	After
Though (Although, Even Though)	As
Despite	Before
However	Once
Nevertheless	Until
While	When
Whereas	Finally
On the Contrary	Meanwhile
In Contrast	Next
In Spite of	Previously
Instead	Then
As Opposed to	Words that Indicate a Conditional Relationship
Words that Indicate an Additive Relationship	If
And	Provided That
As well as	Unless
Not only . . . but	Otherwise
Both . . . and	Words that Indicate an Example is Coming
Furthermore	For Example
In Addition (Additionally)	For Instance
Moreover	Including
Similarly	Such As
Words that Indicate a Reason - Result (Cause & Effect) Relationship	
Because	Hence
Therefore	For this Reason
Thus	So
Since	Accordingly
As a Result	Consequently

The SAT frequently tests transitions by asking you to choose between several transition words. Only one word will best fit the relationship in the question.

Example: (Although / Because / Despite / However) she always had a good time at the park, Heather wanted to go this afternoon.

Writing and Language | Transitions Approach & Drill

When you recognize that a question is testing a transition word, follow the approach below:

If the transition word or phrase comes at the **beginning of the sentence**:

Read the sentence directly before the transition and identify the main idea. Then, read and identify the main idea of the next sentence. DO NOT read the transition word itself, as this will subconsciously alter the way you view the sentences. Identify the relationship that exists between the sentences. Select the answer choice that signifies that relationship. If there is no relationship between the sentences, continue to the next step.

If the transition word or phrase comes in the **middle of the sentence**, or if there was no relationship to the previous sentence:

Check to see if there are two clauses in the sentence, and if so, determine which of the relationships we discussed applies to those clauses. Then select the answer choice that signifies that relationship. If there are not clauses that need a transition word in the sentence, select the answer choice that includes no transition word.

Rewrite the sentences below, fixing the errors that exist.

1. For many groups were vehemently opposed to the latest user interface changes to Facebook, many users expressed their support for the modifications.

Rewrite the sentence: _____

2. Even though Dadius recently completed a merger with rival Beebox, yet the new company is still smaller than chief rival Syke.

Rewrite the sentence: _____

3. Although Molasses McFadden has never donated to a charity because he doesn't believe in charity.

Rewrite the sentence: _____

Writing and Language | Transitions Practice

Standing at the starting line of the Boston Marathon, Bill Rodgers was nervous. It had been a decade since he had run a marathon, which he hoped he was adequately prepared for the event.

1. A) NO CHANGE
B) and
C) then
D) DELETE the underlined portion.

Before meeting at a volunteer event in the heart of Seattle, Eli has remained the object of Sara's affections.

2. A) NO CHANGE
B) When meeting
C) Since meeting
D) After meeting

Johann Wolfgang von Goethe was a famous German writer born in the 18th century. Because he was not always kind to the people in his life, he still issued the following advice: "Treat people as if they were what they ought to be and you help them to become what they are capable of being."

3. A) NO CHANGE
B) Although he was not
C) However he was not
D) Therefore he was not

About an hour east of Santa Cruz, on the edge of California's Central Valley, lies the town of Gilroy.

However, most of the garlic grown in the United States comes from the farms that surround the town. Garlic is so important to Gilroy that the town holds an annual garlic festival.

4. A) NO CHANGE
B) On the other hand,
C) Nevertheless,
D) DELETE the underlined portion.

The new company, Kickstarter, has developed an innovative model for helping small businesses. Individuals make small contributions, which are bundled together and used to fund, for example, a jeweler or woodworker who might have difficulty obtaining a more traditional loan.

5. A) NO CHANGE
B) on the other hand,
C) as a result,
D) instead,

Writing and Language | Transitions

The SAT may also test your knowledge of transitions in another way. Take a look at the example below:

Studies have found that those students who excel in psychology in high school often do better than students who excel in other subjects in both verbal and quantitative exercises. These assertions can be substantiated through the examination of test scores on the SAT exam. 1

1. Which choice most effectively combines the sentences at the underlined portion?
 - A) exercises as
 - B) exercises, but these assertions can be
 - C) exercises, which can also be
 - D) exercises, although they are

Just as we do with other transition questions, we examine the relationship between the two pieces that come before and after the part we want to combine.

a. What is the part prior to the underlined portion discussing? _____

b. What is the part after the underlined portion discussing? _____

c. What is the relationship between the two parts? _____

d. Which answer choice most effectively combines the two pieces? _____

Writing and Language | Transitions Practice

In 1975, there were only 60 computers on this new network, and since most users were unsure exactly what to do with it, 1 it did not gain popularity. Most people saw no need to spend thousands of dollars to join the network themselves.

- Which choice most effectively combines the sentences at the underlined portion?
 - many people saw
 - popularity was not achieved, leading many people to see
 - there was no reason for people to see
 - although it did not gain popularity, people saw

Complicating the Homeric question is that Homer himself seems to have cared little about consistency and accuracy. Told in the third person, Homer's epics are full of contradictory 2 details. For example, in *The Iliad* a Trojan warrior, Cromios, is killed by Diomedes.

- Which choice most effectively combines the sentences at the underlined portion?
 - details, but in *The Iliad*, a Trojan
 - details, such as in *The Iliad* when a Trojan
 - details, while in *The Iliad* a Trojan
 - details, and *The Iliad*'s Trojan

One particularly good example of such a species is the whale 3 shark. A whale shark can be described as a carnivorous fish that is indigenous to warm tropical waters all around the world.

- Which choice most effectively combines the sentences at the underlined portion?
 - shark, which is a
 - shark, though this can be defined as a
 - shark, in addition to being a
 - shark, a

The five tribes designed quite an elaborate political 4 system. This included a bicameral (two-house) legislature, much like the British Parliament and modern U.S. Congress.

- Which choice most effectively combines the sentences at the underlined portion?
 - system, including a
 - system, which was to include a
 - system, despite including a
 - system, in addition to creating a

Writing and Language | Parallelism Approach & Drill

Parallelism is the balancing of similar words, phrases, or clauses that have the same grammatical structure. This balancing can occur within a single sentence or over a paragraph. The SAT most often tests parallelism in the form of lists. A common mistake made when writing long sentences is the “inconsistent list” mistake. You must express all the objects, people, or actions in consistent form.

Incorrect Example: Abed loves hockey, *playing* football, and jogging.

In this list, “hockey” and “jogging” are nouns, while “playing football” is an action.

Corrected Example: Abed loves hockey, *football*, and jogging.

When you recognize that a question has answer choices that are members of a list, follow the approach below:

Check to see that all items in the list are in **parallel form**.

To do so, focus on the members of the list that are not underlined. Since these cannot be changed, the underlined portion must be amended to match this form. If the underlined portion is an adjective, the correct answer must be an adjective. If it's a verb in the “-ing” form, the correct answer must be a verb in that form. And so on.

Rewrite the sentences below, fixing the errors that exist.

1. *The Daily Show with Trevor Noah* first aired in 1996 under the name *The Daily Show*; each episode consisted of an opening monologue, satirical sketches, and interviewing a celebrity.

Rewrite the sentence: _____

2. It is clear that Alex doubts the proposal’s fairness, Barney disputes its effectiveness, and my questions are its legality.

Rewrite the sentence: _____

3. Everyone contributed to the charity breakfast: Larry cooked eggs, Ervin fried bacon, and Michael’s job was to make the pancakes.

Rewrite the sentence: _____

Writing and Language | Parallelism Practice

I recently decided that a cell phone was the only phone I needed. Why bother with a home phone when a cell phone is capable of taking pictures, play music, and download attachments?

1. A) NO CHANGE
B) is able to take pictures
C) is good at picture taking
D) takes pictures

One of the world's leading architects, Frank Gehry is no stranger to controversy. Supporters admire his originality, his bold vision, and there is a love of his willingness to take risks.

2. A) NO CHANGE
B) they admire his willingness to take risks.
C) the willingness for taking risks.
D) his willingness to take risks.

Armstrong's pioneering style in scat singing popularized vocal jazz by incorporating syllabic improvisations reflecting rapid changes of pitch articulation, tonality, and resonating.

3. A) NO CHANGE
B) pitch articulation, tonality, and resonance.
C) pitching articulation, tone, and resonating.
D) articulating, toning, and resonating.

The PhD candidate's goals are usually threefold: to find a great advisor, researching a compelling topic, and to pen an astute dissertation.

4. A) NO CHANGE
B) to find a great advisor, researching a topic that compels and writing an astute dissertation.
C) found a great advisor, researched a compelling topic, and penned an astute dissertation.
D) to find a great advisor, to research a compelling topic, and to pen an astute dissertation.

Writing and Language | Redundancy Approach & Drill

Redundancy means repeating a word, thought, or idea unnecessarily. Correct and clear grammar is concise and free of unnecessary repetition.

Incorrect Example: After capsizing, the Titanic sunk *under the water* to a depth of several thousand feet *below sea level*.

To identify a question that is testing redundancy, keep an eye out for answer choices that seem to say the same thing, but are just phrased differently. One particular warning sign is if you see synonyms for the same word in an answer choice.

To approach a question you deem to be redundancy, begin by testing **the shortest answer choice**.

If that choice works, confidently select it and move to the next question. In order to work, the sentence must be a grammatically correct and complete sentence. An answer choice will not be wrong simply because “it doesn’t include enough information,” so if the shortest answer choice makes sense and says what needs to be said, no need to check the others.

Rewrite the sentences below, fixing the errors that exist.

148

1. Telecommunications satellites orbit above the earth at distances in excess of 30,000 meters over the surface.

Rewrite the sentence: _____

2. During the 2008 Summer Olympics, sprinter Usain Bolt ran the 100 meter dash, a distance of approximately 110 yards, in a time of 9.69 seconds, which broke his own world record of 9.72 seconds.

Rewrite the sentence: _____

3. The rising prices of fashionable clothing have increased dramatically over the past five years.

Rewrite the sentence: _____

Writing and Language | Idioms

Idioms are phrases and combinations of words with meanings and structures that have become standardized through habit and usage. This basically means they are correct because, well, that's just the way it is. Often it is difficult to recognize the correct idiom because we repeatedly hear the incorrect form. An idiom can supplant an equally grammatically correct phrase simply through the virtue of being the common, accepted usage. There are no rules. Idioms are what they are.

The SAT may test you on two types of idioms: prepositional idioms and idioms with -ing/infinitives.

Prepositional Idioms

For prepositional idioms, you must know which preposition to use with a given word. For example, in English we say that we're having a "dispute *over*" something, not a "dispute *for*" something. There is no rule to determine the correct preposition to use. You must be familiar with the phrase or rely on what you think "sounds right." Take a look at the example below:

Incorrect Example: The student was *complying by* the rules when she answered the question in fewer than 100 words.

Corrected Example: The student was *complying with* the rules when she answered the question in fewer than 100 words.

A commonly tested idiom is the phrase "would have" (or "could have"). The correct answer will NEVER be "would of" or "could of", although it may sound like something you hear a lot. What you are actually hearing is the contraction "would've" or "could've."

Idioms with -ing/Infinitives

These types of idioms differ in the verb form they use. Some idiomatic phrases use verbs in the gerund (-ing) form, while other idiomatic phrases use the verbs in the infinitive (to be) form. Again, there are no rules as to why one is right and one is wrong, other than that is just the way we say it. Take a look at the example below:

Incorrect Example: The student was *capable to achieve* a score of 95 on the test.

Corrected Example: The student was *capable of achieving* a score of 95 on the test.

To help prepare yourself for these types of questions, study the chart with common idioms on the next page.

Writing and Language | List of Common Idioms

Idioms	Examples
Argue ... with (a person)	It is not wise to <i>argue with</i> your teacher the day before you ask him for a recommendation letter.
As ... as	<i>As</i> immature <i>as</i> John is, he at least knows better than to drink and drive.
Between ... and	There is no difference <i>between</i> a European size 36 shoe <i>and</i> an American size 6 shoe.
Capable ... of	A determined and diligent student is <i>capable of</i> achieving any score on the SAT.
Comply ... with	Jesse was able to <i>comply with</i> the rules once they were clearly explained.
Composed ... of	The SAT is <i>composed of</i> three parts: Reading Comprehension, Writing & Language, and Math.
Define ... as	Many people <i>define</i> success on the SAT <i>as</i> getting the score needed to attend the school desired.
Different ... from	The behavior of infant boys is <i>different from</i> the behavior of infant girls.
Dispute ... over	The two men had a <i>dispute over</i> whose child was smarter.
Either ... or	Martin will have <i>either</i> the tiramisu <i>or</i> the key lime pie for dessert.
In search ... of	Since the beginning of time, man has been <i>in search of</i> the meaning of life.
Intend ... to	I <i>intend to</i> study six days a week for the SAT.
Mistake ... for	People always <i>mistake</i> me <i>for</i> Janet Jackson.
Neither ... nor	<i>Neither</i> the cat <i>nor</i> the dog liked staying home alone.
Not only ... but also	<i>Invisible Man</i> is <i>not only</i> well written <i>but also</i> very entertaining.
Plan ... to	I often <i>plan to</i> study idiomatic phrases but have neglected to and my SAT score is suffering.
Prior ... to	<i>Prior to</i> the elections the mayor's ratings were incredibly high.
Prohibit ... from	In New York people under the age of 21 are <i>prohibited from</i> consuming alcohol.
Regard ... as	Michael Jordan is <i>regarded as</i> the undisputed king of basketball.
Responsible ... for	Parents are <i>responsible for</i> their children.
Responsibility ... to	Students have a <i>responsibility to</i> maintain good grades.
Superior ... to	Joel's peach cobbler is far <i>superior to</i> any store bought one.
Try ... to	<i>Try to</i> stay focused while taking the exam.
Used ... to	Lucia <i>used to</i> only like science, now she likes math as well.

Writing and Language | Diction

Diction means word choice. Many words in English sound alike, look similar, or even have similar meanings. When writing, we must be sure to use the right words.

Example: The biggest problem (**affecting** / **effecting**) our climate in the new millennium is the overproduction of polluting toxins caused by people’s irresponsible and excessive consumption.

Sometimes diction questions will ask you to pick which word, of a group that is similar in meaning, would be the correct fit in a given scenario. Take a look at the example below:

Given the many health benefits of the food, the advantages of kale outsmart the potential drawbacks of its time-consuming and expensive growth and production.

1. A) NO CHANGE
B) outweigh
C) overpower
D) excel

These words have similar meanings, but only one would fit best in the context of the sentence. If you don’t know what a word means, don’t eliminate it right away. Instead focus on attacking the words you do know and keep or eliminate them accordingly. If you have eliminated all of the others, select the one you may not know. If you find another one that works, select that. Below is a list of commonly mixed-up words.

Word Pair	Meanings
Accept/Except	To Accept (vb): To consent to receive something; to believe Except (preposition): Not including
Affect/Effect	To Affect (vb): To make a difference to Effect (n): A consequence
Allot/A Lot	To Allot (vb): To give A lot: Many
Allude/Elude	Allude (vb): To hint at Elude (vb): To evade
Compliment/Complement	Compliment (n): A nice thing to say about someone Complement (n): Something that completes something
Illicit/Elicit	Illicit (adj): Illegal Elicit (vb): To evoke a response
Its/It’s	Its (pronoun): Belonging to one thing It’s (contraction): It is
Perspective/Prospective	Perspective (n): Point of view Prospective (adj): Likely to happen in the future
Principal/Principle	Principal (n): The person who runs a school, (adj): Primary Principle (n): A fundamental truth
Then/Than	Then (adv): At that time Than (preposition): Used in a comparison
There/Their/They’re	There (adv): At that place Their: Belonging to multiple people They’re (contraction): They are
Waste/Waist	Waste (vb): To use or expend carelessly or to no purpose Waist (n): Part of the human body below the ribs and above the hips
Whose/Who’s	Whose (pronoun): Belonging to someone Who’s (contraction): Who is

Keep an eye out for words in the answer choices that are similar – in meaning or spelling – to other words we commonly use.

Writing and Language | Idioms & Diction Drill

Rewrite the sentences below, fixing the errors that exist.

1. I'm going to try and find a new pair of shoes to go with these pants.

Rewrite the sentence: _____

2. If the convention had not been scheduled for the same week, there would of been enough rooms in the hotel for everyone.

Rewrite the sentence: _____

3. The epidemics in influenza and meningitis has paralyzed airline traffic for two weeks.

Rewrite the sentence: _____

4. From Letta's prospective, politicians seemed far more interested in winning votes than in working for economic justice.

Rewrite the sentence: _____

5. In order to participate in the tournament, Greendale High School had to field the full compliment of debaters.

Rewrite the sentence: _____

6. The judge found no clear way to assess who's fault the accident was.

Rewrite the sentence: _____

Writing and Language | Redundancy, Idioms & Diction Practice

In the movie's opening scene, a missile

¹ that is fired and consequently launched and projected from the deck of an aircraft carrier lands harmlessly in the ocean.

- A) NO CHANGE
 B) fired
 C) fired and thereby projected
 D) fired and consequently propelled

My grandmother is five feet tall and weighs barely

one hundred pounds. She doesn't exactly fit the stereotype ² associated with that of a typical fan of death metal.

- A) NO CHANGE
 B) that is often viewed as closely connected with that of
 C) that is linked to that for
 D) of

As Friday night draws near, my grandmother begins

preparing for forty-eight hours of non-stop clubbing. She eagerly reads the weekly listing of concerts ³ that comes out once a week.

- A) NO CHANGE
 B) that is published on a regular basis.
 C) that appears regularly.
 D) DELETE the underlined portion and end the sentence with a period.

Writing and Language | Redundancy, Idioms & Diction Practice

At the opening night of the hottest new musical on Broadway, the elaborate and flawless choreography 4 illicited uproarious applause.

4. A) NO CHANGE
B) illicit
C) eliciting
D) elicited

Throughout multiple conversations over the following months, Elyse did her best 5 to elude to her secrets without directly revealing them.

5. A) NO CHANGE
B) towards eluding
C) to allude
D) try and elude

Some scholars believe a comprehensive look at US History must include 6 an acknowledgement about settler colonialism and imperialism.

6. A) NO CHANGE
B) an acknowledgement of
C) an acknowledgement that
D) an acknowledgement around

My great grandfather Earl had 7 a tendency to overeat when there were jelly donuts available for breakfast.

7. A) NO CHANGE
B) a tendency toward overeating
C) a tendency for overeating
D) a tendency of overeating

Although I repeatedly explained I had rear-ended her 8 car by accident, my mother did not believe me.

8. A) NO CHANGE
B) car on accident,
C) car, by accident,
D) car and on accident,

Writing and Language | Putting It All Together

Directions: Complete the full passage below, using all of the grammar rules we just discussed.

The Best Lesson

Chelsea hated math with all the angst only a 14-year-old girl can muster.

I was volunteering as a peer tutor the summer before my senior year in high school, and Chelsea was assigned to me. She had failed her required eighth grade pre-algebra class, which she needed to pass.

When Chelsea and I began to study, she was reluctant to even try. She showed up late for appointments and did not complete her homework. I struggled to convince her that doing well in math was important for her future.

I wasn't going to give up on Chelsea, though. With basic math skills, we started from fractions and decimals to organization. I kept our sessions light and fun but focused on encouraging her. Slowly, Chelsea started getting math problems right. We gradually increased the difficulty of the work. Chelsea continued to improve.

I will never forget the day Chelsea walked into our session and said, "You know, this math stuff isn't so bad." I was floored. She reluctantly admitted that she even sort of liked doing her math homework, which she had never liked doing before.

1

- A) NO CHANGE
- B) that she needed to pass.
- C) which was needed by her to pass.
- D) OMIT the underlined portion.

2

- A) NO CHANGE
- B) study she, was
- C) study, she, was
- D) study, being

3

- A) NO CHANGE
- B) We started with basic math skills, from fractions and decimals to organization.
- C) From fractions and decimals to organization, we started with basic math skills.
- D) We started, from fractions and decimals to organization, with basic math skills.

4

- A) NO CHANGE
- B) work, and Chelsea continued
- C) work and continued
- D) work and Chelsea continued

5

- A) NO CHANGE
- B) She reluctantly admitted that she even sort of liked doing her math homework, especially if she was in the library where it was quiet.
- C) She reluctantly admitted that she even sort of liked doing her math homework.
- D) OMIT the underlined portion.

Writing and Language | Putting It All Together

Chelsea started showing up on time for appointments and consistently completing her homework. We even added in extra sessions before her big final. When she got her final grades, I was astounded; she had not only passed her course, but she had received an A on the final!

Later that year, Chelsea's mother told me what a difference I will make in her daughter's life. Not only was Chelsea earning a B+ in Algebra, yet all of her other grades had also risen and gone up. Chelsea was eager to do well in school for the first time in her life, and her mother could not thank me enough.

Chelsea affected me as much as I affected her. When I felt overwhelmed now I try to figure out what the fundamentals of the issue are in order to fix the situation. Slowly, I too gain the confidence needed to solve the problem.

6

- A) NO CHANGE
- B) had made
- C) make
- D) had make

7

- A) NO CHANGE
- B) her daughters' life.
- C) her daughters life.
- D) hers daughter's life.

8

- A) NO CHANGE
- B) but
- C) and
- D) while

9

- A) NO CHANGE
- B) risen from the low grades they were before.
- C) risen, this meant higher grades.
- D) gone up.

10

- A) NO CHANGE
- B) will have felt
- C) had felt
- D) feel

11

- A) NO CHANGE
- B) now, I try to figure out, what are the fundamentals of the issue
- C) now, I try to figure out what the fundamentals of the issue are
- D) now, I try, to figure out, what the fundamentals of the issue are

Writing and Language | Putting It All Together

Directions: Complete the full passage below, using all of the grammar rules we just discussed.

Schools and School Life

*Adapted from *Child Life in Colonial Days*, by Alice Morse Earle

A great contrast of conditions exist between the schooling practices in the colonial period and that of today. Small, uncomfortable schoolhouses with scant furnishings, few and uninteresting books, tiresome and indifferent methods of teaching, and great severity of discipline were typical of schools during colonial times. Yet, with all these disadvantages, children still obtained an education, as a result an education was deeply desired; no difficulties could chill that deep-lying longing for learning. Not only did parents strive for the education of their children, but the colonies assisted by requiring the building and maintaining of a school in each town in which there was a sufficient number of families and scholars. Rhode Island was the only New England colony that did not compel the building of schoolhouses and the education of children.

Massachusetts was so determined to have schools that in 1636, it was only six years after the settlement of Boston, the General Court, which was composed of representatives from every settlement in the Bay Colony, gave over half the annual income of the entire colony to establish the school which two years later became Harvard College. This event is distinguished in history as the first time any group of people in any country ever gave its own money to found a place of education. This event is distinguished in history as the first time any group of people in any

1

- A) NO CHANGE
- B) exist among
- C) exists between
- D) that exists between

2

- A) NO CHANGE
- B) them
- C) this
- D) those

3

- A) NO CHANGE
- B) teaching using methods that are tiresome and indifferent,
- C) using teaching methods that are tiresome and indifferent,
- D) rarely learning because the teaching methods are tiresome and indifferent,

4

- A) NO CHANGE
- B) therefore
- C) for
- D) nevertheless

5

- A) NO CHANGE
- B) only six years after the settlement of Boston;
- C) which was only six years after the settlement of Boston
- D) only six years after the settlement of Boston,

Writing and Language | Putting It All Together

country ever gave their own money to found a place of education.

New England at that time was controlled, both in public and private life, by Puritan ministers who felt that unless school and college flourished, the church and state would not survive. In spite of a law passed in Massachusetts in 1647, every town of fifty families must provide a school in which children could be taught to read and write. The Connecticut Code of Laws written in 1650 had the same requirement.

These schools were public but were not free, they were supported at the expense of the parents. In 1644, the town of Salem in Massachusetts tackled the issue of some families not being able to pay for its students' schooling by requiring that the town pay for it. A list of all the children in the town was made, and if the parents were well-to-do, they had to pay whether their children attended school or not.

6

- A) NO CHANGE
- B) had gave its own
- C) gave its own
- D) had given their own

7

- A) NO CHANGE
- B) had been feeling
- C) had a feeling
- D) feel

8

- A) NO CHANGE
- B) According to
- C) Although there existed
- D) Because of

9

- A) NO CHANGE
- B) in 1647; every town
- C) in 1647: every town
- D) in 1647 – every town

10

- A) NO CHANGE
- B) was not free because it was
- C) were not free; they were
- D) were not free; being

11

- A) NO CHANGE
- B) its students schooling
- C) their student's schooling
- D) their students' schooling

Writing and Language | Putting It All Together

Directions: Complete the full passage below, using all of the grammar rules we just discussed.

Space Nomads

by Lincoln & Jean LaPaz

Defined in scientific terms, a meteor is the streak of light, (usually of brief duration) that accompanies the flight of a particle of matter from outer space through our atmosphere. This particle may be as small as a tiny dust grain or as large as one of the minor planets called asteroids. Fortunately for the inhabitants of the earth, most of the meteor-forming masses encountered by our globe are of the small variety.

As the rapidly moving particle plunge earthward through denser and denser layers of atmosphere, the air molecules offer ever-increasing resistance to their passage. This resistance heats up the meteorite body until it glows. Technically speaking, it becomes incandescent, meaning that it is emitting light as a result of being heated. The meteor is this incandescence. We see it as a ball of white, orange, bluish, or reddish light. But the material object that produced this light is the meteorite.

Many of the meteors we observe represents the heat-induced evaporation of exceedingly small fragments of cosmic matter. The smallest meteor-

1

- A) NO CHANGE
- B) light (usually of brief duration) that
- C) light, (usually of brief duration), that
- D) light usually of brief duration, that

2

- A) NO CHANGE
- B) earth; most
- C) earth. Many
- D) earth: many

3

- A) NO CHANGE
- B) the rapidly, moving, particle plunge
- C) the rapidly, moving particle, plunges
- D) the rapidly moving particle plunges

4

- A) NO CHANGE
- B) densest
- C) the more denser
- D) the increasingly denser

5

- A) NO CHANGE
- B) its
- C) it's
- D) its'

6

- A) NO CHANGE
- B) one observes represents
- C) we observe represent
- D) one observe represent

Writing and Language | Putting It All Together

forming bodies 7 that reach the surface of the earth only as the finest of dust particles or as microscopic droplets of solidified meteorite melt. These residues 8 descended slowly through the atmosphere and may be carried for great distances. 9 Afterwards, they may be found scattered so widely and uniformly on the ground that their presence in any given locality cannot be accounted for by the fall of any specific meteorite. If sizable chunks of meteoritic material enter the atmosphere, they may produce exceptionally large and brilliant meteors. A spectacular meteor is generally known as a “fireball,” and may appear as bright as Venus or Jupiter. It receives the French term *bolide* if, in addition to showing great brilliance, its flight is accompanied by explosions.

The term “shooting star,” 10 is often applied to meteors, is a misnomer. A meteor is not a distant star in rapid motion, for the whole path of the meteor lies within a restricted zone of the earth’s atmosphere. The word “meteor” comes from the Greek word *meteora*, which once applied to any natural occurrence in the atmosphere, and included things 11 such as: rainbows, halos, and auroras. Nowadays, the word “meteor” is used in a much more specialized sense than it was by the ancient Greeks.

7

- A) NO CHANGE
- B) which
- C) they
- D) OMIT the underlined portion.

8

- A) NO CHANGE
- B) descend slowly
- C) were descending slowly
- D) made a slow descent

9

- A) NO CHANGE
- B) As a result,
- C) Initially,
- D) Despite this,

10

- A) NO CHANGE
- B) can often be applied
- C) which is often applied
- D) is applied often

11

- A) NO CHANGE
- B) such as; rainbows, halos, and auroras.
- C) such as rainbows halos and auroras.
- D) such as rainbows, halos, and auroras.

Writing and Language | Argument Logic

While we've spent a lot of time discussing grammar rules thus far, there are other questions on the Writing & Language section as well. These are known as Style and Organization questions. The majority of these questions will be Argument Logic questions and will ask you to judge whether a phrase or sentence is appropriate in context, makes logical sense, or maintains the focus of the passage. Many times Argument Logic questions will test these concepts by asking you to insert or delete text. The most important step when dealing with these questions is to make sure you really understand the question and what it is asking.

Argument Logic Approach

1. Identify the Question Type.

Many Argument Logic questions begin with the phrase "Given that all the choices are true..." If you are asked to support a point, insert or delete specific text, conclude a paragraph, or answer a clearly non-grammatical question, you are most likely dealing with an Argument Logic question.

2. Determine Precisely What the Question is Asking.

Each Argument Logic question will be very specific in what it is asking. Figure out the particular piece of information the question wants.

3. Process of Elimination.

Once you have determined what the question is asking, eliminate any answer choice that does not satisfy it. Don't worry yet about choosing the right answer; just get rid of the wrong ones. (If a question is specifically asking you about adding or deleting a piece of text, the general reasons why you would delete something or why you would opt NOT to add it, are because it either repeats information that has previously been said, or it deviates from the main idea of the paragraph or passage. If a piece of text does neither of those things, you are most likely going to select one of the answers that involves adding or not deleting it.)

4. Compare Remaining Choices.

Identify the differences between any remaining answer choices to determine which choice has the precise information specified.

Writing and Language | Argument Logic

Aunt Anna's Amazing Aptitude

My aunt Anna has a truly amazing aptitude, the skill to advise people well. When I have a dilemma, I go to my aunt for advice. She listens attentively and somehow precisely knows my sentiments. Most people she knows bring her their problems and ask for her advice. My aunt recognizes the importance of helping one another. My friend Stephanie says that her family is so busy that no one is ever home to ask for help.

Her job requires her to go to social events and sometimes I go with her. I have watched her closely at these events; her eyes remain set on whoever is speaking, and she makes a note of every detail.

- Which of the following true statements, if added here, would best strengthen the assertion that many people ask Aunt Anna for advice?
 - Even my own brother takes his problems to her more readily than he does to our parents.
 - Sometimes Aunt Anna asks for my advice.
 - Lately, Aunt Anna has encouraged us to try to find our own answers to our problems.
 - She always gives appropriate and helpful advice.
- The writer is considering deleting the underlined sentence. Should the writer make this deletion?
 - Yes, because the sentence doesn't further the writer's point about her aunt.
 - Yes, because the sentence undermines the writer's point that people are too busy to help.
 - No, because the sentence includes an important support to the writer's main point.
 - No, because the sentence provides a necessary transition to the next paragraph.

Identify the Question Type

Question 1 asks us to strengthen an assertion. Question 2 asks us whether or not to delete a piece of text. Therefore they are both Argument Logic questions.

Determine Precisely What the Question is Asking

Question 1 asks us to give additional evidence that “many people” seek Aunt Anna’s advice. We need an answer that shows people seeking out her advice. Question 2 asks about deleting a sentence. We must figure out what, if anything, that sentence adds to the passage.

Process of Elimination

Which of the choices from question 1 could we eliminate? _____

In question 2, we see a “yes or no” format. Should it be yes or no? _____

What can we eliminate? _____

Compare Remaining Choices

Compare any remaining choices.

In question 1 we would pick _____.

In question 2 we would pick _____.

Writing and Language | Argument Organization

Argument Organization questions ask you to order sentences or paragraphs so they present the most logical and coherent argument. Whenever you see numbers or letters before sentences or above paragraphs, you know there will be an Argument Organization question. Try to determine the main ideas of the sentences or the paragraphs and then order them so there is a logical bridge between the main ideas. You can use the answer choices to determine where to place the sentence or paragraph, and then rule out any choice that makes the passage incoherent.

Argument Organization Approach

1. Identify the Question Type

Argument Organization questions will always have numbers or letters above paragraphs or next to sentences. The question will ask you to move a piece of text that is already present in the passage.

2. Read the Referenced Text

Read the piece of text you are being asked to move and identify the main idea. Try to infer what type of information the passage should be talking about directly before where this text would fit, or what type of information would make sense directly following the text. If you know what you are looking for before going to the answer choices, it will be easier to complete the remaining steps.

3. Process of Elimination

Use the answer choices as your guide. Work your way through them chronologically, placing the text wherever each specifies. Eliminate any choice that does not flow coherently and does not match your inference from step 2.

4. Reread and Choose

Take the remaining answer choice and reread the sentences or paragraphs to make sure the passage is coherent.

Writing and Language | Argument Organization

Aunt Anna's Amazing Aptitude

[1] It sometimes requires her to go to social events and conferences, providing feedback to the various presenters.

[2] I have watched her at some of the events when I am allowed to go; her eyes remain set on whoever is speaking, and she makes a note of every detail. [3] For her job, my aunt is often asked to give advice to her fellow workers and acquaintances. [4] My aunt then demonstrates what a true counselor should be by giving advice that is helpful and beneficial.

1. For the sake of logic and coherence, sentence 3 should be placed

- A) where it is now.
- B) before sentence 1.
- C) before sentence 2.
- D) after sentence 4.

Identify the Question Type

We have numbers next to sentences, and the question asks us where a specific sentence should be placed; therefore, we have an Argument Organization question.

Read the Referenced Text

What is the main idea of Sentence 3? _____

What type of information should come directly before or directly after this sentence? _____

Process of Elimination

Which of the choices would you keep or eliminate?

A) _____

B) _____

C) _____

D) _____

Reread and Choose

After rereading, the best choice is _____.

Writing and Language | Infographics

We see infographics in both the Reading section as well as the Writing and Language section. When you see an infographic on the Writing and Language section, follow the approach below.

Infographic Question Approach

1. Digest the Information in the Infographic

Carefully look at the information presented and get a sense of what the primary idea is. Think about how this idea relates to the passage or paragraph as a whole.

2. Read the Question

Focus specifically on what you are being asked to do. If the infographic is in the question itself, you will likely be asked whether to add it into the passage or not. If it is in the passage itself, the question may ask you something like which answer choice uses the information presented in the infographic to support a claim made in the passage. Knowing clearly what you need to answer makes it less likely that you will make a silly mistake.

3. Process of Elimination

Use the answer choices as your guide. Eliminate anything that does not make sense with the information you observed in the graphic.

Writing and Language | Practice

Westsider Marc Connelly

*Adapted from *100 New Yorkers of the 1970s*, by Max Millard

Eleven years ago, when I was in high school, I saw a movie that made a deep impression on me. It was a film of a stage play called ¹ *The Green Pastures* — a fascinating look at life in biblical times, performed by an all-black cast.

² The memory of that film has remained in my consciousness like a religious experience although I never knew who wrote the play or when it was written. Therefore, it was a welcome surprise to learn that the playwright, Marc Connelly, lived just down the hall from me in my apartment building.

After speaking with him in person, my fascination with his life and career ³ continues to grow. Connelly was born in a small Pennsylvania town, the son of a pair of traveling actors.

1

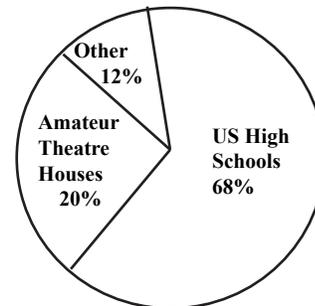
- A) NO CHANGE
- B) The Green Pastures; a fascinating look
- C) The Green Pastures. A fascinating look
- D) *The Green Pastures*; which is a fascinating look

2

At this point, in order to incorporate specific information from the infographic below, the author wishes to add the following sentence:

Although *The Green Pastures* is considered an American classic, it is now performed mostly by schools and amateur companies.

Productions of *The Green Pastures* from 2012-2018



Should the author make this addition?

- A) No, because the sentence detracts from the main point of the passage.
- B) No, because it does not make sense that an American classic would only be performed by schools and amateur companies.
- C) Yes, because the sentence provides details about the significance of the play in American culture.
- D) Yes, because the sentence explains why the film had such a profound impact on the author.

3

- A) NO CHANGE
- B) was continuing to grow
- C) is continuing to grow
- D) continued to grow

Writing and Language | Practice

He wrote *The Green Pastures* in 1930; it won that year's Pulitzer Prize for drama. In his 70-year career, Connelly wrote dozens of plays.

However, Connelly was not simply a playwright. He excelled as an actor, director, producer, writing plays at Yale, and was even a very popular lecturer. He wrote musicals, stage plays, movie scripts and radio plays, which used to be a wildly popular form of entertainment prior to the explosive popularity of the television.

Connelly was one of the original staff members of the *New Yorker* magazine. One of the short stories he wrote for the magazine won an O. Henry, an award given to short stories of exceptional merit. Despite all of his success, he enjoyed writing short stories more than novels.

During our conversation, some of the most interesting stories Connelly relayed to me were tidbits about his involvement in the Algonquin Round Table, it was a group of celebrated New York writers who met for lunch daily for almost ten years. As Connelly tells it, the lunches were filled with wisecracks, wordplay, and witticisms, the majority of which end up in the newspaper columns of those involved.

4

- A) NO CHANGE
- B) in 1930. And it won that year's Pulitzer Prize
- C) in 1930, it won that year's Pulitzer Prize
- D) in 1930; it won that years Pulitzer Prize

5

- Which phrase most effectively sets up the examples in the following sentence?
- A) NO CHANGE
 - B) also an incredible
 - C) not always the most well-known
 - D) only a

6

- A) NO CHANGE
- B) as an actor, directing, producing playwrighting professor at Yale,
- C) as an actor, director, producer, and playwrighting professor at Yale,
- D) as an actor, director, producer, writing plays at Yale;

7

- Which choice best elaborates on the phrase at the beginning of the sentence?
- A) NO CHANGE
 - B) he was extremely well-known in literary circles.
 - C) his first novel wasn't published until he was 74 years old.
 - D) he attributed his ideas he got while walking around the city.

8

- A) NO CHANGE
- B) Table, a group of celebrated
- C) Table; a group of celebrated
- D) Table; which was a group of celebrated

9

- A) NO CHANGE
- B) had been ending up in the newspaper columns
- C) would end up in the newspaper columns
- D) will end up in the newspaper columns

Writing and Language | Practice

It was at the Round Table that Connelly met

George Kaufman, with who he teamed up to pen five comedies.

One of the comments that Connelly made during our interaction really stuck with me, mainly because it was the first thing he said after he opened the door and welcomed me inside. “Theater is probably the greater of all social instruments man ever invented. All religions have sprung from the theater.”

10

- A) NO CHANGE
- B) who
- C) with whom
- D) whom

11

- A) NO CHANGE
- B) the greatest social instruments
- C) the greatest social instrument
- D) the greater social instruments

Writing and Language | Practice

The Galapagos Islands

[1] Seeing as many may have heard of the Galapagos Islands, most are not aware of the incredible importance of this archipelago. This chain of islands is comprised of nineteen individual islands located near the coast of Ecuador. It was named for the multitude of galapagos, or tortoises, that traverse the land. The islands [2] were formed millions of years ago and was first discovered by European explorers in the 1500s.

[2] Darwin spent five weeks on the Galapagos Islands [3] only, gathering data and observing species. He spent the next twenty years, however, writing *The Origin of Species*, which was based on the theories of evolution and natural selection that he formulated as a result of these observations.

[3] [4] The tortoises on the Galapagos are the largest in the world. The islands have remained a vast resource for scientists even today studying evolution, ecology, and geology.

1

- A) NO CHANGE
- B) Since
- C) While
- D) Because

2

- A) NO CHANGE
- B) was formed millions of years ago and was first discovered
- C) formed millions of years ago and were first discover
- D) were formed millions of years ago and were first discovered

3

The best placement for the underlined portion would be

- A) where it is now.
- B) before the word *Galapagos*.
- C) after the word *spent*.
- D) before the word *Darwin*.

4

Which choice is the most effective first sentence of Paragraph 3?

- A) NO CHANGE
- B) Darwin was the first scientist to study the Galapagos Islands, but he was certainly not the last.
- C) *The Origin of Species* sparked controversy in schools across the United States when it was published.
- D) The Galapagos Islands were formed by a series of volcanic eruptions.

Writing and Language | Practice

5 In fact, the Galapagos Islands are considered to be

6 the world's largest, most complex and diverse

group of islands that have remained largely

unaltered by human contact.

[4]

Beyond this diversity, which is invaluable to scientists, the rapid rate of 7 evolution, on the islands offers an opportunity found nowhere else in the

world. Species on the islands are faced with many

8 difficulties: extreme variation in the climate,

isolation from any mainland population, isolation

between the islands themselves, and very low

populations of species. The conditions that these plants

and animals must 9 endure makes survival a

challenge for any species. Therefore, the natural

selection process is made evident in a much

shorter time span. Evolution studies that elsewhere

would take many decades to hundreds of years can be

conducted in ten to twenty years on the Galapagos

Islands.

[5]

It is this vital and unique characteristic of the Galapagos Islands that makes them so essential to conserve.

5

- A) NO CHANGE
- B) However,
- C) In the other hand,
- D) For a reason,

6

- A) NO CHANGE
- B) the world's largest, most diverse
- C) the world's largest and biggest, most complex and diverse
- D) one of the world's largest as well as one of the most complex and diverse

7

- A) NO CHANGE
- B) evolution on the islands offer,
- C) evolution on the islands, offer
- D) evolution on the islands offers

8

- A) NO CHANGE
- B) difficulties
- C) difficulties;
- D) difficulties,

9

- A) NO CHANGE
- B) endure make
- C) endures makes
- D) endures make

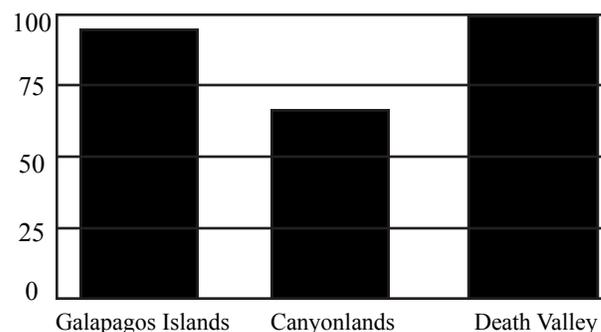
Writing and Language | Practice

10 Under 75 percent of the land is protected as a national park, but the area is still threatened by the growing human population and the tourism industry.

11

10

At this point in the passage, the author wishes to add statistical evidence to support the main idea.



Percentage of Protected Land in National Parks

Judging by the information presented in the graph above, which of the following choices is best?

- A) NO CHANGE
- B) Over 90 percent of the land is protected as a national park, but the area is still threatened
- C) A smaller percentage of the land in Death Valley is protected, but the area is still threatened
- D) Unlike in Death Valley, 100 percent of the land is protected, but the area is still threatened

11

Upon reviewing this essay, the author realizes that he left out some important information. He wants to add the following sentence:

Their worldwide fame, though, began in 1835 when Charles Darwin visited the islands.

The most logical and effective place to add this sentence would be after the last sentence of which paragraph?

- A) 1
- B) 2
- C) 3
- D) 4

Writing and Language | Practice

How to Tell a Story

*Adapted from *How to Tell A Story and Others*, by Mark Twain

I do not claim that I can tell a story as it ought to be told. I only claim to know how a story ought to be told, for I have been in the company of expert story-tellers for many years.

There are several kinds of stories, but only one difficult kind—the humorous. I will talk mainly about that one. The humorous story is American. The comic story is English, and the witty story is French. The humorous story depends upon the manner of the telling for its effect; the comic story and the witty story depend upon the matter.

The humorous story may be spun out at great length, may wander around as much as it pleases, and ultimately may arrive nowhere in particular. The comic and witty stories, on the other hand, must be brief and end with a point. The humorous story bubbles gently along; the others burst.

1

- A) NO CHANGE
- B) one difficult kind; the humorous.
- C) one difficult, kind, the humorous.
- D) one difficult—kind, the humorous.

2

Which choice most effectively combines the underlined sentences?

- A) The humorous story is American, but the comic story is English, and the witty story is French.
- B) The humorous story is American but while the comic story and witty story are English and French respectively.
- C) The humorous story is American, while the comic story is English and the witty story French.
- D) The humorous, comic and witty stories are of American, English and French.

3

Which of the following alternatives to the underlined portion would be LEAST acceptable?

- A) however
- B) on the contrary
- C) despite
- D) though

Writing and Language | Practice

The humorous story is strictly a work of art—high and delicate art—and only an artist can tell it. No art is necessary in telling the comic and the witty story; anybody can do it. The art of telling a humorous stories have been created in America, and has remained at home.

[1] The humorous story is told gravely; the teller does his best to conceal the fact that he even dimly suspects that there is anything funny about them.

[2] However, the teller of the comic story tells you beforehand that it is one of the funniest things he has ever heard, then tells it with eager delight, and is the first person to laugh when he gets through. [3] And sometimes, if he has had good success, he is so glad and happy that he will repeat the punch line and glance around from face to face, collecting applause, and then repeat it again. [4] It is a pathetic thing to see.

Very often, of course, the rambling and disjointed humorous story finishes with a point, a snapper, or whatever you may call it. At that point, the listener must be alert, for in many cases the teller will divert attention from that snapper by dropping it in a carefully casual and indifferent way, with the pretense that he does not know it is supposed to be funny.

4

- A) NO CHANGE
- B) have created
- C) was created
- D) were created

5

- A) NO CHANGE
- B) it
- C) him
- D) those

6

- A) NO CHANGE
- B) he will have been so glad so
- C) he is so happy that
- D) he will be so glad and happy that

7

- If the writer were to delete sentence 4, the essay would primarily lose
- A) an explanation of why the author feels a certain way about comic stories.
 - B) a description of the author's feelings towards a specific type of story-teller.
 - C) conflicting information about how the author feels about a story and how popular that type of story is.
 - D) a suggestion that comic story-tellers instead tell humorous stories.

Writing and Language | Practice

Artemus Ward used that trick a good deal; then when the audience belatedly caught the 8 innocent joke, he would look up with surprise as if wondering what they had found to laugh at. But the teller of the comic story does not gloss over 9 its 10 joke; he shouted it at you every time. And when he prints it in England, France, Germany, or Italy, he italicizes it, puts some whooping exclamation-points after it, 11 and sometimes explained it in parenthesis. All of this is very depressing and makes one want to renounce joking and lead a better life.

8

For the sake of logic and coherence of this sentence, the underlined portion should be placed

- A) where it is now.
- B) after the word *belatedly*.
- C) before the word *surprise*.
- D) before the word *wondering*.

9

- A) NO CHANGE
- B) its'
- C) it's
- D) their

10

- A) NO CHANGE
- B) joke; he shouts
- C) joke. He shouted
- D) joke as he shouts

11

- A) NO CHANGE
- B) and sometimes explains
- C) and sometimes is explaining
- D) and sometimes explain

Writing and Language | Practice

Westsider Craig Claiborne

*Adapted from *100 New Yorkers of the 1970s*, by Max Millard

“To be a good restaurant critic, you shouldn’t have a conscience and you must accept that what you write may hurt people’s feelings,” said Craig

Claiborne, food editor of the *New York Times*. “I used to visit restaurants twice a day, frequently seven days a week very often, and lie awake brooding about

whether my reviews were honest — whether I was hurting somebody who didn’t deserve to be hurt.”

While being recognized throughout the United States as the father of modern restaurant criticism,

Claiborne joined the *Times* in 1957 and shortly thereafter was given the go-ahead to write reviews based on a four-star system. “The *New York Times* made the decision. I was the instrument. It was the first newspaper that allowed a restaurant critic to say anything

he wants. It took a lot of guts, when a newspaper depends on advertising.”

Claiborne, a native of Mississippi did not take himself or his work too seriously. He preferred to be called by his first name, dressing in a particularly unfashionable manner, and to spend as little time as possible at his office.

1

- A) NO CHANGE
- B) peoples’ feelings
- C) people’s feelings’
- D) peoples’ feeling’s

2

- A) NO CHANGE
- B) very oftenly
- C) more often than not
- D) OMIT the underlined portion.

3

- A) NO CHANGE
- B) While being recognized throughout the United States as the father of modern restaurant criticism;
- C) Recognized throughout the United States as the father of modern restaurant criticism,
- D) After having been recognized throughout the United States as the father of modern restaurant criticism;

4

- A) NO CHANGE
- B) he wanted.
- C) he has wanted.
- D) you want.

5

Which choice most effectively sets up the examples given in the next sentence?

- A) NO CHANGE
- B) Claiborne was born in the South but loved living in New York City.
- C) Claiborne wrote his reviews as honestly as he could, even when he knew his review might end the career of a chef.
- D) Claiborne was a unique man with a unique sense of style.

6

- A) NO CHANGE
- B) to dress in a particularly unfashionable manner, and spending as little time as possible at his office.
- C) dressing in a particularly unfashionable manner, and spending as little time as possible at his office.
- D) to dress in a particularly unfashionable manner, and to spend as little time as possible at his office.

Writing and Language | Practice

In spite of his earthiness, Claiborne unquestionably ranked as one of the leading food authorities of his time. His articles, which appeared in the *Times* each Monday, Wednesday, and Sunday, covered every subject from the particulars of a dinner in Washington for Chinese Vice-Premier Teng Hsiao-Ping to the six most creative ways to preparing scallops. He wrote numerous best-selling cookbooks and traveled the world on fact-finding missions. Claiborne's rise from obscurity to obtaining the most prestigious food job in America astonished no one more than himself since his qualifications were a principle B.A. in journalism and one years' training at a hotel and restaurant school in Switzerland. However, the *Times* knew exactly what kind of person was needed, and Claiborne quickly proved to be that man. He threw himself into his work with boundless energy, he wrote no fewer than five columns a week, but his relationship with the newspaper eventually became a love-hate affair.

As a result, Claiborne left the paper for almost two years. He agreed to return if the paper would have someone else do the local restaurant reviews; he also requested that his neighbor and cooking partner Pierre Franey share the Sunday byline.

7

- A) NO CHANGE
- B) six most creative ways of
- C) six more creatively ways of
- D) six most creative ways by

8

The best placement for the underlined portion would be

- A) where it is now.
- B) after the word *his*.
- C) after the word *in*.
- D) after the word *qualifications*.

9

- A) NO CHANGE
- B) a years' training
- C) one year's training
- D) one years training

10

- A) NO CHANGE
- B) boundless energy; writing no less than five
- C) boundless energy, he was writing no less than five
- D) boundless energy, writing no fewer than five

11

Which choice most clearly ends the passage with a sentence showing how much the *Times* valued Claiborne?

- A) Claiborne looked forward to returning to the *Times*.
- B) The newspaper's popularity had dropped significantly in his absence.
- C) Pierre appreciated his partner's support.
- D) The conditions were immediately met.

A series of thin, light gray lines radiate from the left edge of the page, fanning out towards the top right corner.

CHAPTER 3

Practice



Writing and Language | Practice

Westsider Cleveland Amory

*Adapted from *100 New Yorkers of the 1970s*, by Max Millard

Its impossible to mistake the voice if you've heard it once — the tone of mock annoyance, the twangy, almost whiny, drawl that rings in the ear. It could easily belong to a cartoon character or a TV pitchman, but it belongs to Cleveland Amory, an affable and rugged individualist who has been a celebrated writer for more than half of his 61 years.

Born, outside of Boston, Amory's writing talent was on display early on, becoming the youngest editor of the *Saturday Evening Post*. His first book, *The Proper Bostonians*, was published in 1947. "Then I moved to New York," he mused, "because whenever I write about a place, I have to leave it."

Amory's next career stop was writing for the *TV Guide*. It was here that Amory achieved his widest fame. Moreover, this was not fulfilling enough for him, and one of the chief reasons he gave for dropping his *TV Guide* column after 15 years was that "after years of trying to decide whether the Fonz is a threat to Shakespeare, I wanted to write about things that are more important then that."

He was the magazine's star columnist from 1963 to 1976; at which point he gave it up in order to devote his time to other projects, especially the Fund for Animals, a non-profit humane organization he founded in 1967. He has served as the

1

- A) NO CHANGE
- B) It is impossibly
- C) Its' impossible
- D) It's impossible

2

- A) NO CHANGE
- B) a talent for writing was displayed early on
- C) displaying a talent for writing early on
- D) he displayed his writing talent early on

3

The author is considering deleting the following phrase from the preceding quote:

because whenever I write about a place, I have to leave it.

If the writer were to make this deletion, the essay would primarily lose

- A) a specific factor that led to Amory's success.
- B) an example of a specific quality of Amory's personality.
- C) an explanation of Amory's actions.
- D) an elaboration on why Amory prefers New York to Boston.

4

- A) NO CHANGE
- B) Thus,
- C) However,
- D) In addition,

5

- A) NO CHANGE
- B) then those.
- C) than that.
- D) than them.

6

- A) NO CHANGE
- B) 1963 to 1976, at which point he gave it up
- C) 1963 to 1976: when, he gave it up
- D) 1963 to 1976. When he gave it up

Writing and Language | Practice

group's president since the beginning.

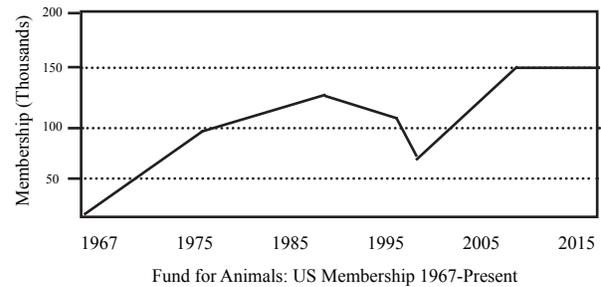
Amory's quest to protect animals from needless cruelty began several decades ago. As a young reporter in Arizona, he wandered across the border into Mexico and witnessed a bullfight.

Shocking that people could applaud the death agony of "a fellow creature of this earth," he began joining various humane societies. Today he is probably the best known animal expert in America.

"A lot of people ask me, 'Why not do something to help children in need, old people who do not have families to look after them, or aiding minorities?'” he said, when asked about why he focuses his efforts particularly on animals. “My feeling is that there's enough misery out there for anybody to work at whatever he wants to. I think the mark of a civilized person is how you treat what's beneath you.”

7

Here, the writer wishes to add a clause that conveys the immense popularity of Amory's Fund for Animals. Which of the following choices best accomplish this?



- A) beginning; group membership dropped sharply in 1996.
- B) beginning; group membership dropped sharply in 1996, but has otherwise steadily climbed over the years.
- C) beginning; as recently as 2015, membership hit 150,000 across the United States.
- D) beginning; as recently as 2015, the group only had 150,000 members across the country.

8

- A) NO CHANGE
- B) beginning
- C) had began
- D) have began

9

Which choice most effectively combines the sentences at their underlined portion?

- A) ago and as
- B) ago when, as
- C) ago because when as
- D) ago but, as

10

- A) NO CHANGE
- B) Shocked that people could applaud
- C) It was shocking that people could applaud
- D) Because he was shocked that people applauded

11

Which choice most closely matches the stylistic pattern established earlier in the sentence?

- A) NO CHANGE
- B) underrepresented minorities
- C) standing up for minority groups
- D) fighting for minority rights through protests

Writing and Language | Practice

The Zodiacal Light Mystery*Adapted from *Curiosities of the Sky*, by Garrett Serviss

There is a singular phenomenon in the sky – one of the most puzzling of ¹² all, that has long captured the attention of astronomers, defying their efforts at explanation. While very few, perhaps even none, of these scientists have ever seen it, ¹³ it's name is often spoken; when one is lucky enough to glimpse it, it exhibits a mystical beauty that charms and awes the beholder. This phenomenon is called The Zodiacal Light, and it marks the sun's annual path through the stars ¹⁴ that it completes on a yearly basis. The Zodiacal Light has given rise to many remarkable theories, and a true explanation of it would probably throw light on a great many other celestial mysteries.

If you are outdoors just after sunset – say, on an evening late in the month of February – ¹⁵ one may perceive, just after the angry flush of the dying day has faded from the sky, a pale ghostly presence rising above the place where the sun went down. The phenomenon brightens slowly with the fading of the twilight and soon assumes the shape of an elongated pyramid of pearly light. This is the Zodiacal Light.

[1] If the night is clear and the moon absent (and if you are in the country, ¹⁶ for city lights ruin the spectacles of the sky), you will be able to watch the apparition for a long time. [2] You will observe that the

12

- A) NO CHANGE
- B) all, which has
- C) all – which has
- D) all – that have

13

- A) NO CHANGE
- B) its
- C) its'
- D) their

14

- A) NO CHANGE
- B) that it completes yearly
- C) that it has completed yearly
- D) OMIT the underlined portion.

15

- A) NO CHANGE
- B) you may perceive
- C) one may be perceiving
- D) you perceived

16

The writer is considering deleting the following phrase:

for city lights ruin the spectacles of the sky

If the writer were to make this deletion, the sentence would primarily lose

- A) an observation as to why city lights are damaging the Zodiacal Light.
- B) a reason the author personally prefers to watch the Zodiacal Light from the country, as opposed to the city.
- C) an explanation of a statement made previously in the sentence.
- D) a specific piece of evidence as to why many

Writing and Language | Practice

light is brightest near the ¹⁷ horizon. It gradually fades as the beam mounts higher. ¹⁸ [3] But when autumn comes it appears again, like a spirit of the morning announcing its reincarnation in the east. [4] It continues to be visible during the evenings of March and part of April, after which, ordinarily, it is seen no more.

The Zodiacal Light is usually faint and therefore requires the contrast of a background of dark sky in order to be easily seen. ¹⁹ But within the tropics, where the Zodiac is always at a favorable angle, the mysterious light is more constantly visible. During a trip to South Africa ²⁰ in 1909 an English astronomer E. W. Maunder found a remarkable difference between the appearance of the Zodiacal Light on his going and coming voyages. When crossing the equator going south, he did not see it at all. However, upon his return, when he was only one degree south of the equator, he had a memorable view of it. It was a bright, clear night, and the Zodiacal Light was extraordinarily ²¹ brilliant; brighter than he had ever seen it before.

I recall my own personal favorite view of the Zodiacal Light from the summit of Mount Etna. There are few lofty mountains so favorably placed as Etna for observations of this kind. Rising directly from sea-level to an elevation of nearly eleven thousand feet, ²² observers on Mount Etna's summit at night feel lost in the midst of the sky. The blaze of the constellations overhead is astonishingly brilliant, and one's attention is immediately drawn to a great tapering light that springs from the place on the horizon where the sun will later rise.

17

Which choice most effectively combines the sentences at the underlined portion?

- A) horizon by gradually fading
- B) horizon, it gradually fades
- C) horizon, gradually fading
- D) horizon; gradually fades

18

For the sake of logic and coherence, sentence 3 should be placed

- A) where it is now.
- B) before sentence 1.
- C) before sentence 2.
- D) after sentence 4.

19

- A) NO CHANGE
- B) Despite
- C) In addition,
- D) Still,

20

- A) NO CHANGE
- B) in 1909 an English astronomer, E. W. Maunder, found
- C) in 1909 an English astronomer, E. W. Maunder found
- D) in 1909, an English astronomer, E. W. Maunder, found

21

- A) NO CHANGE
- B) brilliant – brighter than he had ever seen it before
- C) brilliant, brighter, than he had ever seen it before
- D) brilliant; brighter then he had ever seen it before

22

- A) NO CHANGE
- B) Mount Etna makes an observer on its summit
- C) an observer on Mount Etna's summit
- D) Mount Etna's observers on the summit

Writing and Language | Practice

Directions: Give yourself 8.5 minutes to complete each of the remaining passages. On the real exam, you will have a little less than 9 minutes to complete each of the 4 passages (and 11 accompanying questions) in the allotted 35 minutes.

Chinese Americans

[1]

A Chinese proverb states, “When you drink the water, consider the source.” It seems such obvious wisdom now; an overused cliché for a generation in which everything insightful has already been said.

But all clichés are preserved by truth, and my ancestors were sending a simple but powerful message to their descendants: a people cannot succeed without their foundation in the past.

[2]

If a group is to survive, connections must be made between past and present generations. This is a truth that my grandfather clarified when he told me to “tell the others” about him, and it’s a truth that generations of Chinese people in America have also understood.

[3]

Another Chinese proverb states, “We may visit friends but always return to our family.” This is an adage that reminded us of our instinctual need for our home and heritage. We long for self-identification and self-knowledge.

[4]

For more than 150 years, the ties that have held Chinese Americans to their country of origin have thinned and frayed, and we find ourselves confused and lost, unsure of who we are and where we belong. Yet, with determined passion and unyielding devotion, Chinese Americans have managed to stay connected to the people who remain in China: parents send their children to learn a language fading from their own tongues,

1

- A) NO CHANGE
- B) now, an overused cliché for a generation
- C) now, an overused cliché, for a generation
- D) now, an overused cliché, for a generation,

2

Which of the following alternatives to the underlined portion would NOT be acceptable?

- A) However,
- B) Nevertheless,
- C) Although
- D) Yet,

3

- A) NO CHANGE
- B) its descendants, people
- C) their descendants, a people
- D) its descendants: a people

4

- A) NO CHANGE
- B) reminds
- C) was reminding
- D) had reminded

Writing and Language | Practice

[5] families gathering from miles around to celebrate the traditional holidays and Sunday mornings are filled with the clamor of dim sum carts.

[5]

There is an undeniable desire amongst Chinese Americans and their counterparts who have remained on the other side of the ocean to understand one another [6] more clearer. For generations [7] and hundreds of years, we have looked at one another like farmers gazing into a flowing stream. The image of the other is recognizably familiar [8] and distorted by the gentle movements of the water, and so what we could not discern from this distorted image, we have filled in for ourselves with everything we could imagine.

[6]

[1] Sometimes, when we finally meet, we are initially disappointed by the difference between our fabricated image and reality. [9] [2] However we are repeatedly reminded of our connection. [3] Shadowy ideals do not always reflect the real experience. [4] We wonder whether we had made a mistake, if the relationship we felt [10] might of not really been there, if the ties that held us together had not already broken. [5] The spirit

5

- A) NO CHANGE
- B) families gather from miles around to, celebrate the traditional holidays,
- C) family is gathering from miles around to celebrate the traditional holidays,
- D) families gather from miles around to celebrate the traditional holidays,

6

- A) NO CHANGE
- B) more clear.
- C) more clearly.
- D) the most clear.

7

- A) NO CHANGE
- B) and many years
- C) and one hundred years
- D) OMIT the underlined portion.

8

- A) NO CHANGE
- B) therefore
- C) but
- D) thus

9

- For the sake of logic and coherence of this paragraph, Sentence 2 should be placed
- A) where it is now.
 - B) before Sentence 1.
 - C) after Sentence 3.
 - D) after Sentence 4.

10

- A) NO CHANGE
- B) might have
- C) could
- D) could of

Writing and Language | Practice

of China is in each of us. [6] Through music, literature, and art, we make contact with one another, and the whole world is forced to take note. 11

11

- The author is considering deleting the first sentence from Paragraph 4. If the writer removes this sentence, the essay would primarily lose
- A) information about how Chinese Americans keep their culture alive.
 - B) details supporting the importance of family and self-identification.
 - C) the introduction of a concern many Chinese Americans feel today.
 - D) a transition from the importance of keeping in touch with Chinese origins to the reality that it is impossible to do so.

Writing and Language | Practice

Westsider George Balanchine

*From *100 New Yorkers of the 1970s*, by Max Millard

To some people he was known as the Shakespeare of dance — a title he probably deserves more than anyone else now living — but to his friends and colleagues, he was simply “Mr. B,” George Balanchine, the ageless Russian-born-and-trained choreographic genius whose zest for living was matched only by his humility, his sense of humor, and ¹² the kindness he displayed towards others. ¹³ Mr. B. left his native St. Petersburg in 1924 spent the next nine years working as a ballet master throughout ¹⁴ Europe, after being persuaded by the American dance connoisseur Lincoln Kirstein to come to the United States in 1933. Following the move, Balanchine toured the world with the New York City Ballet. He always found the home crowd, however, to be the most appreciative.

Balanchine almost single-handedly transplanted ballet to American soil and made it flourish. He played a ¹⁵ ruling role in making New York the dance capital of the ¹⁶ world, since it undeniably is today for both classical and modern dance.

12

Which choice most closely matches the stylistic pattern established earlier in the sentence?

- A) NO CHANGE
- B) his trademark kindness.
- C) the acts of kindness he did for others.
- D) being a kind person.

13

- A) NO CHANGE
- B) Mr. B who left his native St. Petersburg during 1924
- C) Mr. B, who left his native St. Petersburg in 1924,
- D) Mr. B, who left his native St. Petersburg in 1924

14

- A) NO CHANGE
- B) Europe; was eventually persuaded
- C) Europe; he was eventually persuaded, however,
- D) Europe but is persuaded

15

- A) NO CHANGE
- B) center
- C) pivotal
- D) grave

16

- A) NO CHANGE
- B) world, which it undeniably was
- C) world; since it undeniably is
- D) world, which it undeniably is

Writing and Language | Practice

17 Classical and modern dance were Balanchine's two areas of interest. He was a man passionate about his work, and there was no way to slow him down. Even during his 30th year serving as director of the New York City Ballet, Mr. B. continued to direct most of the dances for his company. He also taught at the School of American Ballet, which he cofounded in 1934. Balanchine thought of himself more 18 as a craftsmen than as creator, and often compared his work to that of a cook or cabinetmaker.

Balanchine did not write down his dances.

19 How then did he remember such works as *Prodigal Son*, which he had created almost 50 years prior to reviving it for the New York City Ballet in 1941? “How do you remember prayers?” he said in response to being asked this question. “You just do.”

Prodigal Son, in which the biblical story is danced out 20 extremely dramatic, is an example of a ballet with a plot, but the majority of Balanchine's works are based on music and movement 21 purely. The late Igor Stravinsky, a fellow Russian expatriate who was his longtime friend and collaborator, once described Balanchine's choreography as “a series of dialogues 22 perfectly complimentary to and coordinated with the dialogues of the music.”

17

Which choice would most effectively and appropriately lead the reader from the topic of Paragraph 3 to that of Paragraph 4?

- A) NO CHANGE
- B) However, Balachine's success was not surprising.
- C) Balanchine's family pleaded with him to take some time off from work.
- D) Balanchine was lauded for his creativity and originality.

18

- A) NO CHANGE
- B) as a craftsman then as a creator
- C) as a craftsman than as a creator
- D) as craftsmen then as creator

19

- A) NO CHANGE
- B) How then does he remember
- C) How, then, did he remember
- D) How, then, do they remember

20

- A) NO CHANGE
- B) extremely dramatical
- C) extreme dramatically,
- D) dramatically,

21

The best placement for the underlined portion would be

- A) where it is now.
- B) after the word *based*.
- C) after the word *majority*.
- D) after the word *works*.

22

- A) NO CHANGE
- B) perfectly complimenting to and coordinated with
- C) a perfect compliment to in coordination with
- D) in perfect compliments with the coordination of

Writing and Language | Practice

The Island of Krakatoa

*Adapted from *The Wonder Book of Volcanoes and Earthquakes*
by Edwin J. Houston

[1]

Krakatoa, located in the Straits of Sunda, is one of the many islands that form the large island chain known as the Sunda Islands. It is not far from the equator, about 420 miles south and is about thirty miles west of Java. The Straits of Sunda is an important piece of water that forms one of the great highways to the East.

[2]

Krakatoa is uninhabited and very small. It measures about five miles in length and is less than three miles in width. This little piece of land made itself famous as a result of what took place there during August of 1883. It was then that Krakatoa suffered a tremendously, explosively volcanic eruption.

[3]

Krakatoa itself is a volcano. It is not surprising that Krakatoa is a volcanic island, since it lies in one of the most active belts of volcanic islands in the world. The island of Java, small as it is, has nearly fifty volcanoes, by which at least twenty-eight are active. Volcanic eruptions are so frequent that the island is seldom free from them.

23

- A) NO CHANGE
- B) south, and
- C) south -- and
- D) south. And

24

Which choice provides information that best supports the claim made by the previous sentence?

- A) NO CHANGE
- B) The weather on Krakatoa is warm and dry all year round.
- C) However, it has continued to become an increasingly popular tourist destination.
- D) Java, on the other hand, is highly populated.

25

- A) NO CHANGE
- B) land making
- C) land makes
- D) land could make

26

- A) NO CHANGE
- B) tremendously explosively
- C) tremendous explosive
- D) tremendously explosive

27

Which of the following alternatives to the underlined portion would be LEAST acceptable?

- A) NO CHANGE
- B) because
- C) as
- D) although

28

- A) NO CHANGE
- B) in which
- C) from which
- D) of which

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[4]

On the 20th of May, 1883, inhabitants of Java heard noises; that sounded like the firing of guns. These noises were accompanied by the shaking of the ground and buildings. This happened during a season of the year known as the “dry monsoon.” The island of Java greatly needed rain, as they seldom rains during the months of the dry monsoon. When, therefore, the rumbling sounds of the approaching catastrophe of Krakatoa were heard, the people, believing that the noises were due to peals and gales of thunder, rejoiced. But when the rumbling sounds increased, it was clear that the sounds were the beginning of a volcanic eruption.

[5]

These disturbances were merely the forerunner of the terrible eruption soon to follow, and on Sunday, August 26th, 1883, without any further warnings, Krakatoa burst into terrible activity. It began an explosive eruption that hasn't ever been equaled in severity in the memory of man.

29

- A) NO CHANGE
- B) noises, that sounded
- C) noises. That sounded
- D) noises that sounded

30

- A) NO CHANGE
- B) it
- C) it's
- D) he

31

- A) NO CHANGE
- B) was heard
- C) will be heard
- D) would be

32

- A) NO CHANGE
- B) peals
- C) peals, gales
- D) peals, and gales,

33

Upon reviewing this essay, the author realizes that he left out some important information. He wants to add the following sentence:

This was a phenomenon with which they were only too well acquainted.

The most logical and effective place to add this sentence would be after the last sentence of paragraph

- A) 2.
- B) 3.
- C) 4.
- D) 5.

Writing and Language | Practice

Rhinoceros

*Adapted from *Anecdotes of The Habits and Instinct of Animals* © 2007 by R. Lee

It has never been argued that the rhinoceros is renowned for his beauty. He has no tusks, but bears one or two horns upon his nose. Of these, when there are two, the foremost is the larger, and all are curved and polished, appearing to be formed of hairs summed into a solid mass. In all but one species, the upper lip is prolonged and capable of such extension that it becomes prehensile.

[1] As far as we know at present, there are six species of rhinoceros – all of which inhabit Africa and India.

[2] They have three toes on each foot covered with a hoof.

[3] The sides of their body project in a remarkable degree and their skin is enormously thick, knotty on its surface, and has but a few hairs scattered over it. [4] The folds on the skin of the African species, on the other hand, are much less than those of the Indian, and amount to scarcely more than wrinkles. [5] The Indian rhinoceros has enormous folds of this skin, hanging upon the shoulders, haunches, neck and thighs, looking as if each fold covers a thick rope. [6] It has been observed, that the skin of the African rhinoceros is so full of insects that birds are in the habit of being perched upon it, for the purpose of feeding on these insects. [7] The rhinoceros allows its winged friends to remain undisturbed, thinking that as long as the birds stay, no enemy is near. [8] However, if they fly off, the rhinoceros senses that danger is approaching, for which it will immediately look out.

34

- A) NO CHANGE
- B) aggregated
- C) amounted
- D) piled

35

- A) NO CHANGE
- B) rhinoceros; all of which inhabit Africa and India
- C) rhinoceros all of which inhabit Africa and India
- D) rhinoceros, all of which, inhabit Africa and India

36

- A) NO CHANGE
- B) in a remarkable, degree and their skin is
- C) in a remarkable degree, and their skin is
- D) OMIT the underlined portion

37

- A) NO CHANGE
- B) perch
- C) perching
- D) perched

38

- A) NO CHANGE
- B) Despite the fact,
- C) As a matter of fact,
- D) Still,

39

To make this paragraph most logical, sentence 4 should be placed

- A) where it is now.
- B) after sentence 2.
- C) after sentence 5.
- D) after sentence 6.

Writing and Language | Practice

All species carry their heads so low that they almost touch the earth, scuffing up the ground with their horns, scattering stones and soil without any apparent motive. Few things can resist the impetuous force that they put forth when they rush upon an object that has excited their fury. ⁴⁰ Despite its relatively docile nature, a rhinoceros has been seen to attack the bushes around ⁴¹ themselves for hours at a time, uttering a strange noise, something like the combination of a grunt and a whistle. One specific scene which will incite the fury of a rhinoceros with regularity, is the sight of fire. ⁴² In order to get at it, one will dash forward with mad fury and will not rest until it has scattered and extinguished all of the burning wood.

Both in Africa and in India there is a superstition with regard to the horns. ⁴³ It's the custom to make cups of them, and in Africa the inhabitants believe that water ⁴⁴ drank from it possesses medicinal properties, especially if stirred with iron.

40

- Which choice provides the best transition from the previous sentence?
- A) NO CHANGE
 - B) Although,
 - C) During these fits of rage,
 - D) OMIT the underlined portion.

41

- A) NO CHANGE
- B) itself
- C) themselves
- D) them

42

- The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?
- A) Kept, because it provide supporting evidence for the claim made in the previous sentence.
 - B) Kept, because it includes details that explain why a rhinoceros gets angry when it sees fire.
 - C) Deleted, because it adds irrelevant information that distracts from the paragraph's focus on the temperament of a rhinoceros.
 - D) Deleted, because it fails to explain why the rhinoceros makes strange noises.

43

- A) NO CHANGE
- B) Its
- C) They're is
- D) Their is

44

- A) NO CHANGE
- B) drank in it
- C) drunk from them
- D) drunk by them

Writing and Language | Practice

Religion and Art in Ancient Greece

*Adapted from *Religion and Art in Ancient Greece* © 1910 by Ernest A. Gardner

During the Hellenistic age, the Greek gods adapted themselves to new conditions and new meanings. With the conquests of Alexander the Great, Greek language and civilization spread over the Eastern 45 world, and with it went the artistic forms of the Greek pantheon, though often to be modified by local beliefs or influences. Greek art practically became cosmopolitan, its influence broadened, 46 because at the same time its essential nature, in its harmony with the imagination of the Hellenic race, was lost.

In the art of the Hellenistic age we find two main 47 tendencies; the one towards academic generalization and the other towards excessive realism, often coupled with a theatrical or sensational treatment. The two tendencies are by no means rigidly 48 distinguished. For example, we often find a theatrical treatment combined with academic work.

49 We can trace in the Hellenistic age not only the traditions of earlier art, but the direct influence of the masters of the fourth century. Even in a statue that, like the Aphrodite of Melos, shows an 50 aversion to return to the nobler ideals and more dignified and simple art forms of an earlier age, there is something artificial and conventional about both the figure and the drapery. One

45

- A) NO CHANGE
- B) world, and with them
- C) world and with it
- D) world; and with them

46

- A) NO CHANGE
- B) since
- C) while
- D) but

47

- A) NO CHANGE
- B) tendencies: the one
- C) tendencies. The one
- D) tendencies; including the one

48

- Which choice best combines the sentences at the underlined portion?
- A) distinguished, although we are often finding
 - B) distinguished, while often finding
 - C) distinguished, as we often find
 - D) distinguished, but have found often

49

- Which choice provides the best introduction to the paragraph?
- A) NO CHANGE
 - B) The most famous form of art to come from the Hellenistic age was sculpture, particularly the creation of immense statues.
 - C) The origin of art in the Hellenistic age had its roots deeply entrenched in the expanding realm of academia.
 - D) The importance of religion in art was especially prevalent in the Hellenistic age.

50

- A) NO CHANGE
- B) enmity
- C) endeavor
- D) attenuation

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⁵¹ felt that the sculptor is trying rather to reflect the best influences of his predecessors than to embody a present religious conception.

The influence upon art of religious personifications is perhaps stronger than any other during this period. The most interesting example of such personification may be seen in the figures of cities. In the decay ⁵² for the belief in the gods, there seems to have been a craving for nearer and more real objects of worship.

[1] We can see the same tendency in a more extreme form in the deification of human beings. [2] Though some examples of this extreme mortal adoration occur earlier, especially in the case of the heroes or founders of cities, they were not placed on a level with the gods. ⁵³ [3] With his marvelous, almost superhuman achievements, such idealism is easy to understand. [4] We find not only that Alexander is himself represented as a god, but that his expression and cast of features came to affect the sculpture of his age, even in the representations of gods themselves. [5] However, the worship of Alexander the Great places him in a distinctly divine rank. ⁵⁴ [6] His image was also depicted on coins, an honor that before his time was not given to mere mortals. ⁵⁵

51

- A) NO CHANGE
- B) is feeling
- C) has felt
- D) feels

52

- A) NO CHANGE
- B) by
- C) of
- D) with

53

Which choice best supports the main idea of this paragraph?

- A) NO CHANGE
- B) anthropologists have been unable to uncover as many examples of earlier depictions.
- C) the heroes are not depicted in a variety of art forms.
- D) they longed for a return to a simpler period and thus rejected the modern heroes.

54

The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?

- A) Kept, because it provides support for the main idea of the paragraph.
- B) Kept, because it contradicts a widely held belief the author is seeking to prove false.
- C) Deleted, because it adds irrelevant information that distracts from the paragraph's focus on the importance of Alexander the Great in Greek history.
- D) Deleted, because it fails to explain why it is important that his image was depicted on coins.

55

To make this paragraph most logical sentence 5 should be placed

- A) where it is now.
- B) after sentence 1.
- C) after sentence 2.
- D) after sentence 3.

Writing and Language | Practice

Peeps at Many Lands: Ancient Egypt

*by Rev. James Baikie

The Egyptians 56 were, if not quite the earliest, at least among the earliest of all the peoples of the world to discover how to put down their thoughts in writing, or in other words, to make a book. One of their old books, full of wise advice from a father to his 57 son, is, perhaps, the oldest book in the world. The Egyptians were the first to make paper, and they used it for many centuries before other cultures around the world adopted the idea.

58 On their papyrus rolls the Egyptians wrote about all sorts of things – books of wise advice, legends of the gods, histories, and poems, but the book that is most famous is one of their religious books. When an Egyptian wanted to create a book, he or she 59 gathers the stems of a kind of reed called papyrus, which grew in some parts of Egypt in marshy ground. The outer rind was peeled off the stalk and the inner part was separated into thin layers. 60 It was joined to one another on a table, and a thin gum was spread over them. Then another layer was laid crosswise on the top of the first. The double sheet was then put into a press, squeezed together, and dried to create the final product.

After an Egyptian made a sheet of paper, he did not bind the sheets together at the back as we do today. An Egyptian 61 instead joined them end to end, adding on sheet after sheet as he wrote. He rolled up his book as he went along, so when the book was done it formed a

56

- A) NO CHANGE
- B) were if not, quite the earliest,
- C) were, if not quite the earliest
- D) were if not quite the earliest

57

- A) NO CHANGE
- B) son, is, perhaps, the
- C) son is, perhaps, the
- D) son is, perhaps the

58

- Which choice provides the best introduction to the paragraph?
- A) NO CHANGE
 - B) So what type of stories did the Egyptians set out to tell?
 - C) Picture-writing was not very easy work to do when you had nothing but a bruised reed with which to draw all sorts of animals.
 - D) The process of creating a book was extremely different from the one primarily used nowadays.

59

- A) NO CHANGE
- B) were gathering
- C) would gather
- D) were in charge of gathering

60

- A) NO CHANGE
- B) After being
- C) They are
- D) These layers were

61

- Which of the following would NOT be an acceptable place to put the underlined word?
- A) where it is now
 - B) after *them*
 - C) after the second *end*
 - D) after *he*

Writing and Language | Practice

giant roll, sometimes many feet long. ⁶² The rolls were often too heavy for just one person to carry them.

Not only was the paper unique, but the Egyptian writing is perhaps the prettiest that has ever been known. It is called *hieroglyphic*, which means “sacred carving”, and it is nothing but little pictures from beginning to end. The Egyptians began by putting down a picture of the thing that was represented by the word they wanted ⁶³ to use. This later led to the formation of a sort of alphabet. ⁶⁴ As a result, one of their signs for the letter *a* was the figure of an eagle. Their sign for *m* was a lion, and for *u* a little chicken. Therefore, when you look at an Egyptian book written in the hieroglyphic character, you see column after column of birds and beasts, ⁶⁵ with men and women and boats, and of all sorts of other things ⁶⁶ would march across the page.

62

Which choice provides the best specific support for the assertion made in the previous sentence?

- A) NO CHANGE
- B) If the Egyptians could see the method we use today, they would be equally as shocked as we are to see theirs.
- C) Not all of the rolls created by the Ancient Egyptians have been uncovered today, as archaeologists are still searching for the remaining books.
- D) There is one great book in the British Museum that measures 135 feet in length.

63

Which choice best combines the sentences at the underlined portion?

- A) to use, but eventually led to the formation of
- B) to use, forming later the leading to
- C) to use, leading to the eventual formation of
- D) to use, this led later to the forming of

64

- A) NO CHANGE
- B) For instance,
- C) Hence,
- D) As a matter of fact,

65

- A) NO CHANGE
- B) of men and women and boats,
- C) men, and women, and boats,
- D) including men, women and boats,

66

- A) NO CHANGE
- B) marched
- C) were marching
- D) marching

Writing and Language | Practice

The Mountains of California

*by John Muir

Go where you may within the bounds of California, mountains are ever in ⁶⁷ sight, they are charming and glorifying every landscape. ⁶⁸ As a result, so simple and massive is the topography of the state in general views, that the main central portion displays only one valley and two chains of mountains which seem almost perfectly regular in trend and height: the Coast Range on the west side and the Sierra Nevada on the east. Where these two ranges ⁶⁹ converge, a magnificent basin is enclosed, with a level floor more than 400 miles long, and from 35 to 60 miles wide. This is the grand Central Valley of California, the waters of which have only one outlet to the sea through the Golden Gate. ⁷⁰ No great valley or lake is seen, or group of well-marked features of any kind, standing out in distinct pictures.

The Coast Range, ⁷¹ rises as a grand green barrier against the ocean, from 2000 to 8000 feet high, is composed of ⁷² innumerable forest-crowned spurs, ridges, and rolling hill-waves. These surround a multitude of smaller valleys, some looking out through long, forest-lined vistas to the sea, others, with but few trees, to the Central Valley. A thousand others are concealed in mild, round-browed hills, each, with its own climate, soil, and productions.

Making your way through the mazes of the Coast Range to the summit of any of the inner peaks or passes opposite San Francisco in the clear springtime, the grandest and most telling of all California landscapes is outspread

67

- A) NO CHANGE
- B) sight, they were
- C) sight, charming
- D) sight; it was charming

68

- A) NO CHANGE
- B) Because
- C) Still,
- D) Although

69

- A) NO CHANGE
- B) divest
- C) infiltrate
- D) conduce

70

Which choice provides the best transition to the following paragraph?

- A) NO CHANGE
- B) All of the landscapes were evidently predestined, for the physical structure of the rocks on which the features depend was acquired while they lay at least a mile deep below the pre-glacial surface.
- C) Even the summit-peaks, so clear and high in the sky, seem comparatively smooth and featureless.
- D) But with this general simplicity of features there is a great complexity of hidden detail.

71

- A) NO CHANGE
- B) which rose
- C) rising
- D) will rise

72

Which choice would NOT be appropriate to replace the underlined word?

- A) a myriad of
- B) numerous
- C) countless
- D) unaccounted for

Writing and Language | Practice

before you. ⁷³ At your feet lies the great Central Valley glowing golden in the sunshine, extending north and south farther than the eye can reach, one smooth, flowery, lake-like bed of fertile soil. Along its eastern margin rises the mighty Sierra, miles in height, reposing like a smooth cloud in the sunny sky, and so gloriously colored it seems to be not clothed with light, but wholly composed of it, like the wall of some celestial city. Along the ⁷⁴ top, and extending a good way down; you can see a pale, pearl-gray belt of snow, and below it a belt of blue and dark purple, marking the extension of the forests. ⁷⁵

When I first ⁷⁶ was enjoying this superb view one glowing April day from the summit of the Pacheco Pass, the Central Valley was one rich sheet of gold, and the luminous wall of the mountains shone ⁷⁷ in all their glory. Then it seemed to me the Sierra should be called not the Nevada, or Snowy Range, but the Range of Light.

73

Which choice provides support for the assertion made in the previous sentence?

- A) NO CHANGE
- B) It is important to wear multiple layers when ascending to the peaks, as temperatures can reach far below freezing.
- C) To artists, few portions of the Sierra are, strictly speaking, picturesque.
- D) The Sierra range is one great picture, not clearly divisible into smaller ones, differing in this respect from the older, mountains of the Coast Range.

74

- A) NO CHANGE
- B) top and extending a good way down one
- C) top, and extending a good way down, you
- D) top; and extending a good way down one

75

At this point, the writer is considering adding the following sentence:

All these colored belts blending smoothly make a wall of light as beautiful as a rainbow.

Should the writer make this addition here?

- A) Yes, because it provides a transition into the main idea of the following paragraph.
- B) Yes, because it clarifies information in the previous sentence about why light appears in different colors in the range.
- C) No, because the detail is not necessary for understanding how the range appears to a viewer.
- D) No, because it does not provide an explanation as to why the author finds this phenomenon beautiful.

76

- A) NO CHANGE
- B) started enjoying
- C) began to enjoy
- D) enjoyed

77

- A) NO CHANGE
- B) in all its
- C) in all it's
- D) in all of their

Writing and Language | Practice

The Stamp Act

*Adapted from *American Leaders and Heroes* by Wilbur F. Gordy

At the close of the French and Indian War in 1763, England was heavily in debt. As this debt had been incurred largely in defense of the English colonies in America, George III, King of England, ⁷⁸ believed that the colonies should help to carry the burden. ⁷⁹ However, as he intended to send them a standing army for their protection, he deemed it wise to charge them a tax for its support. Parliament, therefore, ⁸⁰ was composed largely of the King's friends, passed a law called the Stamp Act. This required the colonists to purchase stamps, the price of which ranged from a half-penny to twelve cents, to put upon their newspapers and legal documents.

⁸¹ The Stamp Act was unpopular in England because many people did not want to pay more money to the government. But the colonists were of a different mind, for England had not fought the war so much to defend them as to protect ⁸² their own trade. Besides, they had already paid a reasonable share of the war expenses, and ⁸³ have furnished a fair proportion of soldiers for battle. If the King would have asked them for a definite sum, they would have raised it through their Colonial Assemblies and paid the requested amount.

But they strongly objected to any English tax. As free-born Englishmen they objected to paying taxes levied

78

- A) NO CHANGE
- B) had been believing that the colonies should help
- C) believes that the colonies should help
- D) the colonies should help, he believed,

79

- A) NO CHANGE
- B) Despite this
- C) Moreover
- D) As a result

80

- A) NO CHANGE
- B) which was composed largely of the Kings friends
- C) was composed largely of the Kings friends
- D) which was composed largely of the King's friends

81

Which choice best introduces the discussion in the rest of the paragraph?

- A) NO CHANGE
- B) The King thought this tax would be just because it would fall upon all the colonists alike
- C) If Parliament had been at odds with George III's agenda, perhaps the Stamp Act would never have been passed, and the American Revolution may never have happened.
- D) It is unknown how George III was able to gain such support in Parliament.

82

- A) NO CHANGE
- B) they're
- C) it's
- D) its

83

- A) NO CHANGE
- B) were furnishing
- C) furnish
- D) had furnished

Writing and Language | Practice

by Parliament, ⁸⁴ a government that did not represent them. Only the Colonial ⁸⁵ Assemblies, they believed could tax the colonists, because they alone represented the colonists. ⁸⁶ In spite of these strong feelings, as James Otis in a stirring speech had declared, there must be “No taxation without representation.”

George III could not understand the feelings of the colonists, and he had no ⁸⁷ malice for their views. His mother had said to him when he was crowned, “George, be King,” and this advice had pleased him for he was willful and desired to have his own way as a ruler. Thus far he had shown little respect for the British Parliament, and he felt even less for Colonial Assemblies. Certainly if he was to rule in his own way in England, he must compel the obedience of the stubborn colonists in America. The standing army the King wished to send to America was designed not so much to protect the colonies as to enforce the will of the King, and this the colonists knew. They therefore ⁸⁸ opposed with bitter indignation the payment of taxes charged for the army’s support.

84

Which choice best provides justification for the claim made earlier in the sentence?

- A) NO CHANGE
- B) and ultimately decided not to pay it
- C) a sentiment that directly led to the outbreak of the American Revolution
- D) leading King George III to publicly denounce the colonists’ position.

85

- A) NO CHANGE
- B) Assemblies, they believed, could
- C) Assemblies they believed
- D) Assemblies they believed, could

86

Which choice provides the best transition from the previous sentence?

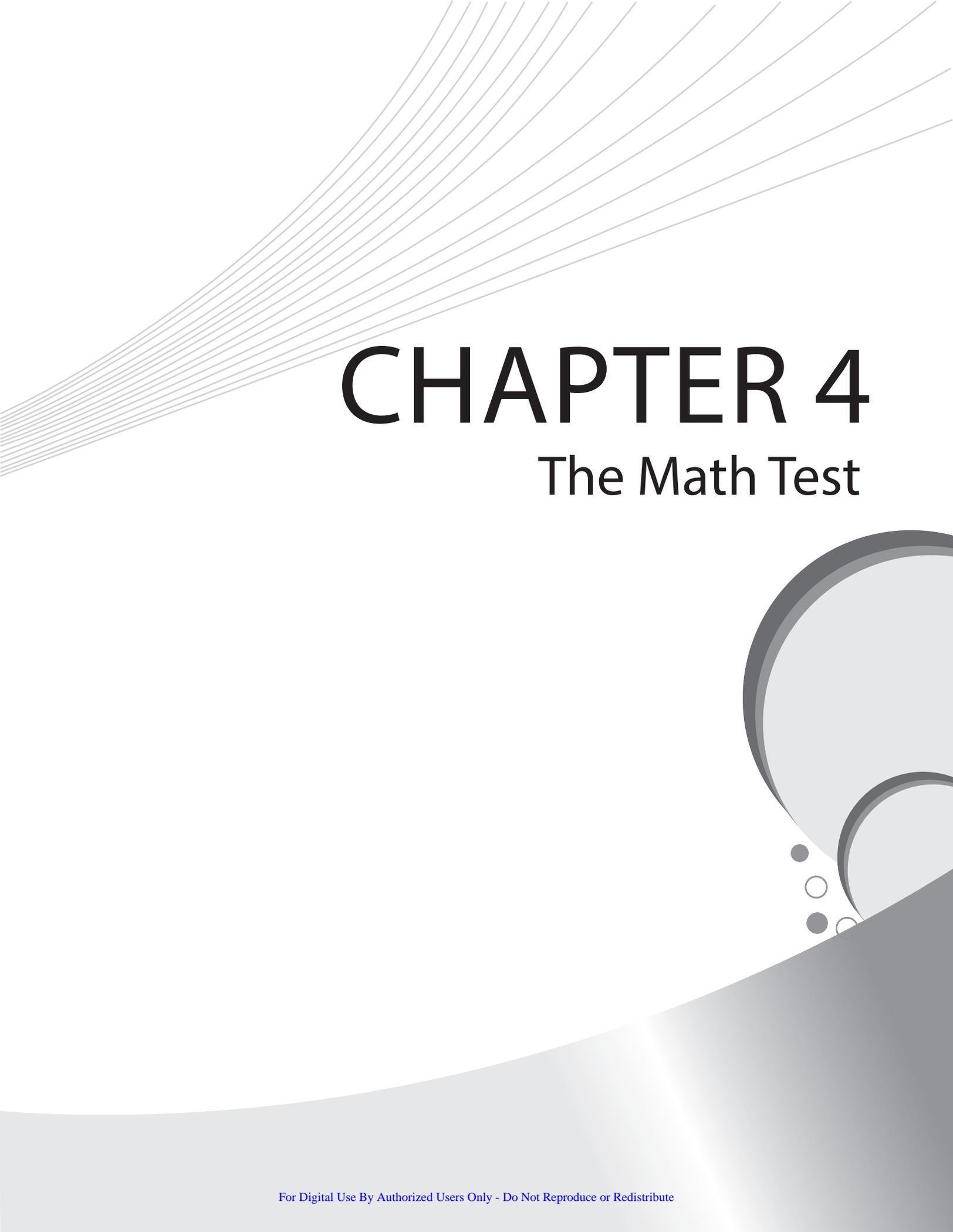
- A) NO CHANGE
- B) Because the physical distance between the colonies and England was so great
- C) Although England had fought to defend the colonies
- D) In other words

87

- A) NO CHANGE
- B) empathy
- C) zeal
- D) fidelity

88

- A) NO CHANGE
- B) opposed with bitter, indignation, the payment of taxes
- C) opposed with bitter, indignation the payment of taxes
- D) opposed, with bitter indignation, the payment, of taxes



CHAPTER 4

The Math Test

The Math Test | Overview

The Math Test is broken down into two sections: Non-Calculator and Calculator. However, your score (on a scale of 200 to 800) is generated as a combination of these two sections. The Non-Calculator section is the third section on the exam, and you will have 25 minutes to complete it. The Calculator section is the fourth and final multiple choice section, and you will have 55 minutes to complete it.

The questions on the Math Test span a variety of topics, but they have one thing in common: They focus on real world scenarios. This means that the problems will rarely involve just one step. The topics on the Math Test, in the language of the test-makers themselves, include the following:

Problem Solving & Data Analysis
These questions require quantitative reasoning about ratios, rates, and proportional relationships, particularly understanding and applying unit rate. You will also be expected to identify measures of center, overall patterns, and deviations from an overall pattern in data sets. You may be asked to perform any of the following:
Use ratios, rates, proportional relationships, and scale drawings to solve single and multistep problems
Solve single and multistep problems involving percentages, measurement quantities, units, and unit conversion
Analyze a scatterplot using linear, quadratic, or exponential models to describe how the variables are related and use this relationship to investigate key features of the graph
Compare linear growth with exponential growth
Use two-way tables to summarize categorical data and relative frequencies, and calculate conditional probability
Make inferences about population parameters based on sample data, including the use of confidence intervals and measurement error
Use statistics to investigate measures of center (mean, median, mode, range, standard deviation) of data and analyze shape, center, and spread
Evaluate reports to make inferences, justify conclusions, and determine appropriateness of data collection methods.
Heart of Algebra
These questions require analyzing, solving, and creating linear equations, inequalities and systems of equations. You may be asked to perform any of the following:
Create, solve, or interpret a linear expression/equation or a system of linear equations
Create, solve, or interpret linear inequalities or systems of linear inequalities
Build a linear function that models a relationship between two quantities using either an equation or function notation
Interpret variables and constants in expressions for linear functions within a context presented and make connections between a linear equation and the real-life meaning of a constant term, variable, or feature of a given equation
Understand connections between algebraic and graphical representations, including: selecting a graph described by a given linear equation, selecting a linear equation that describes a given graph, determining the equation of a line given a verbal description of its graph, determining key features of the graph of a linear function from its equation, and determining how a graph may be affected by a change in its equation.

The Math Test | Overview

Passport to Advanced Math
These questions require an understanding of the structure of expressions and the analysis, manipulation, and rewriting of these expressions. This includes reasoning with more complex equations, and interpreting and building functions. You may be asked to perform any of the following:
Create a quadratic or exponential function
Determine the most suitable form of an expression or equation to reveal a particular trait, given a context
Create equivalent expressions involving exponents and radicals, including simplifying or rewriting in other forms
Solve a quadratic equation having rational coefficients
Manipulate polynomial expressions and simplify the result
Solve an equation that contains radicals or contains the variable in the denominator of a fraction and identify when a resulting solution is extraneous
Solve a system of one linear equation and one quadratic equation
Rewrite rational expressions by adding, subtracting, multiplying, or dividing two rational expressions and simplify the result
Interpret parts of nonlinear expressions in terms of their context to describe the real-life meaning of a constant, a variable, or a feature of the given equation
Understand the relationship between zeros and factors of polynomials, and use that knowledge to sketch graphs
Understand a nonlinear relationship between two variables by making connections between their algebraic and graphical representations
Use function notation, and interpret statements using function notation to solve conceptual problems related to transformations and compositions
Rearrange an equation or formula to isolate a single variable.
Geometry
These questions require working with geometric figures. You may be asked to perform any of the following:
Solve problems using volume formulas (Any required volume formulas will be provided either on the formula sheet or within the question.)
Use the Pythagorean theorem to solve applied problems involving right triangles
Apply theorems about circles to find arc lengths, angle measures, chord lengths, and areas of sectors
Use concepts about congruence and similarity to solve problems about lines, angles, and triangles
Create or use an equation in two variables to solve a problem about a circle in the coordinate plane.
Trigonometry
These questions require working with trigonometric functions. You may be asked to perform any of the following:
Use trigonometric ratios to solve applied problems involving right triangles
Convert between degrees and radians and use radians to determine arc lengths
Use the relationship between similarity, right triangles, and trigonometric ratios
Use the relationship between sine and cosine of complementary angles.

The Math Test | Overview

Take a look at a sample conversion chart below showing the approximate raw scores and their corresponding scaled scores. Although the conversion chart is slightly different for each administration, these numbers can be used to give you a general idea of where you are currently scoring and how many more points you would need to reach your target score. When tackling the Math Test, keep your goal score in mind and make sure you are attempting enough questions in order to achieve this.

Math Test Conversion Chart					
Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
0	200	20	460	40	640
1	200	21	470	41	650
2	210	22	480	42	650
3	230	23	490	43	660
4	250	24	500	44	670
5	270	25	510	45	680
6	290	26	510	46	690
7	300	27	520	47	690
8	320	28	530	48	700
9	330	29	540	49	710
10	340	30	550	50	720
11	360	31	560	51	730
12	370	32	570	52	740
13	380	33	570	53	750
14	390	34	580	54	760
15	400	35	590	55	770
16	420	36	600	56	780
17	430	37	610	57	790
18	440	38	620	58	800
19	450	39	630		

Take a look at your first diagnostic exam. Find your Math Test scaled score and circle it on the chart above.

Use this to set a goal score for yourself for your next exam. For example, a reasonable goal would be to improve by 50 points. Put a star next to that goal score on the chart above.

How many raw points does this mean you will need to get in order to achieve your goal? _____

Keep this number in mind as you approach your prep. Realize that unless you are looking to achieve a perfect score, you will have some room to get questions wrong and still reach your target score. Therefore, you want to be careful not to spend too long on a question that is tripping you up if doing so ultimately means that you may not have enough time to attempt other questions you may be more likely to answer correctly.

The Math Test | Overview

Each question on the Math Test is worth one raw point. You lose no points if you answer a question incorrectly, so even if you do not know how to do a particular problem, take a guess! Never leave a question blank.

There are two types of questions in each of the two sections: Multiple Choice and Grid-Ins.

Multiple Choice Questions: Each multiple choice question has four possible answer choices, and you must select and bubble in the correct one.

Grid-Ins: Grid-In questions come at the end of each section. You will not be given any answer choices, but rather you must generate the answer yourself and bubble it in the provided grid. The grids look like this:

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

When gridding in your answer, there are a couple of things to remember:

1. You CANNOT round your answer prior to the last place in the grid unless specified in the question. You can also choose not to round it at all.

For example, if your answer is $\frac{2}{3}$ you can choose to either grid it in its fractional form, or as .666 or .667. You will be marked INCORRECT if you bubble in .67.

2. Simply writing your answer in the provided spot is not enough. If you do not actually bubble in your answer, you will be marked INCORRECT.
3. You CANNOT grid in a mixed number.

For example, if your answer is one and a half, you must either grid it as a decimal (1.5) or as an improper fraction ($\frac{3}{2}$).

4. You CANNOT grid in a negative number. (There are no negative signs in the grid!)
5. You can grid your answer in any column. The placement does not matter.
6. When gridding a fraction, it does NOT need to be in its most reduced form (unless a fraction has too many digits to fit into the provided spaces on the grid).

The Math Test | Overview

Below is the breakdown of each of the two math sections, so you know exactly what to expect on test day. The questions within each section are generally arranged by order of difficulty, meaning that roughly the first third of the multiple choice questions will be “easy,” the next third will be “medium,” and the last third will be “hard.” This order of difficulty starts over again for the grid-ins, meaning that the first couple of grid-in questions should be easier to answer than the last couple multiple choice questions. As you work out your pacing plan, keep this in mind so you don’t miss out on getting easy points!

Non-Calculator Section

Timing: 25 minutes

Multiple Choice		Grid-Ins	
1	15	16	20

Calculator Section

Timing: 55 minutes

Multiple Choice		Grid-Ins	
1	30	31	38

Take a look at some of the keys to making sure you are ready for the calculator section:

1. Use a calculator you are familiar with.

Don't buy a graphing calculator two days before the test and expect to know how it works. Use the same calculator that you used to prepare.

2. Pay attention to what you're doing.

A calculator is only as effective as the person using it. Double-check your display before each calculation.

3. Use the calculator when necessary – no more, no less.

Every problem on the test can be done without a calculator. Some problems are easier or faster with a calculator, and on some problems it's easier and faster to use your own personal mental calculator (aka the brain). Using your calculator to do $3 + 5$ is both a waste of time and another chance for a mistake to happen.

4. Make sure calculator batteries are charged.

Put fresh batteries in your calculator if you're not sure how old they are. It would be disappointing if you went to do the second problem on the test and your calculator died (don't laugh, it's happened before).

5. Use Parentheses.

When inputting calculations, many students forget to include parentheses where necessary. Your calculator automatically computes data in accordance with PEMDAS (order of operations). Therefore, if you want to make sure that your calculator groups certain data together, set them apart using parentheses. For example, if you want to raise -2 to the second power, you must put (-2) in parentheses, or the calculator will do the exponent first: $2^2 = 4$, and then multiply it by the negative sign, giving you an answer of -4 .

The following are NOT permitted on the SAT:

- Laptops or other computers, tablets, cell phones, smartphones, smartwatches or wearable technology of any kind
- Models that can access the Internet, have wireless, Bluetooth, cellular, audio/video, or camera
- Models that have a computer-style (QWERTY) keypad, pen-input, or stylus
- Models that use electrical outlets, make noise, or have a paper tape

4a

**TEST-TAKING
STRATEGIES & BASICS:**

**DEFINITIONS, SUBSTITUTION,
PLUGGING IN, FRACTIONS & DECIMALS**

Problem Solving | Overview

It can be easy to become overwhelmed as you work through the Math Test, particularly because many of the problems involve multiple steps. Therefore, as you approach each problem, ask yourself the following questions one at a time, until you find one that you are able to answer with a “Yes!” If you come across a problem for which you find yourself answering “No” to each of the questions, bubble in a guess and move on. There is no use spending time on a problem that you have no idea how to approach.

We will discuss each of these questions in further depth throughout the coming chapters:

1. Can I answer this mathematically?
2. Can I graph this on my calculator to get an answer?
*This question only applies to the Calculator section.
3. Can I plug in any of the answer choices?
4. Can I choose my own number to plug in?

Problem Solving | Overview

SAT questions test your ability to problem solve. In order to do this effectively, it is important to follow the steps below:

1. Read and Recognize

Read the *entire* question and identify/recognize the topic(s) being tested. Make note of particular areas of interest/trouble (i.e. positive and negative possibilities when variables are raised to even powers or the lack of the term “integer” to describe a variable).

2. Write Down Additional Information NOT Given in the Question

Write down any necessary formulas. If the problem does not require formulas, think clearly and systematically through the rules and steps you must follow to answer the question. Remember: Many of the questions will involve multiple steps.

3. Connect the Information Not Given to the Information Given

Reread the question then write down and label each piece of information you are given. Integrate that information into the facts not given (i.e., put values given into the formulas).

4. Solve the Problem

Carefully solve the problem.

5. Reread the Question Asked and Select an Answer

Reread just the “question” (not the information leading up to it), to ensure that you have given the value requested.

Definitions | Overview

Many SAT questions don't explicitly test your knowledge of basic terminology, but understanding the following terms will ultimately help you answer more questions correctly. Fill in the chart below to review the meanings of a variety of terms that may show up on the exam.

Term	Definition	Examples & Notes
Integer		True or False: -7 is an integer. True or False: 0 is an integer.
Digit		<i>Digit</i> is not the same thing as <i>number</i> .
Consecutive		This does not specify whether ascending order or descending order.
Distinct		If x and y are distinct, then $x \neq y$.
Even		True or False: 0 is even. True or False: -6 is even. True or False: 4.8 is even.
Odd		
Remainder		What is the remainder when 347 is divided by 6?
Multiple		List some multiples of 7: The smallest multiple of any number is _____.
Least Common Multiple (LCM)		The LCM of 6 and 9 is _____. The LCM of $4xy$ and $7x^2$ is _____. You can use your graphing calculator to find the LCM of two constants: 1. Press the MATH button. 2. Scroll over using the right arrow key until NUM is highlighted. 3. Select #8, lcm(. 4. Type in the two numbers, separating them with a comma, and press ENTER.
Absolute Value		$ -7 =$ _____ $ 7 =$ _____ $ -4 + 2 =$ _____

Definitions | Overview

Term	Definition	Examples & Notes
Factor		List all the factors of 24: Think of factors in pairs. _____ is a factor of every number. Any number is the largest factor of itself.
Greatest Common Factor (GCF)		The GCF of 24 and 8 is _____. The GCF of $16xy$ and $8x^2$ is _____. You can use your graphing calculator to find the GCF of two constants: <ol style="list-style-type: none"> 1. Press the MATH button. 2. Scroll over using the right arrow key until NUM is highlighted. 3. Select #9 from the list, gcd(. 4. Type in your two numbers, separating them with a comma. Press ENTER.
Prime		True or False: -7 is prime. True or False: 1 is prime. 2 is the least (and only even) prime number. 1 and 0 are NOT prime.
Factorial ($n!$)		$6! =$ _____ You can use your graphing calculator to find the factorial of a number: <ol style="list-style-type: none"> 1. Type in the number in front of the factorial sign. 2. Press the MATH button. 3. Using the right arrow key, scroll over until PRB is highlighted. 4. Select #4 on the list, “!” and hit ENTER.
Reciprocal		The reciprocal of 4 is _____.
Order of Operations		Evaluate the expression: $4 + -5 + 3 - (3 - 6)^2$
Scientific Notation		Write the following in scientific notation: $103,000 =$ _____

Definitions | Rules Review

1. What is the smallest positive integer?
2. How many positive, even digits are between -5 and 10?
3. Is 5 a factor of 5?
4. What is the remainder when 17 is divided by 3?
5. Is 1 a prime number?
6. The smallest positive multiple of 12 is
7. The smallest positive factor of integer y is
8. What is the value of 7.5×10^{-4} ?
9. For what value(s) of p is $|7 - p| - 1 < 0$?
10. What is the value of $3! + 8!$?
11. If x and y are distinct prime numbers greater than 5, what is the least common multiple of $10xy$, $6y^2$, $12x$?
12. Let p and q be numbers such that $-p < q < p$. Which of the following must be true?
 - I. $|q| < p$
 - II. $q > 0$
 - III. $p > 0$

Substitution | Overview

On many SAT problems that seem like advanced algebra, you don't actually have to do any algebra at all! One of the best strategies for dealing with these questions is to simply replace the unknown values (variables) with real numbers.

There are three situations in which picking numbers will be helpful. The most common situation is when we see **variables in the answer choices**. When a problem contains variables in the answer choices, replace them with numbers and solve arithmetically instead of algebraically. Then compare the answer you get to the choices to see which matches.

Note: It is important that you plug the value(s) you chose into ALL of the answer choices, just in case multiple choices work for a selected number. Should that be the case, pick a new number, and just plug it into the choices that worked the first time.

Let's try a practice question together:

Michael is twice as old as Janet is and half as old as Tito is. If Janet is j years old, how old is Tito in terms of j ?

A) $\frac{j}{4}$

B) $\frac{j}{2}$

C) $2j$

D) $4j$

211

What tells us that we can substitute our own numbers in the problem above? _____

Which variable should we substitute for? _____

What number should we choose and why? _____

Using the number you chose, fill in the chart below for each of the people mentioned in the problem. How old is...

Janet (j):	Michael:	Tito:
----------------	----------	-------

Therefore, what is the numerical answer to the question asked above? _____

Compare the answer above to the choices by plugging in the value you chose for j . Which matches the numerical answer we got? Circle it above.

Rules for Picking Numbers

1. Pick easy numbers (usually integers): 2, 5, 10, etc.
2. Pick different numbers for different variables.
3. Avoid 0, 1, and numbers in the question/answer choices.

Substitution | Overview

The second common situation in which we can pick numbers is when we are asked a **percent or fraction question with an unspecified starting value**.

Let's do a practice question together:

If the liquid in a bucket, which is $\frac{3}{5}$ full, is poured into an empty tub that is 8 times the size of the bucket, what percent of the tub will be filled?

- A) 0.48%
- B) 0.75%
- C) 4.8%
- D) 7.5%

What tells us that we can substitute our own numbers in the problem above? _____

Notice that in this problem there are no variables to substitute for. In questions like this, we instead want to substitute for the starting amount (or full amount) that is not given. It is especially important to choose numbers that will be easy to work with for this type of substitution.

What might be a good number to choose here and why? _____

What does that number represent in the problem? _____

So if the bucket is $\frac{3}{5}$ full, how much liquid is in it? _____

If the tub is 8 times the size of the original bucket, how large is it? _____

Does the amount of liquid change when we dump it into the tub? _____

So when that liquid is dumped into the tub, what fraction of the tub is full? _____

The final step is to convert this fraction into a percent:

Circle the correct answer above.

Substitution | Overview

The final common situation in which we can pick numbers is when we are given **“rules” about an unknown quantity**. These questions tell us what a variable is equal to in terms of another, or whether a variable is odd or even, or negative or positive, etc.

Let’s do a practice question together:

If $\frac{x}{y} = 4$, what is the value of $\frac{8y}{x}$?

- A) 0.5
- B) 2
- C) 4
- D) 32

What rule are we given in the question above? _____

Pick a value of x and y that satisfies the given rule: $x =$ _____ and $y =$ _____

Using those numbers, the value of $\frac{8y}{x}$ is equal to: _____

Circle the correct answer choice above.

Plugging In | Overview

Sometimes you may not be able to substitute your own number into a question. However, you may be able to plug in one of the answer choices instead. To decide whether or not a question is a good candidate for this strategy, ask yourself, “What do these answer choices represent, and can I plug them in anywhere that will help me work backwards?”

This is a great strategy when the answers are numbers instead of variables and the question asks you to find a single unknown quantity, often times asking “how much” or “how many.” Because the answer choices will always be in ascending or descending order, when plugging them in, start with either choice B or C and then move up or down from there as needed.

Here’s an example:

Barbara and Sharon share an apartment that has a monthly rent of \$1,200. If Barbara pays \$150 more than twice the amount that Sharon pays, how much does Barbara pay?

A) \$900
 B) \$850
 C) \$700
 D) \$650

What do the answer choices represent in the problem above? _____

214

Let’s start with answer choice C:

C) Barbara = \$700

If Barbara pays \$150 more than twice the amount Sharon pays, then Sharon would pay _____.

Therefore, together they would be paying _____.

Does that work? Why or why not? _____

So what should we try next? (Work out the calculations below) _____

STRATEGIES



SKILL SET

1

A professional baseball player has a bonus structure built into his contract. He earns \$235.60 each time he hits a homerun and \$98.70 each time he hits a double. Which of the following expressions represents the amount of the bonus, in dollars, that he earns if he hits h homeruns and d doubles in a season?

- A) $235.60h + 98.70d$
- B) $(235.60 + 98.70)hd$
- C) $235.60d + 98.70h$
- D) $(235.60 + 98.70)(h + d)$

2

$$(4x + 2)(9x - 8)$$

Which of the following is equivalent to the expression above?

- A) $36x^2 + 14x + 16$
- B) $13x^2 - 50x + 16$
- C) $36x^2 - 14x - 16$
- D) $13x^2 - 50x - 16$

3

What value of x satisfies the equation $12x + 4 = 64$?

- A) 4
- B) 5
- C) 6
- D) 8

4

Which of the following values is a solution of the inequality $10x + 2 < 3x - 12$?

- A) -3
- B) -2
- C) -1
- D) 0

5

$$s = 16.13 + 2.29t$$

The speed at which water flows downhill depends on the air temperature. The function above shows the relationship between s , the speed of the water, in centimeters per second, and t , the air temperature, in degrees Fahrenheit ($^{\circ}\text{F}$).

Which of the following expresses the air temperature in terms of the speed of the water?

- A) $t = \frac{s + 16.13}{2.29}$
- B) $t = \frac{s - 16.13}{2.29}$
- C) $t = \frac{2.29}{s + 16.13}$
- D) $t = \frac{2.29}{s - 16.13}$

STRATEGIES



SKILL SET

6

A bakery sells cookies in boxes of 12 and 20 only. The truck that it uses to make deliveries must carry at least 14 boxes of cookies in order to ensure a profit, but cannot exceed a total of 205 cookies or the freshness will be compromised. What is the maximum number of 20 cookie boxes that a truck can carry in one trip?

- A) 2
- B) 4
- C) 6
- D) 8

7

$$D = \frac{6st^3}{t}$$

The distance a baseball travels off a bat is modeled by a function of s , the speed of the pitch hit in miles per hour, t , the air temperature in degrees Fahrenheit ($^{\circ}\text{F}$), and l , the length of the bat used, in meters.

Which of the following expresses the length of the bat in terms of the distance a baseball hit traveled, the air temperature, and speed of the pitch?

- A) $l = \sqrt[3]{\frac{6st}{D}}$
- B) $l = \sqrt[3]{\frac{Dt}{6s}}$
- C) $l = 6Dst$
- D) $l = \sqrt[3]{\frac{6Dst}{3}}$

8

$$c(a - b) = d$$

In the equation above, if $a < b$ and $c < 0$, which of the following must be true?

- A) $d = 0$
- B) $d < a$
- C) $d > 0$
- D) $d < -1$

9

For 5 consecutive integers, the sum of the second and fourth integer is 13 less than three times the first integer. What is the value of the third integer?

- A) 15
- B) 17
- C) 19
- D) 21

10

Luisa bought a stereo system at a store that gave a 30 percent discount off the original price. The total amount that she paid was d dollars, which included a 6 percent sales tax on the discounted price. Which of the following represents the original price of the stereo system in terms of d ?

- A) $\frac{0.76}{d}$
- B) $\frac{d}{(1 - 0.30)(1 + 0.06)}$
- C) $\frac{d}{(1 - 0.06)(1 + 0.30)}$
- D) $0.76d$

STRATEGIES



SKILL SET

1

If $\frac{x^2 - 5}{2} = y$ and $y = 10$, what is the value of x if $x < 0$?

- A) -5
- B) -4
- C) -2
- D) -1

2

$$\begin{aligned} 2x + 6y &= 14 \\ 12y - 7x &= -16 \end{aligned}$$

What is the solution (x, y) to the system of equations above?

- A) (-1, 4)
- B) (2, -5)
- C) (4, 1)
- D) (-3, -6)

3

Sharna owns a jewelry business and sells her work at flea markets. Each pair of earrings costs her \$4 to make, and she sells them for \$8. It costs her \$156 to rent a booth at her favorite flea market. What is the least number of pairs of earrings she must sell at that flea market in order to earn a profit?

- A) 35
- B) 38
- C) 39
- D) 40

4

$$y = \frac{\left(\frac{r}{3,600}\right)\left(\frac{r}{3,600} + 1\right)^t}{\left(\frac{r}{3,600} + 1\right)^t - 1} M$$

The formula above gives the yearly payment y needed to pay off a mortgage of M dollars at r percent yearly interest over t years. Which of the following gives M in terms of y , r , and t ?

- A) $M = \frac{\left(\frac{r}{3,600}\right)\left(\frac{r}{3,600} + 1\right)^t}{\left(\frac{r}{3,600} + 1\right)^t - 1} y$
- B) $M = \frac{\left(\frac{r}{3,600}\right)\left(\frac{r}{3,600} - 1\right)^t}{\left(\frac{r}{3,600} + 1\right)^t + 1} y$
- C) $M = \frac{\left(\frac{r}{3,600} + 1\right)^t - 1}{\left(\frac{r}{3,600}\right)\left(\frac{r}{3,600} + 1\right)^t} y$
- D) $M = \frac{yrt}{3,600}$

5

$$25a^2b^2 + 60ab^3 + 36b^4$$

Which of the following is equivalent to the expression shown above?

- A) $(5a^2b^2 + 6b^3)^2$
- B) $(5ab + 6b^2)^2$
- C) $(6ab + 5ab^2)^2$
- D) $(25ab + 6b^2)^2$

STRATEGIES



SKILL SET

6

If $(y + 3)^2 - 5(-2y - 20) - 45 = 0$, what is the value of y ?

- A) -8
- B) -4
- C) 0
- D) 8

7

$$c = 246 + 75.25w$$

$$s = 189 + 89.50w$$

In the equations above, c and s represent the cost, in dollars, of maintenance on a convertible and sedan, respectively, w weeks after the purchase of each car. What was the cost of the convertible maintenance when it was equal to the sedan maintenance?

- A) \$480
- B) \$502
- C) \$547
- D) \$680

8

If $x > 5$, which of the following is equivalent

to $\frac{1}{\frac{1}{x-5} - \frac{1}{2x+6}}$?

- A) $\frac{x+11}{2x^2-4x-30}$
- B) $\frac{2x^2-4x-30}{x+11}$
- C) $\frac{2x^2-4x-30}{x-1}$
- D) $\frac{x-1}{2x^2-4x-30}$

9

$$pqr - rsq = pq + rs$$

In the equation above, p , q , r , and s are each greater than 1. Which of the following is equivalent to q ?

- A) $-prs$
- B) $\frac{s-1}{pr-2s}$
- C) $\frac{rs}{pr-rs-p}$
- D) $\frac{s}{pr}$

10

The number of minutes it takes to paint a landscape increases by 1 for every additional 49 blades of grass painted. When there is no grass in a scene, it takes 38 minutes to complete the landscape. Which equation gives the total number of minutes, m , it takes to paint a landscape with g blades of grass in the scene?

- A) $m = 49g + 38$
- B) $m = 38 + \frac{g}{49}$
- C) $m = \frac{49}{g} + 38$
- D) $m = 38(49g)$

11

Which of the following is a solution to the equation $12x^2 + 5x - 28 = 0$?

- A) -2
- B) $-\frac{1}{2}$
- C) $\frac{4}{3}$
- D) 5

Fractions & Decimals | Overview

When **adding or subtracting** fractions there are three options:

1. Find a common denominator
2. Convert to decimals
3. Use your calculator

Example:

What is the value of $\frac{1}{8} + \frac{3}{5}$?

Finding a common denominator:

What is the least common denominator of the fractions above? _____

$$\frac{\quad}{\quad} + \frac{\quad}{\quad} = \frac{\quad}{\quad}$$

Converting to decimals:

What is $\frac{1}{8}$ as a decimal? _____

What is $\frac{3}{5}$ as a decimal? _____

The sum of those two decimals is _____

Using your calculator (TI graphing calculator):

Using the parenthesis button to separate each fraction, enter the fractions. Use the division sign to create the fraction bar:

$$\left(\frac{1}{8}\right) + \left(\frac{3}{5}\right)$$

Press ENTER.

To convert the resulting decimal answer back to a fraction, press MATH and then select the first item from the drop down list, FRAC.

Press ENTER.

Fractions & Decimals | Overview

When **multiplying fractions**, multiply across the top (numerator \times numerator) and across the bottom (denominator \times denominator). Do not cross-multiply, but you can cross-reduce where appropriate.

To **reduce** fractions, find a factor common to the numerator and denominator. Reducing can be helpful when multiplying and dividing fractions, particularly on the non-calculator section.

Again, this can all be done on your calculator if a question like this comes up in the calculator section.

Example:

What is the value of $\frac{5}{33} \times \frac{22}{7}$?

When **dividing**, flip the second fraction and then multiply just as we did above.

Example:

What is the value of $\frac{2}{21} \div \frac{5}{14}$?

Fractions & Decimals | Rules Review

1. What is the value of $\frac{5}{33} \times \frac{3}{5}$?
2. What is the value of $\frac{1}{9} - \frac{3}{5}$?
3. What is the value of $\frac{a}{2} + \frac{1}{b}$?
4. What is the value of $\frac{\frac{1}{2} - \frac{1}{8}}{8}$?
5. What is the value of $\frac{7}{8} \div \frac{14}{4}$?
6. What is $(0.4)(0.8)$ as a fraction?
7. What is the correct ordering of the following values from least to greatest?
 $\frac{7}{8}, -\frac{1}{5}, -\frac{7}{8}, -\frac{3}{7}, \frac{5}{6}$?
8. What is the fraction $\frac{33}{121}$ in its most reduced form?

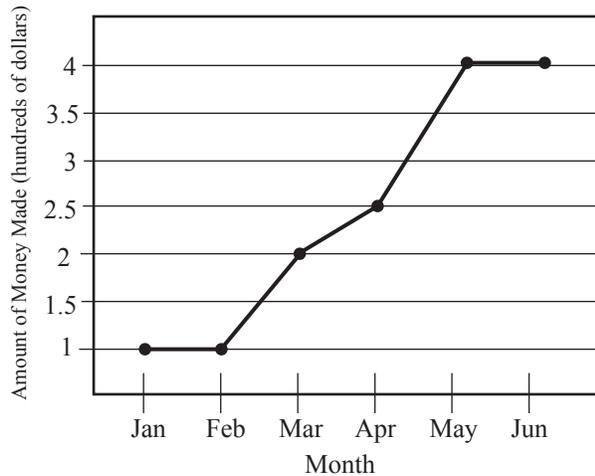
FRACTIONS/DECIMALS



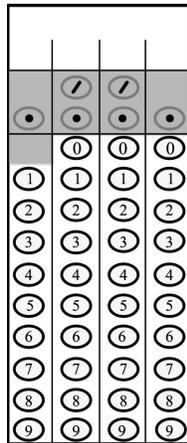
SKILL SET

1

Larry's Lemonade Stand Sales



According to the line graph above, the amount of money that Larry made selling lemonade in April was what fraction of the amount he made in May?



222

2

If $\frac{3}{7}x = \frac{1}{9}$, what is the value of x ?

- A) $\frac{7}{27}$
- B) $\frac{3}{63}$
- C) $\frac{27}{7}$
- D) $\frac{3}{16}$

3

The product of $\frac{a}{3} \times \frac{3}{4} \times \frac{4}{5} \times \frac{5}{6} \times \frac{6}{7} \times \frac{7}{8b}$

can be expressed as

- A) $\frac{8b}{a}$
- B) $\frac{a}{8b}$
- C) $\frac{3ab}{2}$
- D) $\frac{8a}{b}$

4

A subscription book service charges a monthly membership fee of \$14.76 and includes a total of 5 books per month. For each additional book purchased, customers are charged \$3.45. For one month, Leslie paid a total of \$80.31. How many books did Leslie get that month?

- A) 17
- B) 19
- C) 21
- D) 24

FRACTIONS/DECIMALS



SKILL SET

5

The height of a point guard is approximately $\frac{7}{8}$ of the height of a power forward. The height of a center is $\frac{11}{9}$ of the height of a power forward.

If a center is 88 inches tall, what is the difference, in inches, between the height of the point guard and the height of a power forward?

- A) 2
- B) 4
- C) 9
- D) 63

6

$$D = \frac{6sl^3}{t}$$

The distance a baseball travels off a bat is modeled by a function of s , the speed of the pitch hit in miles per hour, t , the air temperature in degrees Fahrenheit ($^{\circ}\text{F}$), and l , the length of the bat used, in meters.

On Tuesday, Player A hit a ball that went 3.375 times the distance of one he hit on Monday. If the air temperature and speed of the pitch he hit remained the same, the length of the bat he used on Monday was what fraction of the length of the bat that he used on Tuesday?

- A) $\frac{2}{5}$
- B) $\frac{3}{7}$
- C) $\frac{2}{3}$
- D) $\frac{5}{8}$

7

A ticket box office sells tickets to a rock concert for \$24.50 each and to a wrestling match for \$17.25 each. The box office's revenue from selling a total of 121 tickets was \$2,609.25. How many wrestling match tickets did the box office sell?

- A) 35
- B) 49
- C) 63
- D) 72

8

Study Technique	Number of Students	
	Passed	Failed
Flashcards	78	22
Cramming	27	81
Memorization	54	43

The table above shows the results of an experiment involving the effect of different study techniques, Flashcards, Cramming, and Memorization, on the student pass rate of a biology final exam. Based on the results, what is the difference between the fraction of the students who used Flashcards and passed the test, and the fraction of students who used Cramming and passed the test?

- A) $\frac{1}{4}$
- B) $\frac{53}{100}$
- C) $\frac{19}{25}$
- D) $\frac{19}{23}$

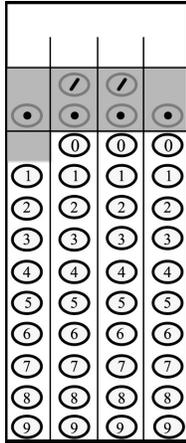
FRACTIONS/DECIMALS



SKILL SET

1

If $y + \frac{2}{5}y = \frac{4}{15} \times \frac{3}{4}$, what is the value of y ?



224

2

A vineyard contains different types of grapevines. One-fourth of the number of white grapevines is one-tenth of the total number of grapevines in the vineyard. One-fifth of the number of red grapevines is one-fifteenth of the total number of grapevines in the vineyard. If there are 120 white grapevines in the vineyard, how many red grapevines are in the vineyard?

- A) 20
- B) 30
- C) 100
- D) 300

3

A one-meter-long wire is to be marked for cutting at intervals of fifths and thirds. How long is the shortest segment of the wire if the wire is cut at the marked intervals?

- A) $\frac{1}{30}$
- B) $\frac{1}{15}$
- C) $\frac{2}{15}$
- D) $\frac{1}{5}$

4

$$E = 460 - \frac{8}{5}C$$

$$R = \frac{7}{10}C$$

A sandwich shop will break even when its expenses are equal to its revenue. If the expenses, E , and revenue, R , in terms of the cost in dollars, C , are given by the equations above, what is the amount of revenue a sandwich shop would need to earn in order to break even?

- A) \$140
- B) \$200
- C) \$220
- D) \$240

FRACTIONS/DECIMALS



SKILL SET

5

$$\frac{4}{x+2} - \frac{10}{3x+6}$$

Which of the following expressions is equivalent to the one above, where $x \neq -2$?

- A) $\frac{1}{x+2}$
 B) $\frac{2}{3x+6}$
 C) $\frac{14}{x+2}$
 D) $\frac{22}{3x+6}$

6

The expression $\frac{7x+6}{x-2}$ is equivalent to which of the following?

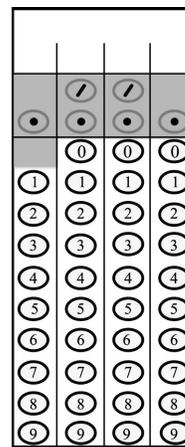
- A) $\frac{7+6}{2}$
 B) $7 - \frac{8}{x-2}$
 C) $7 + \frac{20}{x-2}$
 D) $\frac{x+2}{7x-6}$

7

$$\frac{3x-1}{(x-4)^2} + \frac{2}{x-4}$$

The expression above is equivalent to

$\frac{px-q}{(x-4)^2}$, where p and q are positive constants and $x \neq 4$. What is the value of q ?



8

$$\frac{6}{4x-2} + 8$$

Which of the following is equivalent to the expression above for $x > 1$?

- A) $\frac{16x-5}{2x-1}$
 B) $\frac{14}{3x-2}$
 C) $\frac{14x-2}{3x}$
 D) $\frac{6}{2x-1}$

4b

**PROBLEM SOLVING
& DATA ANALYSIS:**

**RATIOS, RATES, PROPORTIONS,
PERCENTS, SCATTERPLOTS, DATA
ANALYSIS, MEASURES OF CENTER,
DATA COLLECTION METHODS**

Ratios & Proportions | Overview

A **ratio** says how much of one thing there is compared to another thing. Ratios can be represented in three equivalent ways:

1. With words A ratio of 4 to 5
2. As “fractions” $\frac{4}{5}$
3. With a colon 4 : 5

The most common way that the exam will test your knowledge of ratios, is to have you use them as part of a proportion.

What are Proportions?

Proportions are pairs of ratios set on opposite sides of an equal sign. To solve a proportion, we must find the missing piece. Let’s take a look at the example below.

Yabba-Dabba-Doodle sells 22 pens for every eraser. If last month the store sold a total of 24 erasers, how many pens did it sell?

To set up a proportion, follow the steps below:

Step 1: Set up two ratios, one in which we know both pieces and the other in which we only know one part, and set them equal to one another. Both ratios will be made up of the same two units. Put the one unit in the numerator of both ratios and the other unit in the denominator of both ratios. Use x to represent the piece you’re solving for.

In the question above, what are the two units? _____

In the space below, write your two ratios:

Step 2: Cross multiply.

Step 3: Solve for the missing piece.

Ratios & Proportions | Overview

For ratios with more than two parts where we can't just set up an easy proportion, we can instead set up a Ratio Table. Let's work through an example below:

A certain store carries three different items - A, B and C - in a ratio of 3 : 4 : 8. It has a total of 60 items in its inventory. How many of Item C does the store have in inventory?

To answer questions like these, we can set up a grid similar to the one below:

	Item A	Item B	Item C	Total
Ratio Values				
Multiplier				
Real Values				

Once you set up your grid, fill in the given information. Use the grid above to organize the information from the question.

Now locate the column in which you have information from both categories and circle it. You can use this to find the multiplier, or the number we must multiply the ratio value by in order to reach the real value. The multiplier will be the same for each of the columns.

228

The multiplier in this example is _____.

How would you use this to solve the question? _____

Therefore, the store has a total of _____ Item C's in inventory.

Ratios & Proportions | Overview

Questions on the SAT may utilize the terminology “directly proportional” or “inversely proportional.”

Items that are **directly proportional** increase or decrease at the same rate. For example, the number of hours a babysitter works and the amount of money she makes are directly proportional because as the babysitter works more hours, she earns more money at the same rate.

Items that are **inversely proportional** still vary at the same rate, but do so in opposite directions. As one variable increases, the other decreases at the same rate. For example, the number of miles a person drives and the amount of gas remaining in the tank are inversely proportional. As a person drives more miles, the gas remaining will decrease.

Direct Proportionality:

To work with a set of variables that are directly proportional, set up a pair of ratios across an equal sign as we did on the previous page.

The Equation of Inverse Proportionality:

$$y = \frac{k}{x}$$

where y represents one quantity (such as the number of miles driven), x represents the other quantity (such as the amount of gas in the tank), and k represents the constant of proportionality (the rate at which these quantities increase or decrease).

The number of miles driven in a car varies inversely with the amount of gas left in the car’s tank. If a car that has been driven 90 miles has a total of 12 gallons remaining in the tank, how many gallons will be left in the tank if the car is driven 108 miles?

Step 1: Set up the equation and solve for the constant of proportionality.

Step 2: Use the constant of proportionality to set up another equation and solve for the missing variable.

Ratios & Proportions | Rules Review

1. The ratio of $b : c$ is $2 : 7$ and $b = 32$. What is the value of c ?
2. Every inch on a particular map represents 20 miles. Therefore, a distance of 170 miles is represented by how many inches on the map?
3. Variables g and h vary inversely. When g is equal to 18, h is equal to 6. What is the value of g when h is equal to 24?
4. If there are a total of 15 marbles in a bag in a ratio of 2 blue to 2 red to 1 green, how many green marbles are in the bag?
5. The ratio of males to females at an event is 5 to 3. If 39 females are at the event, how many people are at the event?
6. In a box with 156 markers, there is a ratio of $2 : 3 : 1$ among the green, blue, and orange markers, respectively. How many green markers are in the box?

RATIOS/PROPORTIONS



SKILL SET

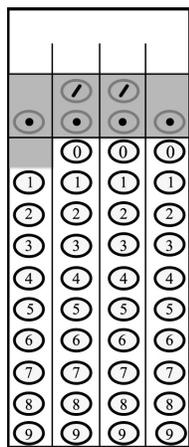
1

If x and y are directly proportional, and when $y = 96$, $x = 12$, what is the value of x when y is equal to 152?

- A) 8
- B) 14
- C) 19
- D) 23

2

Callie can bake at least 22 sheets and at most 30 sheets of cookies per day. Each sheet contains 14 cookies. Based on this information, what is a possible number of cookies that Callie could bake in 2 weeks, if she works Monday through Friday?



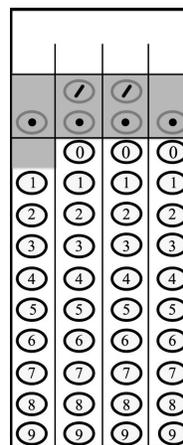
3

A gardener plants tulips each spring. In one row, a total of 460 of the 1,200 bulbs bloomed. If the remaining tulips in the garden bloom at the same rate, about how many tulips out of the total 8,400 in the garden will bloom?

- A) 209
- B) 756
- C) 2,900
- D) 3,220

4

A scout estimates that a wide receiver sprints at a speed of 8.6 feet per second. According to the scout's estimate, how many feet would he expect the wide receiver to run in 25 seconds?



5

The amount of money that an office supply company makes is directly proportional to the number of fax machines it sells. The company earns a total of \$1,260 when it sells 18 fax machines.

How much money will the company make when it sells 306 fax machines?

- A) \$14,240
- B) \$18,960
- C) \$21,420
- D) \$32,480

RATIOS/PROPORTIONS



SKILL SET

6

1 kiloliter = 1,000 liters

1 deciliter = 0.1 liters

A water tank holds a total of 3 kiloliters of water. Based on the information given above, how many 1-deciliter bottles could be filled with the water in the tank, if the tank is filled to capacity?

- A) 300
- B) 3,000
- C) 30,000
- D) 300,000

7

A contractor is estimating how many kilometers of PVC piping will be needed in the construction of a new apartment building. One kilometer of piping is needed to construct four apartments. If each apartment is identical in size and each is 390 square feet, approximately how many square feet could 8 kilometers of piping be used to construct?

- A) 195
- B) 780
- C) 9,200
- D) 12,500

8

A farmer charges \$6.75 per pound of potatoes. When he brings his potatoes to a market, the scale only operates in grams. One customer wants to purchase 1,500 grams of potatoes. What is the approximate price that the customer should pay? (1 pound = 453.6 grams)

- A) \$17.02
- B) \$18.94
- C) \$22.32
- D) \$24.66

9

The table below lists the average attendance at five conferences across the United States from 2009 to 2012.

Conference	Year			
	2009	2010	2011	2012
Farmers United	42,320	50,008	38,506	10,507
AutoClub USA	12,590	23,480	48,009	30,565
Educational Innovations	14,335	35,686	22,817	28,995
Artistic Expressions	68,900	74,578	62,304	59,002
Coding for the Future	13,568	39,903	21,445	54,257

Of the following, which conference has a ratio of its 2009 attendance to its 2012 attendance that is closest to the ratio of AutoClub USA's attendance in 2009 to its attendance in 2011?

- A) Farmers United
- B) Educational Innovations
- C) Artistic Expressions
- D) Coding for the Future

10

The speed of light has been measured at 2.99×10^8 meters per second. If the distance between Earth and Mars is 5.46×10^7 kilometers, approximately how many hours will it take for light to travel between the two planets?

- A) 0.05
- B) 3
- C) 180
- D) 212.5

Percents | Overview

What are Percents?

Percents are essentially just a specific type of proportion. Percents are a way of comparing any part to a whole where the “whole” is always made up of 100 parts. For example:

Three out of ten basketball coaches agree that shooting foul shots for at least one hour everyday will increase a player’s chances of hitting the shot in a real game. What percent of coaches is this?

To answer the question, we must first think about this in terms of a “whole” made up of 100 coaches. And to do this, all we need to do is set up a proportion. The proportion when working with percents should follow this formula:

$$\frac{\text{Part}}{\text{Whole}} = \frac{\text{Percent}}{100}$$

Use the information in the question above to fill in the proportion:

We find that the percent of coaches is equal to _____.

Sometimes, instead of giving you a ratio and asking you to find the equivalent percent, a question will instead give you a percent, and ask you to complete the ratio. This uses exactly the same skills we just discussed. The only thing that changes is where we place the x when setting up the equation. Take a look at the example below.

40% of the dogs at Puppy Playtime have brown fur. If there are a total of 125 dogs at Puppy Playtime, how many have brown fur?

Set up a proportion using the formula:

Solve for the missing value:

How many dogs have brown fur? _____

Percents | Overview

Percent problems often require multiple steps. Take a look at the example below:

If a shirt normally priced at \$30 has 20% deducted from its regular price, what is the new price?
 A) \$6
 B) \$14
 C) \$16
 D) \$24

Using the method from the previous page, find 20% of the regular price.

Once you have that amount, what should you do with it and why? _____

Therefore, the final sale price of the item is _____.

This method will work every time, but to save some time, you can calculate questions like this in one step.

If we take away 20% from an original value, what percent remains? _____

Therefore, you can also solve for the sale price of something decreased by 20% by finding _____ of that number.

The same idea holds true for an increase. Take a look at the example below:

If a shirt normally priced at \$30 has a 7% sales tax added to the price, what is the price including tax?
 A) \$31.07
 B) \$32.10
 C) \$33.00
 D) \$36.50

If 7% sales tax is added to the item, what percent of the original item is the new cost? _____

Use the space below to calculate the price after tax is added:

Another example of a multi-step percent problem would be percent increase or decrease. The formula to calculate that is:

$$\frac{\text{New Value} - \text{Original Value}}{\text{Original Value}} \times 100$$

Percents | Rules Review

1. What is 35% of 260?
2. Twelve is what percent of 96?
3. What percent of 75 is 15?
4. What is 25% of 25% of 25% of 32?
5. Twenty percent of what number is 540?
6. If a stockbroker received a 52% bonus on his yearly \$32,000 salary, what was his gross income after his bonus?
7. If a car, regularly priced at \$56,500 is on sale for 15% off, what is the new price of the car?
8. Julia can do 55 sit-ups in one minute in September. In October, she is able to do 66 sit-ups in one minute. By what percent did Julia's sit-up total increase?

PERCENTS



SKILL SET

1

The amount of money that an office supply company makes is directly proportional to the number of fax machines it sells. The company earns a total of \$1,260 when it sells 18 fax machines.

The company spends 57% of its revenue on rent and employee salaries. The remaining portion of the revenue is the company's profit. What is the company's profit when it sells 18 fax machines?

- A) \$507.60
- B) \$541.80
- C) \$665.70
- D) \$718.20

2

Natalia bought a subway card that had an initial value of \$30. For every subway ride Natalia takes, the cost of one ride is subtracted from the value of the pass. If the cost of one ride is 9.5% of the initial value of Natalia's card, how much money is left on her card after one subway ride?

- A) \$2.85
- B) \$3.00
- C) \$27.00
- D) \$27.15

3

Jessica surveyed a random sample of shoppers at the mall to determine whether they preferred shopping for clothing or for electronics. Of the 360 shoppers surveyed, 52.5% preferred shopping for clothing. Based on this information, about how many of the total 1,025 shoppers who entered the mall that day preferred shopping for electronics?

- A) 485
- B) 515
- C) 540
- D) 600

4

The combined weights of the women on the female wrestling team total 1,248 pounds, which is 36% less than the combined weights of the men on the male wrestling team. Which of the following best approximates the combined weights of the men on the male wrestling team?

- A) 450
- B) 800
- C) 1,950
- D) 2,050

5

The chart below shows the results of a survey conducted at Bramport Middle School.

Grade	Hair Color			Total
	Brown	Blonde	Red	
5	123	70	16	209
6	79	62	11	152
7	106	58	22	186
8	112	84	30	226
Total	420	274	79	773

Which of the following categories accounts for approximately 11 percent of all survey respondents?

- A) 6th graders with red hair
- B) 7th graders with blonde hair
- C) 8th graders with blonde hair
- D) 5th graders with brown hair

6

Amy wants to purchase a dress. To find the best deal, she searches two stores. At Lovely Boutique the dress costs 30% more than at Dress Me Up. If the dress costs \$150 at Dress Me Up, how much more does it cost at Lovely Boutique?

- A) \$45
- B) \$80
- C) \$170
- D) \$195

PERCENTS



SKILL SET

7

Jordan performed an experiment where she rolled two six-sided dice, Die 1 and Die 2, at the same time and recorded whether each one landed on an even or odd number. Her results are shown in the table below.

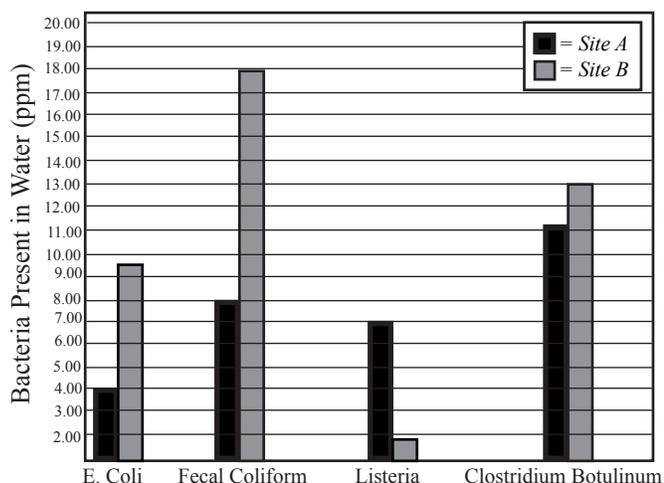
		Die 1	
		Even	Odd
Die 2	Even	18	21
	Odd	19	17

For what percent of the rolls did at least one of the dice land on an odd number?

- A) 22.7%
- B) 24%
- C) 50.7%
- D) 76%

8

Bacteria Present in Water



The bar graph above shows the bacteria present (in parts per million) in water at Sites A and B in 2014.

Of the following, which best approximates the percent decrease in the Fecal Coliform present from Site B to Site A?

- A) 44%
- B) 55%
- C) 88%
- D) 125%

9

The sum of three integers is 1,357. The largest of the three numbers is 30% larger than the sum of the other two. What is the value of the largest number?

- A) 486
- B) 590
- C) 688
- D) 767

10

In his rookie season in 2009, a baseball player had a total of 62 hits. In 2010, he had a total of 78 hits. His batting coach estimated that the percent increase from his rookie season to his 2010 season would be five times as high as the percent increase from the 2010 season to the 2011 season. Based on this prediction, approximately how many hits did the batting coach expect him to get in 2011?

- A) 80
- B) 82
- C) 89
- D) 97

11

An artist created a new shade of paint by mixing orange paint with yellow paint. He used a total of 1,400 milliliters of yellow paint, which made up 6.2% of the mixture. Which of the following is closest to the amount of orange paint, in milliliters, in the mixture?

- A) 22,580
- B) 21,180
- C) 868
- D) 87

Rates | Overview

Another specific type of proportion question is one asking about a rate. A rate is defined as a quantity measured against some other quantity. For example, if someone is traveling at a rate (or speed) of 15 miles per hour, it is measuring their distance (miles) against time (hours). To solve a rate question, we treat it just as we did a proportion. Let's take a look at an example:

John walks 3 miles in 30 minutes. How many minutes will it take him to walk 4.5 miles?
A) 15
B) 20
C) 35
D) 45

Simply set up a proportion, beginning with identifying and labeling the units:

A question may also ask you about what would happen if two individual things, working at different rates, worked together to complete a task. Take a look at an example below:

Juliette types at a rate of 50 words per minute. Susan types at a rate of 70 words per minute. If they work together, how many minutes will it take them to type a total of 240 words?
A) 15
B) 20
C) 35
D) 45

To approach questions like this, add up the amount of work they are able to complete in the same time, and set up a proportion to find the amount of work they could complete together.

In this example, how many words would they both be able to type in one minute? _____

Use that to set up a proportion to find out how many minutes it would take them to type 240 words:

Rates | Rules Review

1. If Julian biked 210 miles in 7 hours, at what rate was he biking?
2. If Wilson paints 5 walls per hour, how many minutes will it take him to complete the 18 walls in his house?
3. Jack climbs a hill in 5 hours at a rate of 2 miles an hour. If Jill climbs the same hill in 4 hours, what is her climbing rate?
4. If Toya paints 5 walls per hour and Ava paints 3 walls per hour, working together, each at her respective pace, how many walls can they paint in 6 hours?
5. Isaiah and Lucas were training for the marathon. Isaiah ran a total of 90 miles in 5 weeks, running the same distance each week. Lucas ran a total of 115.5 miles in 7 weeks, running the same distance each week. What is the relationship between the number of miles each boy ran per week?
6. Connor jogs for 30 minutes at a speed of 9 miles per hour, rests for 10 minutes, and then returns home along the same route. If he only has 45 minutes after the end of his rest period to get home, what is the minimum average speed that he must run his return route?

RATES



SKILL SET

1

Sabrina can type 752 words in 10.8 seconds. If she continues to type at this rate, which of the following is closest to the number of words she can type in 6 minutes?

- A) 11,750
- B) 13,500
- C) 19,000
- D) 25,000

2

Phillip is planning to travel from Maine to Florida. The table below shows information about the route, the amount of time Phillip plans to travel each day, and the speed at which he travels.

Number of exits along the route	168
Number of highway miles	1,184
Number of tolls along the route	8
Number of hours per day Phillip plans to travel	6
Number of side-street miles	462
Phillip's average highway speed (miles per hour)	74
Phillip's average side-street speed (miles per hour)	33

If Phillip travels at the rates given above, which of the following is closest to the number of days it would take him to travel the entire route?

- A) 3
- B) 5
- C) 7
- D) 8

3

The number of sprockets produced by a factory in a year is 4,665,600. It takes the factory 5 seconds to produce a sprocket. If the factory is open 24 hours on any day it is open, how many days of the year is the factory open?

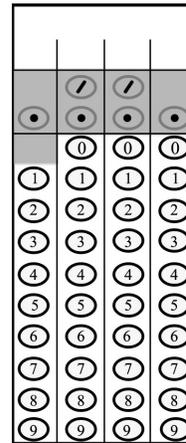
- A) 240
- B) 256
- C) 270
- D) 289

4

Flight Segment	Miles Flown	Hours
1	0-1000	3.75
2	1001-2000	2.5
3	2001-3000	2
4	3001-4000	3.25
5	4001-5000	4

A pilot is training to earn his license. In order to do so, he must complete a 5,000 mile flight from New York to Hawaii. The number of hours each segment of the flight took is shown in the table above.

During the second segment of the flight, the pilot shifts gears at a rate of 13 times per minute. How many times did he shift gears throughout that entire segment?



5

During the ascent of a rocket launched at sea level, the air pressure in the cabin fell at a constant rate of 11.2 pascals/meter as the rocket climbed. Which of the following is closest to the air pressure in the cabin when the rocket leveled out at an altitude of 1.8 kilometers above sea level, if the air pressure in the cabin at the time of the launch measured 101,325 pascals?

- A) 20,160
- B) 38,995
- C) 81,165
- D) 121,485

Averages (Arithmetic Mean) | Overview

The term “arithmetic mean” often appears in average problems and means the same thing as “average.” Any time a question asks you to find the average of something, set up the average formula (below):

$$\text{Average} = \frac{\text{Sum (Total)}}{\text{Number of Things}}$$

Remember: To find the average of multiple averages, set up a different equation for each set of information given and one for the combined average.

Let’s work through a sample problem together:

The average cost of 8 items is \$40. Two more items are added, bringing the total cost of all 10 items to \$370. What is the average cost of the last 2 items?

A) \$25
 B) \$30
 C) \$37
 D) \$40

When working with multiple averages in the same question, we must set up separate equations. Let’s start by setting up the equation for the 8 items first:

Now set up an equation with the information we have regarding all 10 items.

How can we use this information to find the average of just the final 2 items?

What is an Average Rate of Change?

The average rate of change between two values is the total change divided by the change in time. For example, if a girl scout troop sold a total of 70 boxes of cookies in January and 100 boxes of cookies in April, the average rate of change would be:

$$\frac{100 \text{ boxes} - 70 \text{ boxes}}{3 \text{ months}} = 10 \text{ boxes per month}$$

Averages & Rates | Rules Review

1. If the average (arithmetic mean) of eight numbers is 27, what is the sum of those numbers?
2. What is twice the sum of seven numbers with an average (arithmetic mean) of 13?
3. Four horses with an average weight of 830 pounds are loaded onto a truck with a capacity of 5,200 pounds. How many additional pounds can be loaded onto the truck?
4. If a student had an average (arithmetic mean) of 100 on his first 6 tests and a score of 85 on his next test, what will his new average be, rounded to the nearest tenth?
5. The average time for each leg of a three-leg road trip took Justin 1 hour and 40 minutes. How long did it take Justin to complete the trip?
6. The average height of two girls is 5.1 feet and the average height of three boys is 5.6 feet. What is the average height, in feet, of all five children?
7. One employee at Al's Garage makes yearly total sales of \$43,000. Another employee makes yearly total sales of \$62,000. If the average yearly total sales between the three employees at Al's Garage totals \$51,000, how much does the third employee make in sales?

AVERAGES



SKILL SET

1

The table below shows the number of miles run by 14 professional sprinters in the year 2014.

Sprinter	Miles	Sprinter	Miles
Savage	128	Lew	306
Dash	209	Schwartz	323
Silver	72	Oliver	245
Cotter	211	McCurry	119
Perlman	157	Luckert	409
Daly	129	Smith	292
Barry	285	Wright	311

According to the table, what was the mean number of miles run by each sprinter in 2014? (Round your answer to the nearest mile.)

	/	/	
●	●	●	●
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

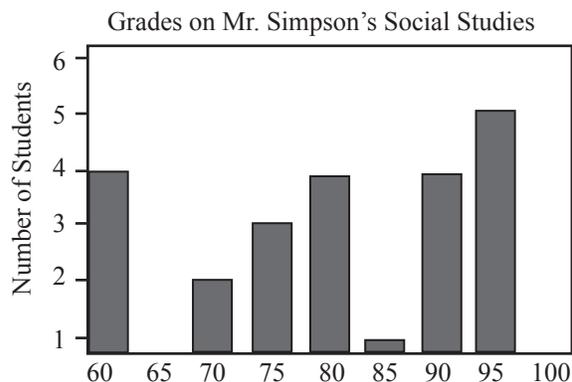
2

During a marking period, Sydney has earned the following grades on six tests: 72, 83, 91, 73, 92, and 88. What score must she receive on her final exam in order to earn an average grade of 85 for the marking period?

- A) 91
- B) 94
- C) 96
- D) 97

3

The histogram below shows the grades on Mr. Simpson's social studies midterm.



Which of the following represents the approximate average of the scores?

- A) 70
- B) 75
- C) 80
- D) 90

4

The table below lists the average attendance at four conferences from 2009 to 2012.

Conference	Year			
	2009	2010	2011	2012
Farmers United	42,320	50,008	38,506	10,507
AutoClub USA	12,590	23,480	48,009	30,565
Educational Innovations	14,335	35,686	22,817	28,995
Artistic Expressions	68,900	74,578	62,304	59,002
Coding for the Future	13,568	39,903	21,445	54,257

Which of the following best approximates the average annual rate of change in the attendance at Farmers United from 2009 to 2012?

- A) Decreases by 4 people per year
- B) Decreases by 10,600 people per year
- C) Decreases by 15,800 people per year
- D) Decreases by 31,000 people per year

AVERAGES



SKILL SET

5

The average score on a science test in Ms. May's class was an 89. After three of the 17 students transferred out, the average for the class raised to a 93. What was the average score, to the nearest whole number, for the three students who transferred out?

- A) 68
- B) 70
- C) 73
- D) 79

6

If a is equal to the average (arithmetic mean) of x and 7, b is the average of $4x$ and 7, and c is the average of $7x$ and 28, what is the average of a , b , and c in terms of x ?

- A) $2x + 19$
- B) $2x + 7$
- C) $3x + 15$
- D) $4x + 18$

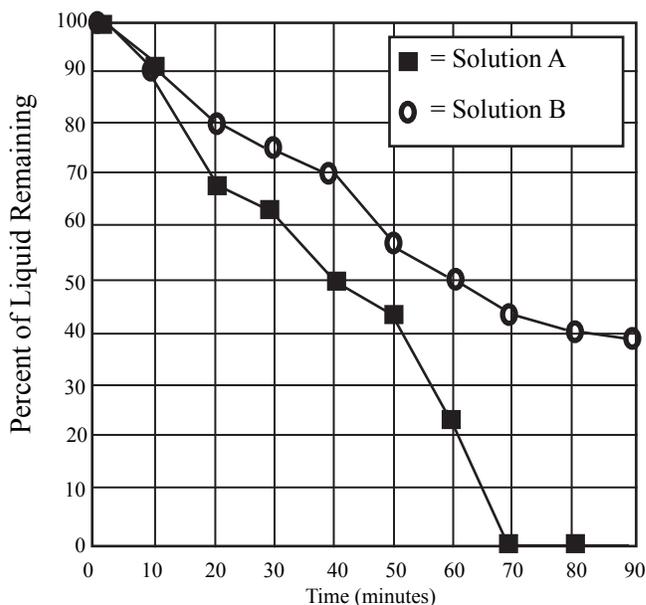
7

Beatriz takes a total of 25 quizzes, scored 0 to 70 inclusive, in her calculus class. For her first 12 quizzes she receives an average (arithmetic mean) score of 57. What is the lowest score she can receive on her 13th quiz and still be able to have an average of a 63 on her 25 quizzes?

	/	/	
•	•	•	•
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

8

Two beakers filled with equal amounts of aqueous solutions A and B were treated with a chemical to turn the solutions into solids. A scientist calculated the percentage of the liquid remaining in each beaker at 10 minute intervals. The data is displayed in the graph below.



Which of the following statements correctly compares the average rates at which the two solutions become solid?

- A) In every 10 minute interval, the magnitude of the rate of change of Solution A is greater than that of Solution B.
- B) In every 10 minute interval, the magnitude of the rate of change of Solution B is greater than that of Solution A.
- C) In the intervals from 10 to 20 minutes and from 50 to 60 minutes, the magnitude of the rate of change of Solution A is greater than that of Solution B.
- D) In the intervals from 30 to 40 minutes and from 60 to 70 minutes, the magnitude of the rate of change of Solution B is greater than that of Solution A.

Measures Of Center | Overview

The SAT will test other measures of center in addition to the mean. The most common of these are listed below:

Mode – _____

Set A includes: 1 1 3 4 4 4 6 7 10 11 The **mode** of Set A is _____.

Median – _____

In order to find the median, the numbers must be _____

Set A includes: 4 7 3 6 1 6 4 1 10 The **median** of Set A is _____.

Set B includes: 11 1 7 10 4 6 6 3 4 1 The **median** of Set A is _____.

Range – _____

Set A includes: 1 1 3 4 4 4 6 7 10 11 The **range** of Set A is _____.

If all of the values in Set A are increased by 3, what is the range of the new set? _____

Standard Deviation – Standard Deviation (SD) is a measure of how spread-out numbers in a set are. The more spread-out the data, the higher the SD. Similarly to the range, if the values of all the elements in a set increase or decrease by the same amount, the SD does NOT change. You may be asked to compare the SD's of multiple sets. The set with elements that have a wider range will also have a larger SD.

If you are unsure when looking at the two given sets, you can calculate the SD's using your calculator by following these steps:

1. Press STAT and select 1:Edit.
2. Enter the data points from the first set in L_1 and data points from the second set in L_2 .
3. Press STAT. Then scroll to the right and click CALC, then select 1:1-Var Stats.
4. Select the first list and press calculate. There will be a long list of data that comes up. The SD is σx . Do the same for the second list and compare. In order to change the list, press 2nd-STAT (List) and select the one you want to work with.

Outlier – _____

If an outlier is removed, the _____ will always change the most.

First Quartile – _____

Third Quartile – _____

Interquartile Range – _____

Measures Of Center | Overview

There are many ways to express data that we may need to use to find various measures of center. Check out some of the most popular ways.

Table

A table is one of the most straightforward ways to represent data. Take a look at the example below:

Students in Mr. Tuddle's Gym Class

Number of Students	Number of Pull-Ups
1	5
4	6
5	7
3	8

This table is specifically called a **frequency table** because it gives information about the number of times a data value occurs. The number of students corresponds to the number of times, while the number of pull-ups are your data values. One student is able to complete 5 pull-ups, while five students are able to complete 7 pull-ups.

Reading the chart is relatively straightforward, but it can be trickier to find the mean or median. **We must remember that the mean and median are found by taking into account EACH individual piece of data.** Take a look at how the three students below calculated the mean and median.

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Jacque: We calculate the mean by computing $\frac{5 + 6 + 7 + 8}{4} = 6.5$

The median equals 6.5 as well, since that is the middle of 5, 6, 7, and 8

Leonardo: We calculate the mean by computing $\frac{1(5) + 4(6) + 5(7) + 3(8)}{4} = 22$

The median equals 7, since that is the middle of 5, 6, 6, 6, 6, 7, 7, 7, 7, 8, 8, 8

Nicole: We calculate the mean by computing $\frac{1(5) + 4(6) + 5(7) + 3(8)}{13} = 6.77$

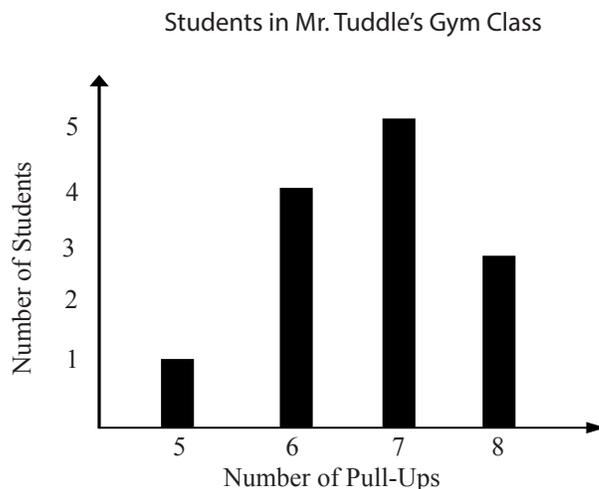
The median equals 7, since that is the middle of 5, 6, 6, 6, 6, 7, 7, 7, 7, 8, 8, 8

Which student computed the mean and median correctly? _____

Measures Of Center | Overview

Bar Graph

Sometimes data can be displayed in a bar graph, as shown below:



This bar graph shows the exact same information as the chart on the previous page. Just as we have to be careful when analyzing charts that we are taking into account each individual piece of data, we must remember to do that with bar graphs as well.

Stem-and-Leaf Plot

Another way to represent data points is on a Stem-and-Leaf plot. Check out an example below:

The number of points a basketball player scored in each game this season is represented on the stem-and-leaf plot below. What is the mean number of points he scored?

Stem	Leaf
1	1 1 3 9
2	0 4 4 4
3	1
4	5

In a Stem-and-Leaf plot, the stem represents the value of the tens digit, while the leaf represents the value of the ones digit. Therefore, on the first line, the data points we have are: 11, 11, 13, and 19.

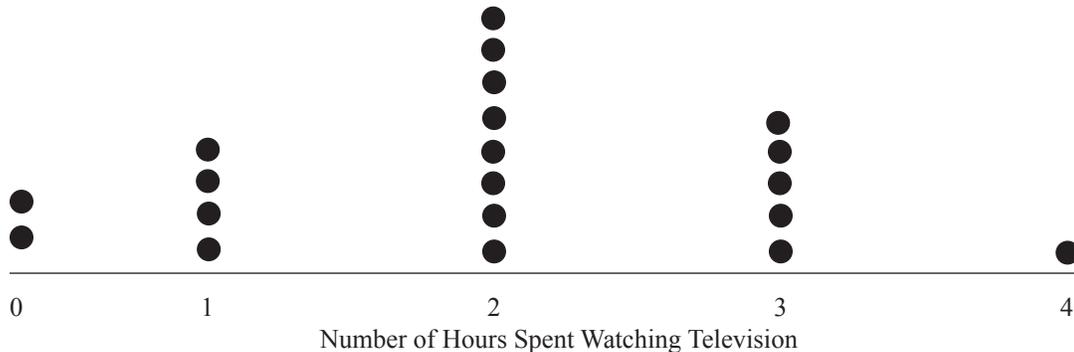
Using the information on a Stem-and-Leaf plot, we can find any measure of center, including the mean as we are asked to find in this question. The first step is to write out all of the data points in their regular form:

Now that your data points are in an easy to read list, find the mean as you normally would.

Measures Of Center | Overview

Dot Plot

Another way to represent data points is by using a Dot Plot (also called a Line Plot). Dot Plots look like this:



On a Dot Plot, each dot represents a data point. For example, since there are two dots above the 0, two of the data points equal 0. Since there are 4 dots above the 1, four of the data points equal 1.

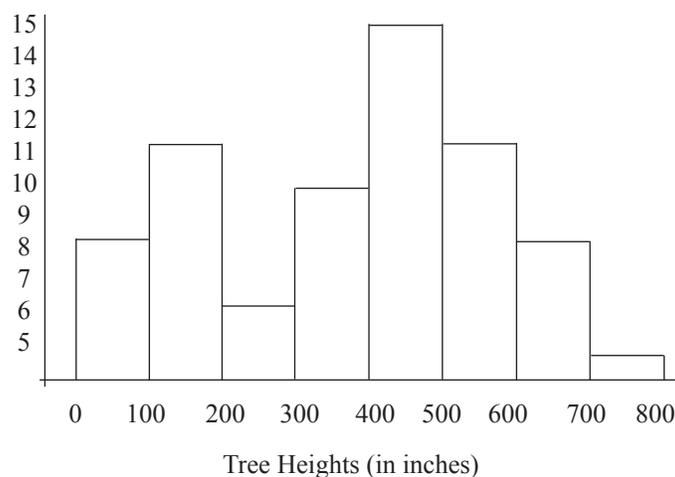
Therefore, if we were going to write out all of the data points, it would look like:

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Similarly to a Stem-and-Leaf plot, a Dot Plot will make it easy to put the numbers in order to find the median. It also makes it very easy to find the mode, since the mode is just the value with the most dots above it.

Histogram

Data can also be represented on a histogram. A histogram is very similar to a bar graph, though instead of each bar representing a specific value, the bars represent a range of values. Take a look at the example below.

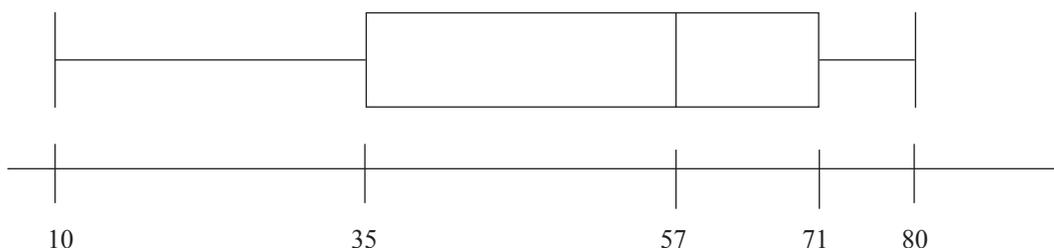


Notice that the first bar spans the distance from 0 to 100. Therefore, that bar represents all values from 0 through 99. The second bar represents all values from 100 through 199, and so on. The height of the bar tells us the number of values that fall within this range. For example, there are six trees in Redwood Forest that have a height between 0 and 100. Unlike the other data plots we have discussed thus far, a histogram does not give us the specific data points. Instead, it just gives us groups of data values within a range.

Measures Of Center | Overview

Box-and-Whisker Plot

The final way data will be represented is on a Box-and-Whisker Plot (sometimes just called a Box Plot). Take a look at an example below:



Understanding a Box-and-Whisker Plot is not as straightforward as some of the others plots we have already discussed. In order to understand this type of plot, you must know what each part of the plot represents.

We will work our way from left to right:

The leftmost line  represents the minimum (smallest) data point.

In the example above, _____ is the smallest number in the data set.

The next line we come to is the leftmost edge of the box.  This represents the **First Quartile**.

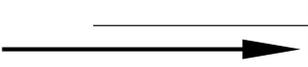
In the example above, _____ is the first quartile.

The next line is the one inside the box.  This represents the median of the set.

In the example above, the median would be _____.

The next line is the one on the far end of the box.  This represents a value called the **Third Quartile**.

In the example above, _____ is the third quartile.

The rightmost point on the plot  represents the maximum (largest) data point.

In the example above, the maximum is _____.

Measures Of Center | Rules Review

Set Q : {6, 2, 9, 14, 11, 10}

1. What are the median, mean, first quartile, and third quartile of Set Q ?

2. A group of students took a quiz. Six students scored a 4; five students scored a 5; eight students scored a 7; two students scored a 9, and one student scored a 10. What is the mode of the set of quiz scores for the class?

Set N : {12, 3, 7, 5, x , 9}

Set M : {5, 3, 5, 7, 8}

4. If the mode of Set N is 4 greater than the mode of Set M , the value of x must be

5. Of the 100 employees at a certain company, each of the 15 most experienced employees earned a salary of \$41,000, and each of the 51 least experienced employees earned a salary of \$21,000. If the other employees each earned a salary of \$39,000, what was the median salary for the company?

Set N : {12, 3, 7, 5, x , 9}

3. If the median of Set N is 8, the value of x must be what?

Set A : {12, 11, 16, 11, 5, 17, 9}

6. If all of the elements in Set A were to be increased by 2, which of the following would not increase?

- I. Median
- II. Mode
- III. Range
- IV. Mean
- V. Standard Deviation

MEASURES OF CENTER



SKILL SET

1

A business consultant collects data from two different tech companies, each with four employees. The results of the study are listed in the tables below.

TechByte

Years of Employment	Salary in Dollars
1	58,000
3	60,000
6	72,000
12	83,000

CompUTech

Years of Employment	Salary in Dollars
1	44,000
2	57,000
4	71,000
15	84,000

Which statement is true about the data?

- A) The median salaries for both companies are greater than \$65,000.
- B) The mean salary for CompUTech is greater than the mean salary for TechByte.
- C) The salary range for CompUTech is greater than the salary range for TechByte.
- D) The range in the years of employment for CompUTech is less than the range in years of employment for TechByte.

2

Prior to the final exam, the minimum score Jenny received on a Spanish test was 72. She scored a 68 on the final exam. Which of the following measures must be greater for Jenny's set of scores after the final exam than before it?

- A) The median
- B) The range
- C) The first quartile
- D) The third quartile

3

The table below shows the test scores for applicants to University X in 1990.

University X applicant pool data 1990				
Test scores	400	500	600	700
Number of applicants	15	30	55	40

What is the median of the test scores for applicants to University X in 1990?

- A) 400
- B) 500
- C) 550
- D) 600

4

A survey of the value of cars in a parking lot was taken. It was found that the mean car value was \$23,500 and the median car value was \$27,900. Which of the following situations could explain the difference between the mean and median car values in the parking lot?

- A) The cars have values that are close to one another.
- B) There are a few cars that are valued much lower than the rest.
- C) There are a few cars that are valued much higher than the rest.
- D) Many of the cars are valued between \$23,500 and \$27,900.

5

The scores for 23 students in Mr. Ramos's Spanish class were reported, and the mean, median, range, and standard deviation were calculated. The student with the highest test score was mismarked and actually scored three points higher. Which of the following remains unchanged if the four values were calculated using the correct scores?

- A) Mean
- B) Range
- C) Standard Deviation
- D) Median

MEASURES OF CENTER



SKILL SET

6

The tables below give the distribution of test scores for Student *A* and Student *B* over the same 23 tests from September through June.

Student *A*

Test Score	Frequency
100	2
95	15
90	1
85	3
80	2

Student *B*

Test Score	Frequency
100	6
95	3
90	1
85	3
80	4
75	6

Which of the following is true about the data shown for these 23 tests?

- A) The standard deviation of test scores for Student *A* is larger.
- B) The standard deviation of test scores for Student *B* is larger.
- C) The standard deviation of test scores for Student *A* is the same as that of Student *B*.
- D) The standard deviation of test scores for these students cannot be calculated with the data provided.

7

The table below lists the weights, to the nearest pound, of a random sample of 30 African elephants.

Weights of African Elephants (in pounds)

4,800	4,900	4,900	5,010	5,010
5,010	5,200	5,350	5,400	5,400
5,550	5,560	5,600	5,600	5,600
5,600	5,600	5,850	5,900	6,020
6,500	6,600	6,600	6,800	6,800
6,800	7,300	7,500	7,700	11,000

The outlier measurement of 11,000 pounds is an error. Of the mean, median, mode, and range of the values listed, which will change the most if the outlier is removed from the data set?

- A) Mean
- B) Median
- C) Mode
- D) Range

8

A census taker interviewed 450 families at random from each of three towns. He asked each family how many people live the household. The results are shown in the table below.

Household Numbers Survey

Number in Household	Silvertown	Goldville	Copperton
1	25	80	50
2	75	140	60
3	115	30	190
4	160	80	40
5	30	60	80
6	45	60	30

There are a total of 1,800 residents in Silvertown, 2,220 residents in Goldville and 1,500 residents in Copperton.

What is the median number of household members for all the families surveyed?

- A) 2
- B) 3
- C) 3.5
- D) 4

Data Collection | Overview

The SAT will sometimes ask you questions that involve no math at all. These questions may instead test your understanding of what makes a good sample population on which to conduct a survey or an experiment. When answering questions like these, keep a couple of things in mind:

1. An experiment must contain as little bias as possible.

Bias in an experiment will influence the results. For example, if you are conducting an experiment about how often students at a school work out, just interviewing students in the gym will cause your results to skew higher, since the students who do not go to the gym at all will not be counted.

2. An experiment must contain as large a sample size as possible.

Surveys conducted using only a small segment of a population will not necessarily be representative of the larger population. To increase the accuracy of a set of data, the number of people surveyed must represent a significant portion of the population.

3. Just because the results of an experiment suggest something, that does not mean the results apply in all cases.

For example, if an experiment suggests that if drivers take the Lincoln Tunnel rather than the Holland Tunnel from New York to New Jersey they will arrive quicker, it does not mean that EVERY driver who takes the Lincoln Tunnel will arrive quicker. The experiment only suggests that this is likely to be the case.

4. Some experiments may have a built in margin of error.

Margin of error is usually a small amount that is allowed for in case of miscalculation or change of circumstances. Margin of error tells us the amount that the result of a survey may be off by in either direction. Therefore, if a question gives you a margin of error, both add it to and subtract it from the given results to get the possible result range.

DATA COLLECTION



SKILL SET

1

Ariana conducted a survey to determine whether residents of a community would vote in favor of a ballot proposal to use \$50,000 of local taxes to open a new elementary school. She surveyed 75 adults attending a singles mixer at a local restaurant, and she found that 20 of those surveyed reported that they would vote in favor of the proposal. Which of the following statements must be true?

- A) When the actual vote is taken, 25 percent of the votes will be in favor of the proposal.
- B) The sampling method is flawed and may produce biased results.
- C) The sampling method is not flawed and is likely to produce unbiased results.
- D) No prediction should be made about the vote on the proposal because the sample size is too small.

2

A university offers 78 choices of major to its students. A researcher believes that student happiness varies greatly from major to major. Which of the following sampling methods is most appropriate to estimate the proportion of the students at the university who are happy?

- A) Selecting 12 students from each major at random and surveying each student selected
- B) Surveying the 50 students on campus with the highest GPA and the 50 students on campus with the lowest GPA
- C) Creating a survey and passing it out in all of the dorms and then using the first 75 completed surveys submitted
- D) Selecting one of the 78 majors at random and surveying every student who has selected that major

3

A school newspaper will survey students about the quality of the school's theater department. Which method will create the least biased results?

- A) Twenty-five actors are randomly surveyed.
- B) Fifty students are randomly chosen from each grade level.
- C) Students who dislike the school's theater department are chosen to complete the survey.
- D) A booth in the auditorium is set up for students to voluntarily complete the survey.

4

A survey is being conducted to determine if a cable company should add another cooking channel to the schedule. Which random survey would be the least biased?

- A) Surveying 50 women at a grocery store
- B) Surveying 65 people at a mall
- C) Surveying 55 men at a baseball game
- D) Surveying 15 members of a cooking club

5

A researcher conducted a survey to determine whether people at a university prefer staying on campus over the weekend or going home. The researcher asked 198 students in their dorm rooms on Sunday morning, and 14 refused to respond. Which of the following factors makes it least likely that a reliable conclusion can be drawn about the weekend preferences of the students at the university?

- A) The number of people who refused to answer
- B) Population size
- C) Where the survey was given
- D) Sample size

DATA COLLECTION



SKILL SET

6

To determine if taking notes by hand leads to higher test grades than taking notes on a computer, researchers interviewed a random sample of 12,800 college students taking Introductory Biology courses. Study participants were identified as either hand note-takers or computer note-takers. At the end of the semester, the researchers interviewed all of the students.

They found that, on average, the grades for the students who took notes by hand were significantly higher than the average grades for the students who took notes on a computer. Which of the following is the most appropriate conclusion of the study?

- A) Taking notes by hand is helpful in producing higher grades for students in all classes.
- B) Taking notes by hand leads to higher grades for students in biology classes, but not necessarily for students in any other classes.
- C) There is an association between taking notes by hand and taking notes on the computer for students in Introductory Biology courses, but it is not necessarily a cause-and-effect relationship.
- D) There is an association between taking notes by hand and taking notes on the computer for students in college courses, but it is not necessarily a cause-and-effect relationship.

7

For a project in his marketing class, Gene wanted to find out whether citizens in City X prefer to purchase products from companies with animals in their ads or with people in their ads. He decided to survey shoppers at the local mall. Which of the following survey methods would provide him with the most accurate results about all of the citizens in City X ?

- A) Asking all of the shoppers entering the pet supply store from 12:00pm until 4:30pm
- B) Asking all of the female shoppers who enter the food court all day
- C) Asking every fifth shopper who exits the mall's parking garage for a period of 3 hours
- D) Asking every shopper between the ages of 15 and 35 who enter the department store after 3:00pm

8

A research study was conducted to determine if study technique Z is successful in raising test scores. From a large population of high school students, 400 students were chosen at random. Half of the participants were randomly assigned to prepare for an upcoming history test using technique Z , while the other half did not use technique Z . The resulting data showed that the participants who prepared using technique Z scored significantly higher than those in the control group. Based on the design and results of the study, which of the following is an appropriate conclusion?

- A) Technique Z will result in higher test scores for those who struggle in school.
- B) Technique Z is likely to result in higher test scores than any other techniques available to students.
- C) Technique Z will result in higher test scores for every student who uses it.
- D) Technique Z will likely result in substantial increases in test scores nationwide.

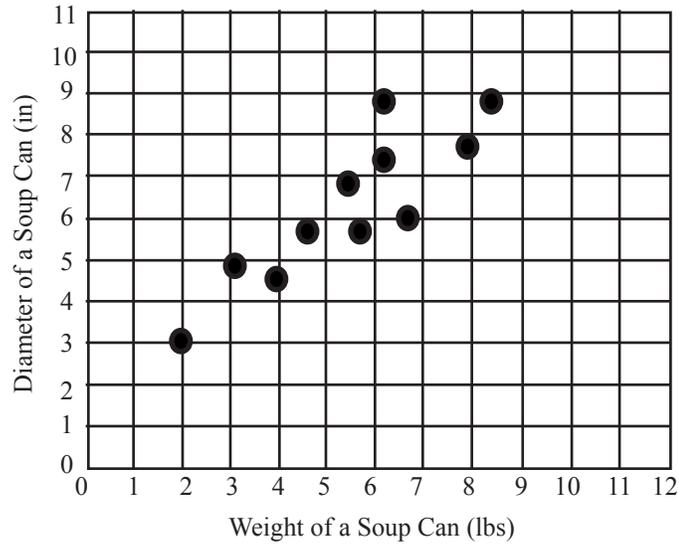
9

Kevin wanted to test whether Candidate A or Candidate B would win the race for student body president at his high school. Kevin sampled 500 of his fellow students at random, and 53% of the students favored Candidate A. The margin of error associated with his poll was $\pm 5\%$. Based on the poll's results, which of the following statements must be true?

- A) Candidate A will win the election with 53% of the votes.
- B) Candidate A will win the election, but the percentage of votes received cannot be predicted.
- C) Candidate A will win the election with at least 58% of the votes.
- D) The poll's results do not provide sufficient evidence to conclude which candidate will win.

Scatterplots | Overview

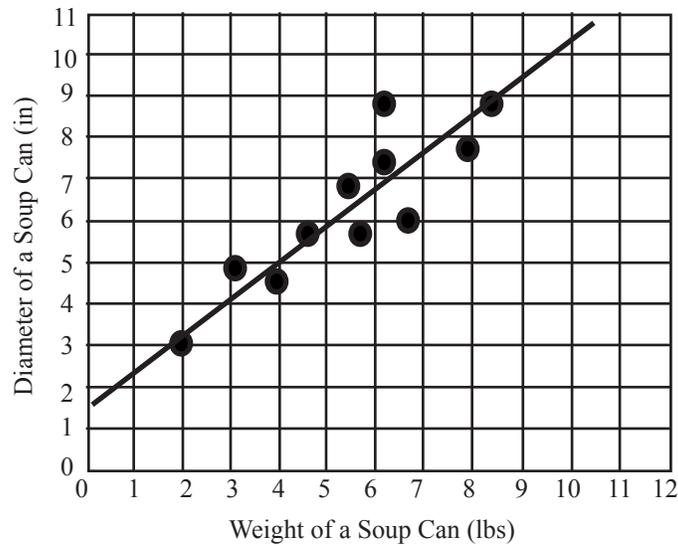
A scatterplot is a way to graphically display the relationship between two data sets. Each axis represents a different data set. Take a look at the example below:



256

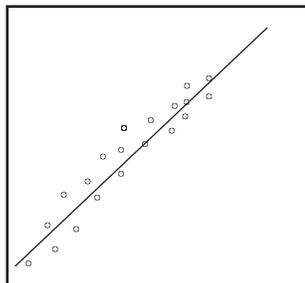
A scatterplot will tell us whether there is a positive correlation, a negative correlation, or no correlation between the data sets. In order to determine the correlation, you must draw a Line of Best Fit.

A Line of Best Fit shows the general direction in which a group of points is heading. If we were to draw a Line of Best Fit onto the graph above, it would look like this:

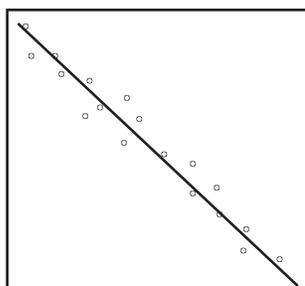


Scatterplots | Overview

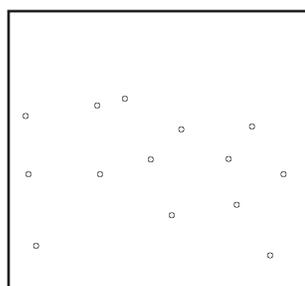
The Line of Best Fit gives us information about the correlation. If the slope of the Line of Best Fit is positive, as in the previous example, the correlation between the data sets is positive.



If the Line of Best Fit has a negative slope, there is a negative correlation between the data sets.



If no Line of Best Fit can be drawn, there is no correlation between the data sets.



If the data points are tightly clustered around a Line of Best Fit, the correlation is high. If they are more spread out, the correlation between the sets is low.

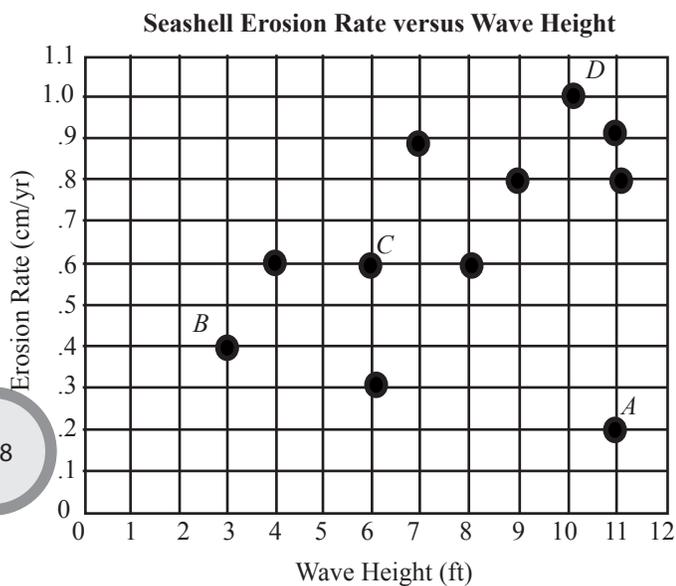
SCATTERPLOTS



SKILL SET

Questions 1 and 2 refer to the following information.

A scientist created the scatterplot below to examine the relationship between wave height and seashell erosion rate at 11 beaches on the Pacific coast.



258

1

What is the erosion rate, in centimeters per year, of the beach with the shortest wave height?

- A) 0.2
- B) 0.4
- C) 0.6
- D) 0.9

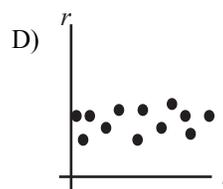
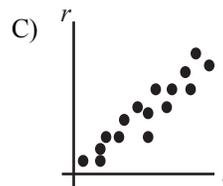
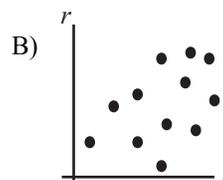
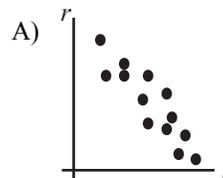
2

Of the labeled points, which represents the beach for which the ratio of wave height to erosion rate is the greatest?

- A) *A*
- B) *B*
- C) *C*
- D) *D*

3

Which of the following graphs best shows a strong positive association between rate (r) and time (t)?



SCATTERPLOTS

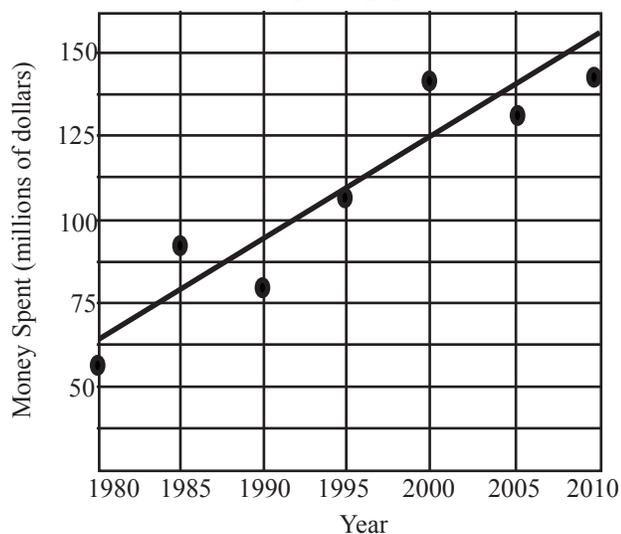


SKILL SET

4

The scatterplot below shows the number of dollars spent (in millions) on sporting events in various years.

**Money Spent on Sporting Events
1980 - 2010**



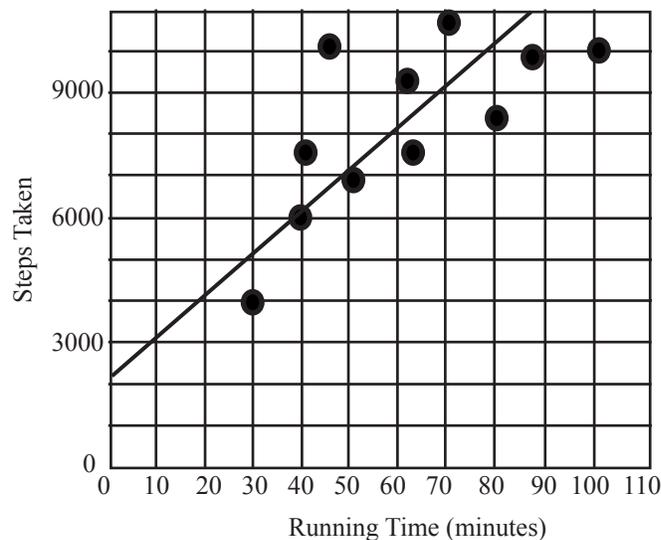
According to the line of best fit in the scatterplot above, which of the following best approximates the year in which the amount of money spent on sporting events was estimated to be 119 million dollars?

- A) 1986
- B) 1994
- C) 1998
- D) 2003

5

Kelly trained for a marathon over a span of 11 days. The scatterplot below shows her running time each day and the number of steps she took.

Running Time versus Steps Taken



The line of best fit for the data is also shown. For the run that took 1 hour and 28 minutes, Kelly's steps taken were about how many less than the number predicted by the line of best fit?

- A) 1,100
- B) 7,500
- C) 9,900
- D) 11,100

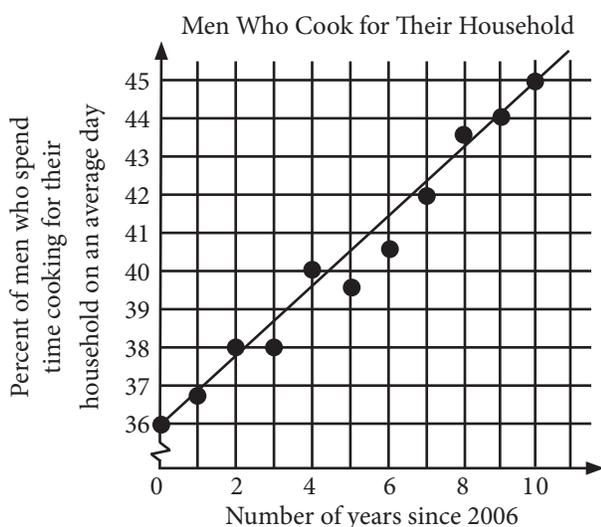
SCATTERPLOTS



SKILL SET

Questions 6 and 7 refer to the following information.

The Bureau of Labor Statistics recorded the percent of adult men in the United States who spent time on an average day cooking for their household from 2006 to 2016. In the scatter plot below, x represents the number of years since 2006, and y represents the percent of men who spent time cooking for their household. The line of best fit for the data is shown.



6

Which of the following is the best interpretation of the slope of the line of best fit shown for the data?

- A) The actual increase in the number of men who spend time cooking for their household on an average day each year.
- B) The predicted increase in the number of men who spend time cooking for their household on an average day each year.
- C) The actual increase in the percent of men who spend time cooking for their household on an average day each year.
- D) The predicted increase in the percent of men who spend time cooking for their household on an average day each year.

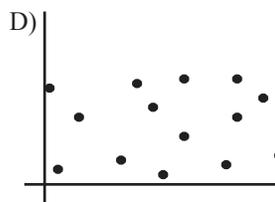
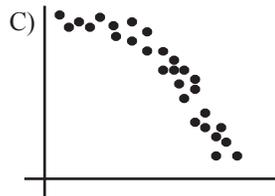
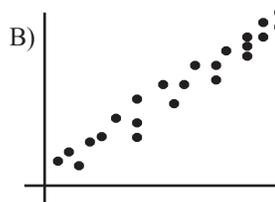
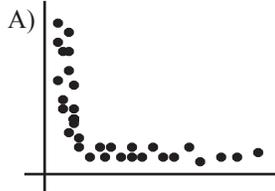
7

Which of the following is closest to the equation of the line of best fit shown?

- A) $y = 36x + 9$
- B) $y = \frac{9}{10}x + 36$
- C) $y = \frac{9}{10}x - 36$
- D) $y = \frac{9}{10}x$

8

Which of the following scatterplots shows the relationship that is appropriately modeled with the equation $y = a^b x^b$, where a is a positive number less than 1 and b is a negative integer?



Analyzing Tables & Graphs | Overview

Scatterplots are not the only way that the SAT will test data analysis. The exam will also test your ability to interpret graphs, tables, and charts.

When a question gives you a set of data represented in one of these ways, follow the steps below:

- 1. Identify what the axes represent and the units in which they are expressed.**
Make sure you understand what each axis (or column/row heading if you are dealing with a chart) represents. It is easy to get confused and read data from the wrong axis, so take steps to avoid making a silly mistake like that.
- 2. Identify the data that the question is referencing and circle it.**
This step will help you avoid falling into the trap of looking at data that is not necessary to answer a specific question.
- 3. Carefully read the information and use it to answer the question.**
Once you have identified what you are looking for, find that specific information and use it to answer the question.

Analyzing Tables & Graphs | Overview

Sometimes the SAT will take these questions one step further by asking you to calculate the probability of something being selected from all of the potential data in a set. To calculate probability, use the formula below:

$$\text{Probability} = \frac{\text{Successful Outcomes}}{\text{Total Outcomes}}$$

Things to remember:

1. Probabilities are always going to be between 0 and 1, inclusive.
2. A probability of 0 means the action, event, or outcome will not happen.
3. A probability of 1 means the action, event, or outcome will definitely happen.
4. To find the combined probability of two or more independent events, multiply the probabilities of each event.

Take a look at the example below:

The data in the table below were gathered by a teacher who is studying the amount of money spent on school supplies by students in her 8th grade math classes.

	\$0 - \$25	\$26 - \$45	\$46 - \$100	Total
Class 1	5	8	12	25
Class 2	3	12	5	20
Class 3	6	9	4	19
Total	14	29	21	64

Class 1 consists of 25 students; Class 2 consists of 20 students, and Class 3 consists of 19 students. If a student is chosen at random from those who spend at least \$26, what is the probability that the student is in Class 3?

- A) $\frac{3}{16}$
- B) $\frac{6}{19}$
- C) $\frac{6}{25}$
- D) $\frac{13}{50}$

How many successful outcomes do we have in the question above? _____

How many total outcomes are there? _____

Therefore, the probability of selecting a student in Class 3 from those who spent at least \$26 is _____

TABLES & GRAPHS



SKILL SET

1

The table below shows the distribution of gender and height for professional basketball players.

Gender	Height		Total
	Under 6'2"	6'2" or Taller	
Male	8	29	37
Female	17	6	23
Total	25	35	60

If one of the players surveyed is chosen at random to appear in a commercial, what is the probability that the player will either be a female 6'2" or taller, or a male under 6'2"?

- A) $\frac{2}{15}$
 B) $\frac{7}{30}$
 C) $\frac{23}{30}$
 D) $\frac{13}{15}$

2

The table below shows the 75 sporting events that had the highest attendance in 2014, categorized by sport and by level.

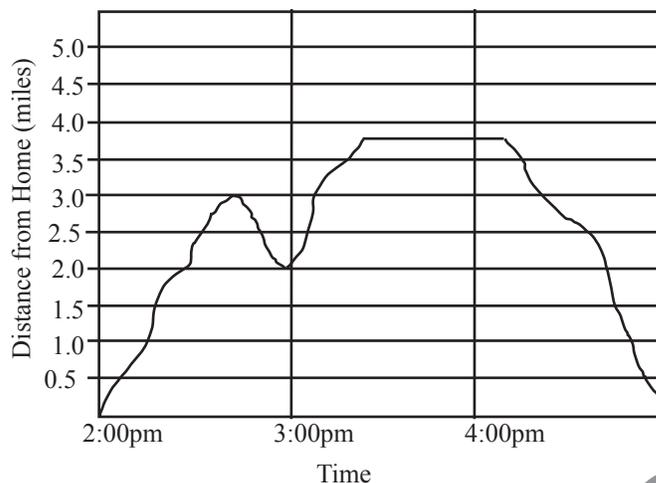
Level	Sport				
	Basketball	Baseball	Football	Tennis	Total
Professional	11	4	21	3	39
College	10	2	12	2	26
High School	3	2	4	1	10
Total	24	8	37	6	75

What proportion of the sporting events are college basketball games?

- A) $\frac{2}{75}$
 B) $\frac{11}{75}$
 C) $\frac{2}{15}$
 D) $\frac{24}{75}$

3

The graph below shows Sarah's distance from her house during a 4-hour bike ride.



Along the route, Sarah was forced to backtrack for one mile to pick up her water bottle that had fallen out of its holder. Sarah also stopped for 45 minutes during the ride to stretch her hamstring before she headed home. Based on the graph, which of the following is closest to the time she retrieved her water bottle and continued on her ride?

- A) 2:12 pm
 B) 2:55 pm
 C) 3:20 pm
 D) 4:08 pm

TABLES & GRAPHS

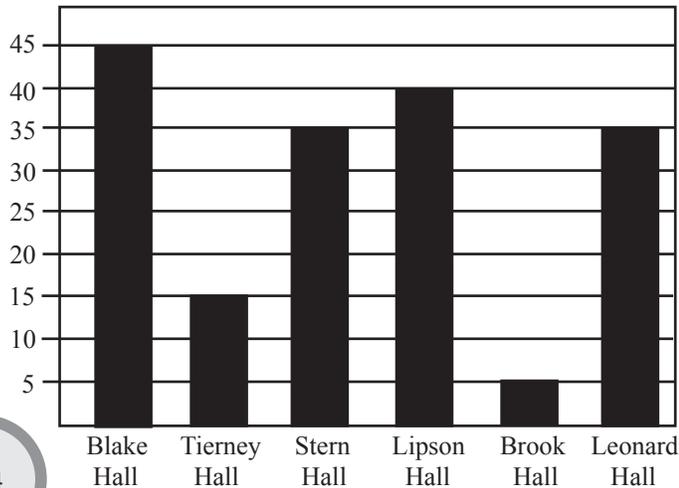


SKILL SET

4

The number of dorm rooms with air conditioning units across six residence halls on Campus X is shown in the graph below.

Number of Dorm Rooms with Air Conditioning Units



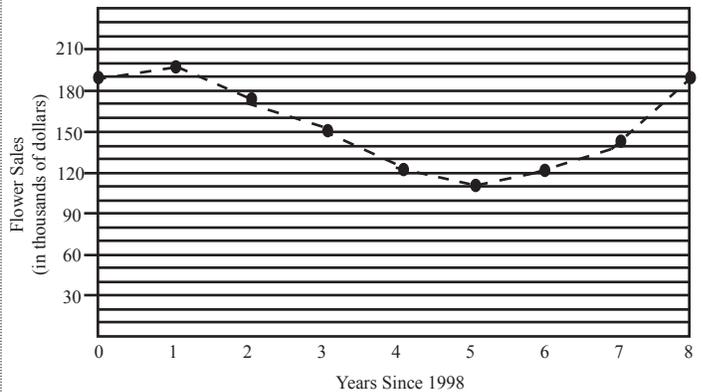
If the total number of rooms with air conditioning units equals 1,750, what is an appropriate label for the vertical axis of the graph above?

- A) Rooms with Air Conditioning Units
- B) Rooms with Air Conditioning Units (in tens)
- C) Rooms with Air Conditioning Units (in hundreds)
- D) Residence Halls on Campus X

5

The graph below shows the total number of flowers purchased on Valentines Day each year from 1998 through 2006.

Valentines Day Flower Sales



Based on the graph, which of the following best describes the general trend in Valentines Day flower sales from 1998 through 2006?

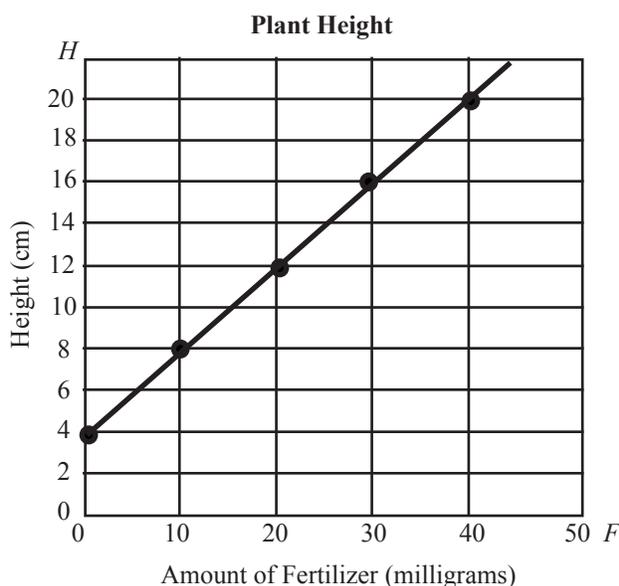
- A) Sales generally decreased each year since 1998.
- B) Sales generally increased each year since 1998.
- C) Sales increased between 1998 and 1999, and then again between 2003 and 2006.
- D) Sales generally remained steady between 2000 and 2003.

TABLES & GRAPHS



SKILL SET

Questions 6 and 7 refer to the following information.



6

What does the H -intercept represent in the graph?

- A) The height of the control group in the experiment
- B) The combined heights of all plants tested
- C) The total amount of fertilizer needed to make a plant grow
- D) The increase in height from one plant to another correlated with the amount of fertilizer provided

7

Which of the following represents the relationship between the height of a plant and the amount of fertilizer provided?

- A) $H = 0.4F$
- B) $H = 2.5F$
- C) $H = 0.4F + 4$
- D) $H = 2.5F + 4$

8

Question Types on a Test

	Multiple Choice	Short Response	Essay
Midterm	50	13	4
Final	45	15	5

The table above shows the question types on Mr. Layton's English exams. If Rebecca got one-fifth of the total multiple choice questions incorrect, five-sevenths of the total short response questions correct and one third of the total essay questions incorrect, what fraction of all the questions across both exams did Rebecca get correct?

- A) $\frac{17}{22}$
- B) $\frac{85}{128}$
- C) $\frac{93}{132}$
- D) $\frac{31}{44}$

9

The data in the table below were gathered by an economist who was studying the amount of money saved on a monthly basis by high school students.

	\$0 - \$50	\$51 - \$100	\$101 - \$150	Total
Group 1	20	33	37	90
Group 2	22	35	33	90
Total	42	68	70	180

Group 1 consisted of 90 students who held part-time jobs and Group 2 consisted of 90 students who received an allowance from their parents. If a student is chosen at random from those who saved at least \$51, what is the probability that the student belonged to Group 2?

- A) $\frac{34}{69}$
- B) $\frac{35}{69}$
- C) $\frac{35}{138}$
- D) $\frac{35}{68}$

4c

**HEART OF
ALGEBRA:**

**MANIPULATING & TRANSLATING
EQUATIONS, INEQUALITIES, SYSTEMS
OF EQUATIONS, FUNCTIONS**

Manipulating Equations | Overview

Working with algebraic expressions requires knowledge of the terms, names, and definitions of common algebraic components. The most important aspects of algebraic expressions for the SAT are given in the table below. Some of these concepts may look familiar as they are concepts we have already discussed.

Term	Definition	Examples – Notes
Equation		$5x + 6 = 11$
Inequality		$5x + 6 < 11$ or $1.21 \geq 5y + 9$
Square		___ is the square of 5.
Square Root		The square root ($\sqrt{\quad}$) of 36 is ___.
Absolute Value		Absolute value of a is represented as $ a $.
Exponent		5^3 is a term where 5 is the base, and it is raised to the 3 rd power (i.e. $5 \times 5 \times 5$). 3 is the exponent.

Now that you know the lingo, let's talk about how to solve algebraic problems. To solve an algebraic expression you must do three things:

1. Combine like terms and isolate the variable.
2. Do the opposite math operation.
3. Do the same thing to both sides of the equal (or inequality) sign.

If $5x + 20 = 8x + 14$, what is the value of x ?

- A) 1
B) 2
C) 3
D) 4

What is the first step in solving the equation above?

When you isolate the variable, the value of x is equal to _____.

Manipulating Equations | Rules Review

1. $x + 2 = 7$

5. $\frac{2}{3}x = 6$

2. $3x + 6 = 27$

6. $19 = 17 - 2x + 5x$

3. $4x = 20 + 5x$

7. $\frac{3}{5}x = \frac{4}{3}$

4. $\frac{x}{5} = \frac{3}{7}$

8. $6x - 4.5 = \frac{x}{4} - \frac{1}{2}$

MANIPULATING EQUATIONS



SKILL SET

1

If $5y = 40$, what is the value of $8y - 6$?

- A) 32
- B) 49
- C) 58
- D) 70

2

$$7x + 12 = x$$

What value x satisfies the equation above?

- A) -2
- B) 0
- C) 2
- D) 6

3

If $7x + 11 = 25$, what is the value of $14x + 8$?

- A) 28
- B) 32
- C) 36
- D) 50

4

Which of the following expressions is equal to 0 for some value of y ?

- A) $|y + 7| - 8$
- B) $|y + 8| + 8$
- C) $|y - 7| + 8$
- D) $8 + |y + 7|$

5

If $\frac{x+y}{2x} = \frac{4}{9}$, which of the following must also be true?

- A) $\frac{y}{x} = 9$
- B) $\frac{x}{y} = 9$
- C) $\frac{x}{y} = \frac{1}{9}$
- D) $\frac{x}{y} = -9$

6

If $\frac{x}{12} = \frac{2x+3}{-12}$, what is the value of $\frac{x}{4}$?

- A) -4
- B) -1
- C) $-\frac{1}{4}$
- D) $\frac{1}{4}$

7

If $\frac{x-2}{x+2} = 18$, what is the value of x ?

- A) -2
- B) $-\frac{38}{17}$
- C) $\frac{7}{36}$
- D) $\frac{21}{39}$

Translating Equations | Overview

You must memorize a few terms and know what their math equivalents are in order to attack algebra word problems. Let's review a few key terms.

Term	Math Equivalent
Of, by	Multiply
Is added to, more than, greater than	Added to another number
Less than, taken from	Subtracted from another number
Percent	Divided by 100
Is, are, were, results in	Equals
Goes into, divided by, out of	Division
What, a number	Variable (like w , x , y , or a)

Translating Equations | Rules Review

Translate the following into mathematical expressions.

1. A number decreased by 13
2. John has 5 times as many shirts as Pam.
3. Two times the sum of x and y
4. Larry bought 5 hot dogs and 6 bottles of water for a total cost of 12 dollars.
5. What is 12 divided by the quantity 4 less than 10?
6. A number subtracted from 5 is 4 times the sum of 2 and 3.

TRANSLATION



SKILL SET

1

If $5x + 17$ is 18 more than 24, what is the value of $10x + 4$?

- A) 5
- B) 27
- C) 38
- D) 54

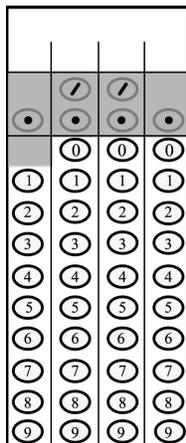
2

When 6 times an integer y is subtracted from the sum of 22 and 49, the difference is equal to 23. What is the value of the product of 7 and y ?

- A) 8
- B) 56
- C) 59
- D) 72

3

To ship a package, its weight must be under 850 pounds. A manufacturer wants to ship pencils to a university. The shipping materials weigh 125 pounds, and the manufacturer is including a box of erasers that weighs 70 pounds. If each box of pencils weighs 11 pounds, how many complete boxes of pencils can fit in the package?



4

George pays his cell phone bill every month. The monthly cost includes a fixed charge of \$40 plus \$0.50 for every 10 sent text messages. In a particular month, he sent 500 text messages. How much was his phone bill that particular month?

- A) \$25
- B) \$42.50
- C) \$65
- D) \$250

5

For each performance, a pianist charges r dollars per hour for each hour worked plus a flat fee of d dollars. If the pianist charges \$170 for a 3 hour performance, which of the following represents r in terms of d ?

- A) $r = 170 + 3d$
- B) $r = 170 - 3d$
- C) $r = \frac{170 + d}{3}$
- D) $r = \frac{170 - d}{3}$

6

To make the track team, a sprinter must be able to run at a speed of 32 feet per second. Miguel currently runs at a speed of 23 feet per second, but believes that with practice, he can increase his speed by 0.1 feet per second per day. Which of the following represents Miguel's speed w weeks from now?

- A) $23 + 0.1w$
- B) $32 - 0.7w$
- C) $23 - 0.1w$
- D) $23 + 0.7w$

TRANSLATION



SKILL SET

7

The product of two integers x and y is 200, and the absolute value of the difference between the two numbers is 17. What is the value of $x + y$?

- A) 33
- B) 42
- C) 183
- D) 217

8

A shipping company charges a flat rate of \$4.55 to ship any package that weighs 5 ounces or under. For any overage, the company charges \$0.40 for each additional 3 ounces. Which equation gives the total price, p , in cents, for shipping a package that weighs x ounces?

- A) $p = 4.55 + 0.40\left(\frac{x}{3}\right)$
- B) $p = 4.55 + 0.40(x - 5)$
- C) $p = 455 + (40) \frac{x - 5}{3}$
- D) $p = 455 + 40(x - 5)$

9

A chef has c ounces of cookie batter in his kitchen, and plans to use it to create cookies that weigh 5 ounces each, which will result in 2 ounces of leftover batter. If he were going to make the same number of cookies but instead create ones that weighed 7 ounces, he would need an additional 18 ounces of batter. How many ounces of batter does the chef have in his kitchen?

- A) 45
- B) 50
- C) 52
- D) 62

10

The first floor apartment in a building in Manhattan is 750 square feet. There are 27 floors in the building in total, with one apartment per floor. As you go up the floors in the building, each apartment has 15 more square feet than the apartment below it. Which expression represents the total number of square feet in the apartment on the 24th floor?

- A) $750 + 15^{24}$
- B) $750 + 15(24)$
- C) $750(15)(24)$
- D) $750 + 15(24 - 1)$

11

A rectangular living room table has an area of 576 square inches. The width, w , in inches, is 12 inches shorter than the length. Which of the following equations can be solved to determine the width, in inches, of the table?

- A) $w^2 - 12w = 576$
- B) $w^2 - 12 = 576$
- C) $w^2 + 12w = 576$
- D) $w^2 + 12 = 576$

12

For 7 consecutive positive odd integers, the sum of the fourth and seventh integers is four times the second integer. What is the sum of the first integer plus the sixth integer?

- A) 5
- B) 15
- C) 20
- D) 25

TRANSLATION



SKILL SET

1

Malnati's Pizzeria charges a base price of \$9 per pizza plus \$2 per topping. Gigio's Pizzeria charges a base price of \$11 per pizza plus \$1.50 per topping. If x represents the number of toppings on a pizza, which of the following equations could be used to determine the number of toppings for which the price of a pizza at Malnati's would equal the price of a pizza at Gigio's?

- A) $9x + 1.5 = 11x + 2$
- B) $9 + 1.5x = 11 + 2x$
- C) $9x + 2 = 11x + 1.5$
- D) $9 + 2x = 11 + 1.5x$

2

The fixed cost of manufacturing couches is \$1,725.00 per week. The cost for extra fabric is \$23.75 per couch and the cost to make one pillow is \$14.23. Which of the following expressions can be used to model the cost of manufacturing p couches in one month made up of 28 days, each requiring extra fabric, and two pillows?

- A) $1,725p + 23.75p + 2(14.23)p$
- B) $4(1,725p) + 4(23.75p) + 2(14.23p)$
- C) $1,725p + 23.75p + 14.23p$
- D) $4(1,725) + 23.75p + 2p(14.23)$

3

A taxi company charges its passengers \$1.50 as a base price with an additional \$0.75 per quarter mile that the taxi travels. Which of the following expressions represents the cost, in dollars, of taking a taxi m miles?

- A) $1.5 + m$
- B) $1.5 + .75m$
- C) $15 + 75m$
- D) $1.5 + 3m$

4

The number of flowers that bloomed in a nursery from March through June is four times the number of flowers that bloomed from July through October. If 64 flowers bloomed in March, 18 bloomed in April, 20 bloomed in May, 26 bloomed in June, and f flowers bloomed between July and October, which of the following equations is true?

- A) $4f = (64 + 18 + 20 + 26)$
- B) $f = 4(64 + 18 + 20 + 26)$
- C) $\frac{f}{4} = (64 + 18 + 20 + 26)$
- D) $\frac{f}{4} = 4(64 + 18 + 20 + 26)$

5

A moving company charges customers \$3.25 per box and \$62.50 per 100 pounds of furniture. Which of the following expressions represents the price, in dollars, of hiring the moving company to move b boxes and f hundred pounds of furniture?

- A) $b + 625f$
- B) $3.25(100)b + 62.5f$
- C) $3.25b + 62.5(100)f$
- D) $3.25b + 62.5f$

6

The air pressure at sea level is 101,325 Pascals (Pa). For every increase of 10 meters above level, the air pressure drops by 113 Pa. Which of the following equations gives the air pressure A , in Pa, at m meters above sea level?

- A) $A = 101,325 + 113m$
- B) $A = 101,325m + 113$
- C) $A = 101,325 - 113(10m)$
- D) $A = 101,325 - 11.3m$

TRANSLATION



SKILL SET

7

$$F = 1.8C + 32$$

A scientist uses the formula above to convert the temperature in degrees Fahrenheit, F , of an object, from the temperature in degrees Celsius, C , of the object. Which of the following must be true?

- A) When the value of C is increased by 1, the value of F increases by 1.8.
- B) When the value of F is increased by 1, the value of C increases by 1.8.
- C) When the value of C is increased by 1, the value of F increases by 32.
- D) When the value of F is increased by 32, the value of C increases by 32.

8

Rebecca bikes an average of 120 miles each month. When she bikes, she can go 16 miles before she needs to buy a new water bottle, each of which costs her \$6. If Rebecca wants to decrease her monthly expenditure on water bottles by \$15, which equation could be used to determine how many fewer average miles, m , Rebecca should bike each week?

- A) $\frac{16}{5}m = 60$
- B) $\frac{6}{16}m = 15$
- C) $\frac{16}{15}m = 6$
- D) $\frac{16}{5}m = 120$

9

The atmospheric temperature can be best approximated using the equation, $t = 32 + 0.27h$, where t is the temperature in Fahrenheit and h is the height in meters above sea level. What is the increase in height, in kilometers, that is necessary to increase the temperature by 1 degree Fahrenheit?

- A) $\frac{1}{270}$ km
- B) 2.7 km
- C) $\frac{1}{0.27}$ km
- D) 32 km

10

The relationship between the length of the femur bone and an individual's overall height is so strong that scientists can use it to predict an individual's height when the length of the femur is known. For every inch increase in the femur, the predicted height of the individual increases by 1.8 inches. If the predicted height of an individual with a 20 inch femur is 5 feet 8 inches, which of the following equations gives the predicted height of an individual H , in inches, with a femur length of l ?

- A) $H = 1.8l + 5.8$
- B) $H = 68 - 1.8l$
- C) $H = 1.8l + 32$
- D) $H = 32 - 1.8l$

Systems Of Equations | Overview

Systems of equations involve two (or more) equations that have the same two (or more) variables. When given a system, you have two options for working with the equations:

Option 1 (Substitution Method): Solve for one variable in terms of the other.

1. Isolate one variable (using the manipulating rules we already discussed).
2. Plug this value into the other equation.

What is the value of y if $5y + x = 20$ and $3x + 20y = 100$?

A) 16
B) 8
C) 4
D) -8

In which equation is it easiest to isolate one the variables? _____

Plug that value into the other equation so it is entirely in terms of one variable:

Option 2 (Elimination Method): Align the equations and manipulate them.

1. Arrange the equations one above the other so that the variables line up.
2. Add or subtract the equations to isolate the desired variable or quantity.

If $3x - 2y = 6$ and $3y - 3x = 4$, then $y =$

A) 24
B) 10
C) 2
D) 1

Stack the two equations on top of one another so that the common variables are lined up:

Add or subtract the equations so that one variable cancels out completely:

Systems Of Equations | Overview

Sometimes after you stack the equations, you will not be able to add or subtract to eliminate a variable immediately. In this case, multiply either one or both of the equations by a constant so that you will be able to add or subtract and cancel out one of the variables. Take a look at an example below:

If $6x - 6y = 12$ and $2y - 4x = 4$, then $x + y =$
A) 24
B) 12
C) 2
D) -10

Again start by stacking the two equations so the common variables are lined up:

Since we aren't able to cancel one of the variables out yet, we must multiply either one or both of the equations by a constant.

What can we multiply by in the example above? _____

When you multiply, make sure to multiply the entire equation, not just the variable you are looking to cancel out:

Now solve as you normally would:

Since the question is asking for the value of $x + y$, plug the value of x back into either of the original equations to solve for y :

Systems Of Equations | Overview

Systems of equations can also be solved graphically if they show up on the calculator section. The solution to a system of equations can be represented graphically as the point of intersection between two lines on a coordinate plane. Let's take a look at how we could use the TI-83 or 84 graphing calculator to answer the question from the previous page without using the elimination method.

If $6x - 6y = 12$ and $2y - 4x = 4$, then $x + y =$
 A) 24
 B) 12
 C) 2
 D) -10

In order to be able to graph an equation on the calculator, you must manipulate it so it is in terms of y . This is a fancy way of saying that you want to isolate y and move all of the other variables and constants to the opposite side. Solve for each of the equations above in terms of y .

Once you have found each equation in terms of y , follow the steps below on your calculator:

1. Press $y =$ in the upper left corner and enter each of the equations, one in Y_1 and the other in Y_2 . (*If you're entering a binomial in either the numerator or denominator of a fraction, put parentheses around it to avoid the calculator reading it incorrectly.*)
2. Press Graph in the upper right corner and the lines will be displayed on the coordinate plane. If you don't see them right away, you may need to adjust your window. First, try pressing Zoom and selecting #6, which will take you to the standard window, 10 away from the origin in all 4 directions. If that doesn't help, press Zoom and select #0, which is Zoom Fit. It will automatically move the screen of the calculator to help you see the lines. If that doesn't work, try changing the window by hand, by pressing Window and then changing Xmin, Xmax, Ymin, and Ymax to stretch the screen in various directions.
3. Once you see the lines, the point of intersection represents the answer to the question. To find that point, press 2nd - Trace, which will take you to the Calculate menu. Then select #5, Intersect.
4. The calculator will ask you whether the blinking dot is on your First curve, which just means one of the two lines. Press Enter. It will then ask you if the blinking dot is on the Second curve. Press Enter. The calculator will then prompt you to Guess. Press Enter. The x and y coordinates that show up represent the answer to the question.

Using the steps above, find the values of x and y for this system of equations and answer the question.

Systems Of Equations | Rules Review

1. What is the value of x if $10y = 50$ and $-4y - 3x = 10$?
2. If $52 - 2y = 46$ and $4x + 3y = 19$, then the value of x is
3. If $3x + y = 13$ and $x + 2y = 1$, then what is the value of $4x + 3y$?
4. If $x + y = 13$ and $2x + y = 26$, then the value of $3x + 2y$ is
5. What is the value of $2x$ if $22y + 4x = 50$ and $11y + 3x = 40$?
6. If $3x + 4y = 18$ and $2(y + 2) - x = 12$, then what is the value of $2y + 4x$?
7. Jennie and Helena went to the amusement park and purchased ride tickets and hot dogs for their friends. Jennie spent a total of \$16.40 on two hot dogs and three ride tickets. Helena spent a total of \$29.20 for four hot dogs and two ride tickets.

Write a system of equations that can be used to find the price of one ride ticket and the price of one hot dog.

Systems Of Equations | Infinitely Many Solutions

Sometimes questions will ask you to deal with a system of equations that has either infinitely many or no solutions.

Systems with Infinitely Many Solutions:

If a system has infinitely many solutions, it means that the two equations will produce the exact same line if they were to be graphed on a coordinate plane. Essentially, the two equations are the same line, just written in a different way. Therefore, in order to solve these, we need to manipulate them so they look identical. Let's work through an example:

In the system of equations below, a and b are constants.

$$\begin{aligned}ax + by &= 5 \\ 14x + 21y &= 35\end{aligned}$$

If the system has infinitely many solutions, what is the value of ab ?

Step 1: Manipulate the equations so they equal the same value. You can do so through multiplication or division, never through addition or subtraction.

Step 2: Solve for a by setting the coefficient of the x term from the first equation equal to the coefficient of the x term in the second equation.

Step 3: Do the same with the y terms.

Step 4: Answer the question.

Systems Of Equations | No Solutions

Systems with No Solutions:

Unlike systems with infinitely many solutions, those with no solutions will never intersect one another when graphed on a coordinate plane. Let's work through an example of one of these questions:

In the system of equations below, p is a constant and x and y are variables. For what value of p will the system of equations have no solution?

$$\begin{aligned} px - 6y &= 4 \\ 2x - 5y &= 10 \end{aligned}$$

When two lines never intersect one another, they are parallel to one another. Lines that are parallel have the same slope. Therefore, if we find the slope of the known line, we will be able to solve for the missing piece.

Step 1: Manipulate the line with only two variables (x and y) so it is in $y = mx + b$ form and identify the slope.

Step 2: Manipulate the other equation so it is in $y = mx + b$ form and identify the algebraic expression representing the slope.

Step 3: Set the known slope in the first equation equal to the algebraic expression for the slope in the second equation and solve.

SYSTEMS



SKILL SET

1

After pooling the money in their wallets, Danny and Claire had a total of \$325. If Danny had \$65 more than Claire, how much money did Claire have?

- A) \$130
- B) \$135
- C) \$195
- D) \$205

2

Last month Jessica walked 17 more miles than Samantha. If they walked a combined 123 miles, how many miles did Jessica walk?

- A) 53
- B) 61
- C) 70
- D) 89

3

The total price of three copies of book X and two copies of book Y is \$19.00. The total price of 5 copies of book Y is \$16.00 more than 3 copies of book X . What is the total price of one copy of book X and two copies of book Y ?

- A) \$8
- B) \$11
- C) \$13
- D) \$16

4

If $5q + 9p = 24$ and $2q + 3p = 10$, what is the value of $3q + 6p$?

- A) 8
- B) 14
- C) 16
- D) 22

5

$$5x + 10y = 102$$

$$5x + 3y = 53$$

For the solution to the system of equations above, what is the value of y ?

- A) 3
- B) 7
- C) 9
- D) 14

6

$$3x + 7y = 12$$

$$2x + 6y = 24$$

In the system of equations above, what is the value of $x + y$?

- A) -12
- B) 0
- C) 6
- D) 12

7

$$\frac{3}{8}y = \frac{5}{24} + \frac{1}{4}x$$

$$4y = 3x$$

In the xy -plane, the lines that correspond to the system of equations above intersect at the point (p, q) . What is the value of pq ?

- A) 5
- B) $6\frac{2}{3}$
- C) $33\frac{1}{3}$
- D) 42

SYSTEMS



SKILL SET

8

$$\begin{aligned} 11.9x + 2.7y &= 6.4 \\ 2.1x + 0.9y &= -0.2 \end{aligned}$$

The system of equations above is graphed in the xy -plane. What is the x -coordinate of the intersection point (x,y) of the system?

- A) -0.75
- B) -0.3
- C) 0.8
- D) 1.25

9

The incomplete table below shows the number of soccer players and basketball players in Lamborg High School, broken down by gender.

Gender	Sport Played		
	Basketball	Soccer	Total
Male			85
Female			68

The number of female soccer players is 3 times the number of male soccer players, while the number of male basketball players is 6 times the number of female basketball players. If a student were to be selected at random, what would be the approximate probability the student would be a female soccer player?

- A) 0.37
- B) 0.44
- C) 0.48
- D) 0.56

10

$$\begin{aligned} 2x + 9y &= 2p \\ 8x + 6y &= 14 \end{aligned}$$

In the system of equations above, p is a constant. What is the x -value of the solution to the system in terms of p ?

- A) $\frac{21 - 2p}{10}$
- B) $\frac{14 - 8p}{20}$
- C) $\frac{21 - 10p}{2}$
- D) $\frac{5p - 12}{30}$

11

$$\begin{aligned} 5x + p &= 7x - 10 \\ 5y + q &= 7y - 10 \end{aligned}$$

In the equations above, p and q are constants.

If $p - q$ equals $\frac{1}{8}$, which of the following is true?

- A) x is y plus $\frac{1}{8}$
- B) x is y minus $\frac{1}{4}$
- C) x is y plus $\frac{1}{16}$
- D) y is x minus $\frac{1}{2}$

SYSTEMS



SKILL SET

1

$$\frac{a}{b} = 7$$

$$2(b + 10) = a$$

If (a, b) is the solution to the system of equations above, what is the value of a ?

- A) 4
- B) 7
- C) 12
- D) 28

2

$$2x + 3y = 15$$

$$2x + y = 29$$

What is the solution (x, y) to the system of equations above?

- A) (7, 18)
- B) (18, -7)
- C) (-18, -7)
- D) (18, 7)

3

$$3x + 4y = 14$$

$$-6y + 9x = -12$$

If (x, y) is a solution to the system of equations above, what is the value of $x + y$?

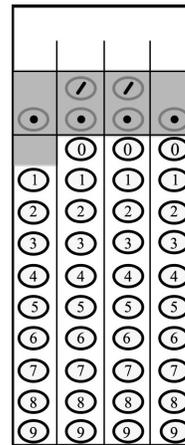
- A) $\frac{3}{11}$
- B) $\frac{4}{9}$
- C) $\frac{7}{5}$
- D) $\frac{11}{3}$

4

$$3x + 6y = 24$$

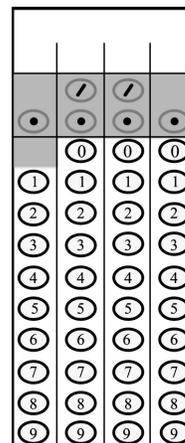
$$2x + 3y = 18$$

According to the system of equations above, what is the value of x ?



5

In a school supply store, each spiral notebook has 80 more sheets of paper than a marble notebook has. If Luisa bought 4 spiral notebooks and 3 marble notebooks which totaled 1,930 sheets of paper, how many sheets of paper are in a marble notebook?



SYSTEMS



SKILL SET

6

$$\begin{aligned}5x + 4y &= 114 \\ x &= 3y\end{aligned}$$

If the ordered pair (x, y) satisfies the system of equations above, what is the value of y ?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

7

$$\begin{aligned}12x + 7y &= 195 \\ 6x + 3y &= 95\end{aligned}$$

Based on the system of equations above, what is the value of $6x + 4y$?

- A) 100
- B) 125
- C) 290
- D) 205

8

In the system of equations below, p and q are constants.

$$\begin{aligned}px - qy &= 4 \\ -6x + 14y &= 24\end{aligned}$$

If the system has infinitely many solutions, what is the value of $\frac{p}{q}$?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

9

$$kx - 4y = 12$$

$$\frac{1}{2}x - 7y = 16$$

In the system of equations above, k is a constant and x and y are variables. For what value of k will the system of equations have no solution?

- A) $-\frac{2}{7}$
- B) $-\frac{3}{5}$
- C) $\frac{2}{7}$
- D) $\frac{3}{5}$

Inequalities | Overview

What is an Inequality?

An inequality is a number sentence very similar to an equation, but instead of having an equal sign, it includes one of these four signs: $>$, $<$, \leq , or \geq . Make sure you know what each of these signs mean:

$x < 4$ means _____

$x > 9$ means _____

$x \leq 12$ means _____

$x \geq 50$ means _____

Solving inequalities is just like solving equations. **However**, if you multiply or divide by a negative number, *you must flip the inequality sign*.

If $-7p - 11 > 52$, which of the following must be true?

- A) $p > 9$
- B) $p > -9$
- C) $p = 9$
- D) $p < -9$

To solve an inequality with two inequality signs, perform operations on all three parts of the inequality.

If $6 < 3y < 30$, which of the following must be true?

- A) $2 < 3y < 10$
- B) $6 < y < 5$
- C) $2 < y < 10$
- D) $3 < 3y < 15$

Start by finding the GCF of all parts of the inequality. In the example above, the GCF is _____.

Divide each of the parts by that GCF.

Therefore, the answer to the problem above is _____.

Inequalities | Overview

Another unique type of inequality is one containing an absolute value.

If $|x + 6| < 10$, which of the following must be true?
A) $x < 4$
B) $-16 < x < 4$
C) $x > -16$
D) $x < 4$ or $x < -16$

Step 1: Drop the absolute value bars and rewrite the equation. Then solve as normal.

Step 2: Create a second equation in which you drop the absolute value bars, switch the inequality sign and negate the value on the opposite side. Then solve as normal.

Step 3: Combine the two inequality answers.

Inequalities | Rules Review

1. $x + 2 > 7$

2. $4 - r \geq 1$

3. $|-b + 3| \leq 5$

4. $-\frac{3}{4}h \geq -30$

5. $6 - 6x < 30 + 4x$

6. $12 < 4j < 16$

7. $30 < 2f + 4 < 40$

8. How many integer values are there for x such that $0 < 4x + 8 < 12$?9. If $-4 \leq 2x + 6 < 10$, what is the least possible value of $4x^2 - 1$?10. Insert the correct symbol ($<$, $>$, \leq , \geq) for each scenario:

a. Luther is saving up to buy a coat that costs \$325. He saves \$12 each week. The inequality below represents the number of weeks, w , in which he will have at least enough money to purchase the coat if he currently has \$16 in his account.

$$16 + 12w \text{ ______ } 325$$

b. Martina collects pairs of shoes, s , and belts, b . Her mom told her that she is not allowed to have more than 23 total belts and pairs of shoes. The inequality below represents the number of belts and shoes Martina can have.

$$s + b \text{ ______ } 23$$

INEQUALITIES



SKILL SET

1

Faye wants to attend the county fair. The price of admission is \$12.50, and each ride costs an additional 50 cents. If she can spend at most \$23.00 at the fair, which inequality can be used to solve for r , the number of rides Faye can go on?

- A) $0.50 + 12.50r \leq 23.00$
- B) $12.50 + 0.50r \leq 23.00$
- C) $0.50 + 12.50r \geq 23.00$
- D) $12.50 + 0.50r \geq 23.00$

2

As of June 1, 2019, Ken's bank account holds a total of \$23,450. Each month he deposits an additional \$330. If Ken is saving up to purchase a car that costs \$56,000, which of the following inequalities describes the set of months in which he will have at least enough money to purchase the car if m represents the number of months since June 1, 2019?

- A) $56,000 - 23,450 \geq + 330m$
- B) $23,450 + 330m \geq 56,000$
- C) $23,450 \geq 56,000 + 330m$
- D) $23,450 + 330m \leq 56,000$

3

Which of the following is the solution set for the system of inequalities below?

$$\begin{aligned} 2x &\leq 10 \\ 3x + 17 &\geq 29 \end{aligned}$$

- A) $x \leq 2$
- B) $x \leq 5$
- C) $4 \leq x \leq 5$
- D) $-4 \leq x \leq 5$

4

A farmer harvests wheat and corn each fall. A bag of corn, c , weighs a total of 355 pounds and a bag of wheat, w , weighs 405 pounds. The farmer harvests at most 7,500 pounds each fall, or a maximum of 18 bags. Which of the following systems of inequalities represents this relationship?

- A) $\begin{cases} 355c + 405w < 7,500 \\ c + w > 18 \end{cases}$
- B) $\begin{cases} 355c + 405w > 7,500 \\ c + w < 18 \end{cases}$
- C) $\begin{cases} 355c + 405w \leq 7,500 \\ c + w \leq 18 \end{cases}$
- D) $\begin{cases} 355c + 405w \leq 7,500 \\ c + w \geq 18 \end{cases}$

5

Rodrigo wanted to clean out his closet to donate old clothing to Goodwill. At the start of the day, he had a total of j pairs of jeans. He first got rid of b pairs of black jeans and then he got rid of r pairs of ripped jeans. If at the end of the day he had no more than 6 pairs of jeans left in his closet, which of the following inequalities can be used to correctly represent this situation?

- A) $j - (b + r) \leq 6$
- B) $j - (b - r) \leq 6$
- C) $j - b - r < 6$
- D) $j - b + r \geq 6$

6

Which of the following is equivalent to $|x - k| < 5$?

- A) $x - k < 5$ or $x + k < 5$
- B) $x - k < 5$ and $k - x < 5$
- C) $x - k < -5$ or $x - k > 5$
- D) $x - k > -5$ or $x - k < 5$

INEQUALITIES



SKILL SET

7

Jeremy has 120 ounces of flour. He wants to bake at least 3 batches of cookies and at least 5 batches of cupcakes. Each batch of cookies requires 8 ounces of flour, and each batch of cupcakes requires 12 ounces of flour. If k represents the number of batches of cookies and p represents the number of batches of cupcakes, which of the following systems of inequalities represents this situation?

- A) $k + p \leq 120$
 $k \geq 3$
 $p \geq 5$
- B) $8k + 12p \leq 120$
 $k \geq 3$
 $p \geq 5$
- C) $3k + 5p \leq 120$
 $k \geq 24$
 $p \geq 60$
- D) $24k + 60p \leq 120$
 $k \geq 3$
 $p \geq 5$

8

Maya reads the newspaper at a constant rate of 0.25 pages per minute. She read 5 pages before eating breakfast and plans to spend m minutes reading after she finishes eating. If Maya wants to finish reading at least the style section which is 16 pages long, which of the following inequalities best represents this situation?

- A) $0.25m \leq 16$
- B) $0.25m + 5 \geq 16$
- C) $0.25m - 5 \geq 16$
- D) $5m - 0.25 \leq 16$

9

A track coach bets his runners that he can guess the times it will take them to complete a race within 5 minutes of their official time. When the first runner begins, the coach writes his guess and labels it g . If the runner completes the race in t minutes, which of the following inequalities represents the relationship between the actual time and the coach's correct guess?

- A) $g \geq 5 + t$
- B) $g < 5 < t$
- C) $-5 < g + t < 5$
- D) $-5 < g - t < 5$

10

$$\begin{aligned} x &< k - y \\ -y &> x + g \end{aligned}$$

In the xy -plane, if $(0,0)$ is a solution to the system of inequalities above, which of the following relationships between g and k must be true?

- A) $|g| < |k|$
- B) $g < k$
- C) $-g = k$
- D) $|g| = |k|$

Functions | Overview

What is a Function?

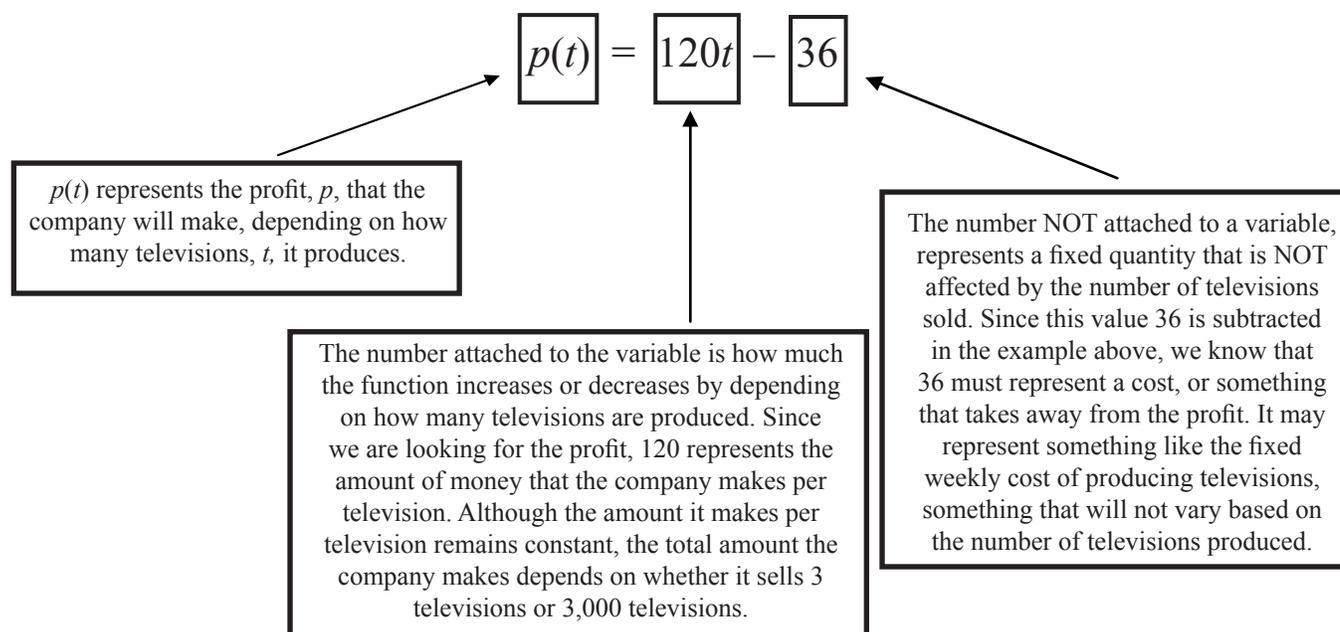
A function is a relation between a set of inputs and a set of allowable outputs such that each input is related to exactly one output. A function is generally denoted like this: $f(x)$, where f represents the output when we use x as the input. Take a look at the example below:

A company produces t televisions per week. The profit, p , the company makes on the televisions is represented by the following function: $p(t) = 120t - 36$.

In the example above, the profit a company makes (the output) is dependent on the number of televisions produced (the input).

Understanding the Pieces of a Function

Many SAT questions require you to understand what each part of a function represents. Take a look at how the function above has been broken down:



Functions | Overview

Evaluating Functions

Sometimes questions will ask you to evaluate functions, or find the outputs based on different inputs.

A company produces t televisions per week. The profit, p , it makes on the televisions is represented by the following function: $p(t) = 120t - 36$, where \$120 is the amount of revenue the company makes per television, and \$36 is the fixed weekly cost of producing televisions. To the nearest dollar, what is the difference in profit between producing 6 televisions and 9 televisions?

What are we trying to find? _____

What is the profit when the company produces 9 televisions?

What is the profit when the company produces 6 televisions?

What is the difference between the two scenarios?

292

Translating Functions

Sometimes instead of giving you the actual function equation, a question will ask you to create an equation based on information given. Take a look at the example below:

Halifax Tuna Company charges restaurants a fixed price of \$4.75 per tuna up to 3 pounds, and then an additional \$0.40 for each additional pound. Write the function that would determine the cost, $c(t)$, in dollars that a restaurant would pay to purchase a tuna weighing t pounds, where t is an integer greater than 3?

What is the function input in the question above? _____

What is the function output value? _____

What factors affect the output? _____

Now put this information into the form of a mathematical function:

Functions | Overview

Composite Functions

Composite functions require you to put two functions together and to evaluate them one step at a time to get a final answer. To successfully work with composite functions, always work from inside the parentheses outward.

Take a look at an example below:

The function $f(x)$ is defined as $f(x) = x + 2$ and the function $g(x)$ is defined as $g(x) = 2x$. What is the value of $f(g(5))$?

Step 1: Evaluate the function in the parentheses.

Step 2: Take the value you just found and use it to evaluate the function outside of the parentheses.

Functions | Rules Review

1. If $f(x) = 3x^3$, what is $f(2)$?
2. If for all real numbers x , $f(x) = \frac{\sqrt{x^2 + 1}}{\sqrt{x^2 - 1}}$, what is the value of $f(3)$?
3. If for all values of x , $f(x) = \frac{5x + 2}{4}$, then what is the value of $f(7) + f(5)$?
4. For all real numbers p , $f(p) = \frac{1}{2}(p + 2)$. What is the value of p such that $f(p) = 18$?
5. The owner of a tutoring business has one employee who is paid an hourly rate of \$35. The owner estimates his weekly profit using the function $P(x) = 1780 - 35x$. In this function, x represents the number of:
 6. The value in dollars, $d(t)$, of a certain car after t years is represented by the equation $d(t) = 22,000(0.73)^t$. To the nearest dollar, how much more is the car worth after 2 years than after 3 years?
 7. In 2015, Tourist Taxi charged \$1.50 for any ride up to 3 miles and \$0.70 per mile for each additional mile. Create a function that would determine the cost, $c(m)$, in dollars, of a cab ride of m miles where m is an integer greater than 3?

FUNCTIONS



SKILL SET

1

A telemarketing firm began selling and marketing a new product. The total number of sales, S , generated by the firm is defined by the function

$$S(c) = \frac{4}{5}c + 275$$

where c is the total number of consumers the firm attempted to call. If the firm attempted to call 3,000 people, what was the total number of sales generated?

- A) 120
- B) 240
- C) 465
- D) 515

2

$$h(b) = 36 + 2.3b$$

The height of a new building being constructed can be modeled by the expression above, where h is the height of the building in feet and b is the number of bricks added to the foundation. How many bricks have been added to the foundation when the building reaches a height of 700.7 feet?

- A) 242
- B) 280
- C) 289
- D) 304

3

x	2	4	6	8
$f(x)$	4	14	24	34

The table above shows values of the linear function f . Which of the following defines f ?

- A) $f(x) = 5x - 6$
- B) $f(x) = x + 10$
- C) $f(x) = 2x + 10$
- D) $f(x) = 4x + 6$

4

When Sam studies for a math exam, the grade she receives, g , can be expressed as a function of the time in hours she spends studying, t , and the amount of other homework in hours, h , she has to complete. The grade can be expressed as $\frac{h^2}{t}$. For Sam's final exam, she spent 15 hours on other homework and scored a 75. How many hours did Sam spend studying for her math exam?

- A) 3
- B) 4
- C) 5
- D) 6

5

$$f(x) = \frac{x^2 - 5}{4}$$

For the function f defined above, what is the value of $f(-7)$?

- A) 7
- B) 11
- C) 27
- D) 49

6

$$g(x) = 3^x + 1$$

The function g is defined above. What is the value of $g(2) + g(4)$?

- A) 81
- B) 82
- C) 91
- D) 92

FUNCTIONS

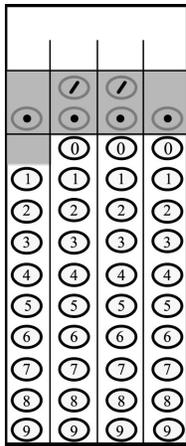


SKILL SET

7

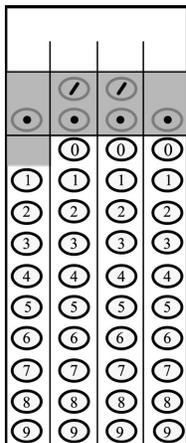
$$s(w) = 24 + 12w$$

Kat took over her sister's stamp collection and each week added a fixed number of stamps to the collection. The function above models the number of stamps, s , in Kat's collection after w weeks. According to the model, how many stamps were in Kat's collection when she took it over from her sister?



8

The function f has the property that $5f(x) = f(5x)$. If $f(15) = 30$, what is the value of $f(3)$?



9

The function f satisfies $f(5) = 7$ and $f(8) = 12$. The function g satisfies $g(4) = 5$ and $g(9) = 10$. What is the value of $f(g(4))$?

- A) 5
- B) 7
- C) 10
- D) 12

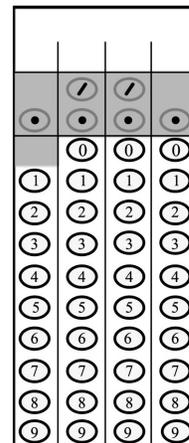
10

An engineer is studying the effects of utilizing robots to mechanize a factory's system of computer manufacturing. He currently has a total of 1,200 computers in inventory. The number of computers he expects the robots to produce next month, $C_{\text{next month}}$, can be estimated by finding the number of computers present in inventory this month, $C_{\text{this month}}$, using the model below.

$$C_{\text{next month}} = C_{\text{this month}} + 0.6 \left[1 + \frac{k(C_{\text{this month}})}{k + 100} \right]$$

The constant, k , in this model is the amount of time, in minutes, the robot can run without requiring repairs.

According to the function, what will be the number of computers in inventory at the end of next month if $k = 1,550$? (Round your answer to the nearest whole number.)



FUNCTIONS



SKILL SET

1

When quoting the price of a job to a client, a catering company estimated the price, p , of job x , in dollars, using the function $p(x) = 1,450 + 90wh$, where w is number of waiters needed and h is the number of hours the waiters must work. Which of the following is the best interpretation of the number 1,450 in the function?

- A) The company pays the waiters a total of \$1,450.
- B) The company is charged a fee of \$1,450 by the venue.
- C) The company charges a fixed price of \$1,450 for working an event.
- D) Each waiter works a total of 1,450 hours per year.

2

$$h(m) = 11 + 57.8m$$

An architect uses the model above to estimate the height, h , in feet, of a building, in terms of the months, m , spent constructing it, between 6 and 18. Based on the model, what is the estimated increase, in feet, of the building each month?

- A) 11
- B) 40.6
- C) 57.8
- D) 68.8

3

A company that manufactures printers first pays a start-up cost, and then spends a fixed amount to manufacture each printer. If the cost, c , of manufacturing p printers in a month is given by the function $c(p) = 5.25p + 125$, the value 5.25 represents

- A) the fixed cost to manufacture printers each month.
- B) the profit earned from the sale of one printer.
- C) the amount spent to manufacture each printer.
- D) the average number of printers manufactured.

4

A cable television company charges a one-time installation fee and a monthly service charge. The total cost is modeled by the function $y = 60 + 106x$. Which statement represents the meaning of each part of the function?

- A) y is the total cost, x is the number of months of service, \$106 is the installation fee, and \$60 is the service charge per month.
- B) y is the total cost, x is the number of months of service, \$60 is the installation fee, and \$106 is the service charge per month.
- C) x is the total cost, y is the number of months of service, \$60 is the installation fee, and \$106 is the service charge per month.
- D) x is the total cost, y is the number of months of service, \$60 is the installation fee, and \$106 is the service charge per month.

5

If $g(x) = -7 - 3x^2$, what is the value of $g(-2x)$?

- A) $-7 - 12x^2$
- B) $12x^2 - 7$
- C) $-7 - 12x^4$
- D) $-7 - 6x^2$

6

$$h(x) = 15 + jx^3$$

For the function h defined above, j is a constant and $h(3) = 123$. What is the value of $h(-2)$?

- A) -17
- B) -49
- C) 32
- D) 49

4d

**PASSPORT TO
ADVANCED MATH:**

**EXPONENT, RADICAL AND QUADRATIC
EQUATIONS, QUADRATIC & EXPONENTIAL
FUNCTIONS, GRAPHING FUNCTIONS,
POLYNOMIAL EXPRESSIONS & FACTORING,
IMAGINARY NUMBERS**

Exponents | Overview

When working with exponents, it is important to memorize and understand the rules in the table below:

You can only ADD or SUBTRACT expressions with exponents if they have the same base AND the same exponent.		
$x^2 + y^2$ remains $x^2 + y^2$	$x^2 + x^3$ remains $x^2 + x^3$	$x^2 - x^3$ remains $x^2 - x^3$
$5y^2 - y^2 =$ _____	$y^2 + y^2 =$ _____	$15y^2 - 7y^2 =$ _____
You can multiply expressions with exponents if they have the same base. Add the exponents and keep the base.		
$x^5 \cdot y^4$ remains $x^5 \cdot y^4$	$y^2 \cdot y^3$ becomes _____	
You can divide expressions with exponents only if they have the same base. Subtract the exponents and keep the base.		
$\frac{x^5}{y^3}$ remains $\frac{x^5}{y^3}$	$\frac{y^5}{y^3} =$ _____	
$\frac{3^8}{3^6} =$ _____	$\frac{16x^5}{8x^3} =$ _____	
You can rewrite expressions with different bases only if they have the same exponents		
$x^2 \cdot y^2$ can be written as x^2y^2 or as $(xy)^2$	$3^2 \cdot 5^2$ can be written as $(3 \cdot 5)^2$ or as $(15)^2$	$\frac{12^5}{3^5} = \left(\frac{12}{3}\right)^5 = 4^5$
When raising an expression with exponents to another exponent, multiply the exponents, but keep the base.		
$(x^3)^5 =$ _____	$(2^4x^5)^3 =$ _____	$(3x^4y^5)^2 =$ _____
You cannot distribute exponents around addition/subtraction signs.		
$(5^3 + 2^2)^2 \neq 5^6 + 2^4$	$(x^3 + y^2)^2 \neq x^6 + y^4$	$(x^3 + y^2)^2 = (x^3 + y^2)(x^3 + y^2)$
To work with values that have different bases, use the change of base formula to get the values in terms of a similar base.		
$2^{3x+3} = 8^{6x}$ 8 can be rewritten as 2^3 $2^{3x+3} = 2^{3(6x)}$ $2^{3x+3} = 2^{18x}$ $3x+3 = 18x$ $x = \frac{1}{5}$	$3^{5x-2} = 9^{4x}$ $x =$ _____	$4^{3x+6} = 64^{2x}$ $x =$ _____
A fractional exponent is another way to express a root. The numerator is the power to which you raise the base and the denominator is the root you take.		
$x^{\frac{3}{2}} =$ _____	$x^{\frac{5}{7}} =$ _____	$2^{\frac{3}{2}} =$ _____

Exponents | Overview

To work with negative exponents, create the reciprocal and make the exponent positive .		
$x^{-7} = \frac{1}{x^7}$	$3^{-2} = \underline{\hspace{2cm}}$	$\frac{1}{4^{-2}} = \underline{\hspace{2cm}}$
One raised to any power is one, zero raised to any power is zero, and any number raised to the power of zero is one.		
$1^{10} = \underline{\hspace{2cm}}$	$0^5 = \underline{\hspace{2cm}}$	$12^0 = \underline{\hspace{2cm}}$
A negative number raised to an even exponent will become positive . A negative number raised to an odd exponent will remain negative . If you are raising a negative number to an exponent on your calculator, always put a parenthesis around the number like this: $(-2)^2$.		
$(-3)^2 = \underline{\hspace{2cm}}$	$(-4)^3 = \underline{\hspace{2cm}}$	$(-\frac{1}{2})^3 = \underline{\hspace{2cm}}$
Positive fractions get smaller when raised to higher powers.		
$(\frac{1}{2})^2 = \underline{\hspace{2cm}}$	$(\frac{1}{2})^3 = \underline{\hspace{2cm}}$	$(\frac{1}{2})^4 = \underline{\hspace{2cm}}$

Roots | Overview

Like exponents, roots have several rules. Memorize these rules to increase your speed and accuracy with root-related problems.

The square root of a number asks what number, when squared, gives the value under the root. (The square root operation always yields a positive value!)		
$\sqrt{16} = \underline{\hspace{2cm}}$	$\sqrt{x^2} = \underline{\hspace{2cm}}$	$\sqrt{4y^4} = \underline{\hspace{2cm}}$
If there is addition or subtraction to be done underneath the root, those operations must be completed first.		
$\sqrt{9 + 9} = \underline{\hspace{2cm}}$	$\sqrt{x^2 + x^2} = \underline{\hspace{2cm}}$	$\sqrt{a - b} \neq \sqrt{a} - \sqrt{b}$
When adding or subtracting, the number under the root must be the same.		
$3\sqrt{2} + 4\sqrt{2} = \underline{\hspace{2cm}}$	$9\sqrt{7} - 14\sqrt{7} = \underline{\hspace{2cm}}$	$3\sqrt{2} + 4\sqrt{3} = 3\sqrt{2} + 4\sqrt{3}$
When multiplying or dividing roots, multiply or divide the numbers outside of the root, and then separate or combine the items under the root.		
$\sqrt{(36)(16)} = \underline{\hspace{2cm}}$	$\sqrt{\frac{25}{4}} = \underline{\hspace{2cm}}$	$4\sqrt{2} \cdot 2\sqrt{3} = \underline{\hspace{2cm}}$
When the result under the root is not a perfect square, look for ways to simplify the root. You can do this by factoring out perfect squares.		
$\sqrt{75} = \underline{\hspace{2cm}}$	$\sqrt{48} = \underline{\hspace{2cm}}$	$\sqrt{a^2b} = \underline{\hspace{2cm}}$
Typically, roots will not be left in the denominator; the fraction will be rationalized to remove the roots.		
$\frac{1}{\sqrt{3}} = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$	$\frac{10}{\sqrt{5}} = \underline{\hspace{2cm}}$	$\frac{x}{\sqrt{y}} = \underline{\hspace{2cm}}$
A small number, n , to the left of the root indicates the n^{th} root. $\sqrt[3]{\hspace{1cm}}$ is the third root. If this shows up on the calculator section, you can find the cube (third) root by pressing MATH-4. To do any other root, first type in the value of the root, then press MATH-5, and enter the value under the root sign.		
$\sqrt[3]{27} = \underline{\hspace{2cm}}$	$\sqrt[4]{625} = \underline{\hspace{2cm}}$	$\sqrt[5]{1024} = \underline{\hspace{2cm}}$
To eliminate a radical sign, raise it to the power equivalent to the root you are taking. If you are solving an equation, raise the other side to that power as well.		
$\sqrt{x} = 5$ $(\sqrt{x})^2 = 5^2$ $x = 25$	$\sqrt[3]{x} = 3$ $x = \underline{\hspace{2cm}}$	$\sqrt[5]{x} = 2$ $x = \underline{\hspace{2cm}}$

If there is a negative number under a square root sign, the answer is an imaginary number, a topic we will discuss later in the chapter.

Roots | Overview

Solving a Root Equation

One way in which the SAT will test your knowledge of roots, is by asking you to solve equations in which roots are present. Take a look at the example below:

$$\sqrt{2x - 8} - 4\sqrt{x + 3} = 0$$

What value of x satisfies the equation above?

- A) -4
- B) -2
- C) 0
- D) 8

When approaching questions like this, the goal is to eliminate the root from the equation. In order to do that, we first need to make sure that one, or both, of the root expressions are the only thing on that side of the equal sign. Therefore, in the equation above, we need to manipulate it so that the second root expression is brought to the other side of the equal sign:

Once you have done that, you can now eliminate the radical by doing the opposite operation. Since this is a square root, the opposite expression would mean squaring both sides of the expression. (If this had been a cube root, we could have had to cube both sides, etc.)

Now solve as you normally would:

Exponents & Roots | Rules Review

1. $5\sqrt{5} + 4\sqrt{5} =$

9. $(a^4)(a^4)(a^4) =$

2. $\sqrt{3} \cdot \sqrt{12} =$

10. $9x^5 - 3x^5 =$

3. $7\sqrt{3} - \sqrt{108} =$

11. $\frac{y^{-2}z^4}{x^{-3}y^4z^{-1}} =$

4. $x^5 + x^5 =$

12. For a positive real number x , where $x^5 = 4$, what is the value of x^{20} ?

5. $(x^5)(x^4) =$

13. $\frac{9^{13}}{9^3} \cdot 9^{5-12} =$

6. $\frac{y^{16}}{y^7} =$

14. $(8x^3)^{\frac{2}{3}} =$

7. $(3x^3)^4 =$

8. If g and h are positive real numbers, in the equation below, what is g in terms of h ?

$$\sqrt{g} + 4\sqrt{h} = 7\sqrt{h}$$

EXPONENTS & ROOTS



SKILL SET

1

Which of the following is equal to the expression $b^{\frac{5}{4}}$, for all values of b ?

- A) $\sqrt[4]{b^{\frac{5}{4}}}$
 B) $\sqrt[4]{b^{\frac{5}{5}}}$
 C) $\sqrt[4]{b^5}$
 D) $\sqrt[5]{b^4}$

2

If $g^{\frac{40}{h}} = 25$ for positive integers g and h , what is one possible value of h ?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

3

In the equation $A = b^x$, b is a constant and $x > 0$. If the value of A decreases as the value of x increases, which of the following must be true?

- A) $-1 < b < 0$
 B) $b = 0$
 C) $0 < b < 1$
 D) $1 < b$

4

If $x = \frac{8y^3}{24y^6}$, which of the following equals $2x$?

- A) $\frac{1}{3y^3}$
 B) $6y^2$
 C) $\frac{2}{3y^3}$
 D) $\frac{3y^3}{2}$

5

If $\sqrt{g} - \sqrt{16} = \sqrt{144}$, what is the value of g ?

- A) 4
 B) 16
 C) 80
 D) 256

6

Which of the following could be the value of $\sqrt{x^4}$ for some integer x ?

- A) 2
 B) 5
 C) 6
 D) 9

7

Which of the following is equivalent to $5^{\frac{3}{2}}$?

- A) $\sqrt{15}$
 B) $5\sqrt{5}$
 C) $\sqrt{5}$
 D) $3\sqrt{5}$

EXONENTS & ROOTS



SKILL SET

8

The expression $\frac{p^{\frac{1}{3}}q^4r^{-\frac{2}{3}}}{q^2r^{-5}}$, where $p > 1$, $q > 1$, and $r > 1$, is equivalent to which of the following?

- A) $\frac{1}{\sqrt[3]{pq^6(3\sqrt{r})^2}}$
 B) $\frac{\sqrt[3]{pr^5}}{q^2(3\sqrt{r})^2}$
 C) $\frac{r^5q^4}{\sqrt[3]{p^3\sqrt{r}}}$
 D) $\frac{\sqrt[3]{pr^5}}{q^6\sqrt[3]{r^2}}$

9

If $x - 2y = 6$, what is the value of $\frac{4^x}{16^y}$?

- A) 2^{14}
 B) 4^6
 C) 16^{-3}
 D) The value cannot be determined from the information given.

10

If $\frac{27x^k}{9x^4} = 3x^{18}$ and $2x^{a2} \times 5x^{b2} \times x^{ba} \times 3x^{ba} = 30x^{49}$,

what is the value of $k(a + b)$?

- A) 67
 B) 140
 C) 154
 D) The value cannot be determined from the information given.

11

Which of the following is equivalent to

$$\left(p + \frac{q}{4}\right)^2?$$

- A) $p + \frac{qp}{2} + \frac{q^2}{4}$
 B) $p + 2pq + \frac{q^2}{4}$
 C) $\frac{16p^2 + 8pq + q^2}{16}$
 D) $p^2 + \frac{q^2}{16}$

12

Which of the following is an equivalent form of $\sqrt[4]{g^{8b}h^5}$, where $g > 0$ and $h > 0$?

- A) $g^{2b}h^{\frac{5}{4}}$
 B) g^bh^5
 C) $g^2h^{\frac{5}{4}}$
 D) $g^{\frac{2}{b}}h^{\frac{4}{5}}$

13

If $g = 3\sqrt{3}$ and $2g = \sqrt[4]{16x}$, what is the value of x ?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Polynomials | Overview

What is a Polynomial?

A polynomial is an expression consisting of 2 or more algebraic terms, particularly terms that contain different powers of the same variable.

Adding/Subtracting Polynomials

You can only add or subtract values with the same variables that are raised to the same exponents (like terms). For example

$$4x + 5x = \underline{\hspace{2cm}}$$

$$4x + 5y = \underline{\hspace{2cm}}$$

$$4x - 5x^2 = \underline{\hspace{2cm}}$$

$$4x^3 + 5x^2 - 10x^3 = \underline{\hspace{2cm}}$$

When you subtract polynomials, it is important to pay attention to any parentheses you may see. For example

$$(5x^2 - 10x^3) - (-3x^2 + 8x^3)$$

A common mistake people make when answering these questions is forgetting to distribute the negative sign before the second set of parentheses. To avoid this pitfall, rewrite the polynomials without the parentheses, switching the signs in the second polynomial. Therefore, the equation above would look like this:

Now combine like terms to get the final answer:

Multiplying Polynomials

Anytime you multiply numbers with variables, follow traditional exponent and fraction rules. For example

$$6x(5x^3) = \underline{\hspace{2cm}}$$

If you are multiplying something by a polynomial, use the FOIL (First-Outer-Inner-Last) Method. For example

$$(5x + 6)(4y - 2) =$$

First:

Outer:

Inner:

Last:

$$(5x + 6)(4y - 2) = \underline{\hspace{2cm}}$$

Polynomials | Overview

Fractional Polynomials: Addition/Subtraction

Add or subtract following the same rules as those for normal fractions. This means that the first thing we must always do is find a common denominator. Let's work through an example below:

$$\frac{x+2}{11} + \frac{5}{3x} =$$

Step 1: Find the common denominator. To do so, multiply both fractions by what one denominator is “missing” in order to make them equal. Remember to use FOIL or the distributive property if necessary.

Step 2: Add the numerators, keep the denominator the same, and combine like terms if possible.

Fractional Polynomials: Multiplication

Multiply straight across the numerator and straight across the denominator. Remember to use FOIL or the distributive property if necessary.

$$\frac{x+2}{11} \times \frac{5}{3x} =$$

Fractional Polynomials: Division

Switch the division sign to a multiplication sign, flip the numerator and the denominator of the second fraction, and then solve.

$$\frac{x+2}{11} \div \frac{5}{3x} =$$

POLYNOMIALS



SKILL SET

1

Which of the following is equivalent to $6(2x + 3) - 12$?

- A) $12x + 18$
- B) $6x - 7$
- C) $12x - 9$
- D) $12x + 6$

2

$(7x^2 - 5x + 2) - (1 - 4x + 3x^2)$ is equivalent to

- A) $4x^2 - x + 1$
- B) $4x^2 - x - 1$
- C) $10x^2 - 9x + 1$
- D) $4x^2 - x^2 - 1$

3

Which of the following is equivalent to the difference of $9xy$ and $4x(5x + 2y)$?

- A) $-19xy$
- B) $xy - 20x^2$
- C) $9xy - 20x^2$
- D) $17xy - 20x^2$

4

$$(x - 2)(x^2 + 3x - 2)$$

Which of the following is equivalent to the expression above?

- A) $x^3 + x^2 - 8x + 4$
- B) $x^3 + x^2 + 2x - 4$
- C) $x^3 + x^2 + 8x - 4$
- D) $x^3 + 5x^2 + 2x + 4$

5

$$(4x^2y^2 - 2x^2 + 3xy^2) - (-xy^2 - 3x^2 + 7x^2y^2)$$

Which of the following is equivalent to the expression above?

- A) $3x^2y^2 - x^2 - 4xy^2$
- B) $5x^2y^2 + x^2 + 2xy^2$
- C) $-3x^2y^2 + x^2 + 4xy^2$
- D) $5x^2y^2 - x^2 - 4xy^2$

6

$$4x^2 + 2x - 6$$

$$-7x^2 + 5x - 11$$

Which of the following is the difference of the two polynomials shown above?

- A) $3x^2 - 7x - 5$
- B) $11x^2 - 3x - 5$
- C) $-3x^2 + 7x - 17$
- D) $11x^2 - 3x + 5$

7

$$-3(2x^2 - 7x + 3) - 4(-x^2 - 2x + 4)$$

If the expression above is rewritten in the form of $ax^2 + bx + c$, where a , b , and c are constants, what is the value of $a + b$?

	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Quadratic Functions | Overview

Quadratic Equations are polynomials that have variables raised to the 2nd power or greater. The standard form for a Quadratic Equation is $ax^2 + bx + c = 0$.

Foiling, as we discussed in the previous section, is used to turn binomials into complete quadratic expressions. However, to turn quadratic expressions into binomials, we must factor. There are a few types of factoring you may encounter on the exam.

Greatest Common Factor (GCF) Method: To use this method, find a common factor to pull out of each element of the expression.

Example:

$$8x^3 + 4xy^3 - 24xz$$

What is the GCF of the three terms in the expression above? _____

When we pull this GCF out of each term, what are we left with? _____

Difference of Perfect Squares Method: To use this method, one perfect square must be subtracted from another in the given expression.

Example:

$$16x^2 - 100$$

Step 1: Set up two sets of parentheses, one with an addition sign in the middle and the other with a subtraction sign in the middle.

$$(\quad - \quad)(\quad + \quad)$$

Step 2: Find the square root of the first element in the expression and put it before the sign in each set of parentheses. Find the square root of the second element in the expression and put it after the sign in each set of parentheses.

$$(\quad - \quad)(\quad + \quad)$$

Quadratic Functions | Overview

Quadratic Factoring Method: To use this method, a quadratic equation must be in standard form and a must be equal to 1.

Example:

$$x^2 + 2x - 24 = 0$$

To factor this, we must find a pair of numbers that **multiply to equal the constant** and also **add to equal the coefficient of the x term**. Set up those numbers in a pair of parentheses both beginning with x .

$$(\quad) (\quad)$$

If a question asks you not simply to factor the quadratic equation, but to find the roots (or zeroes or solutions), set each factor equal to 0 and solve.

$$(\quad) = 0$$

$$x = \underline{\quad}$$

$$(\quad) = 0$$

$$x = \underline{\quad}$$

If there had been a coefficient in front of the x^2 term, we could not have used the method above. If you see a coefficient in front of the x^2 term, first ask yourself if there is a GCF that you can pull out from all of the terms.

Example:

$$4x^2 + 20x + 16 = 0$$

Step 1: Since we see a number in front of the x^2 term, see if we can factor out a GCF.

Step 2: Factor the expression inside the parentheses in the same way as in the example above.

Quadratic Functions | Overview

Quadratic Formula

Another way to algebraically solve quadratic equations, both with or without coefficients in front of the x^2 term, is to use the Quadratic Formula. The Quadratic Formula is:

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

a is the coefficient of the x^2 term. If there is no coefficient written, a is equal to 1, NOT 0.

b is the coefficient of the x term. If there is no coefficient written, b is equal to 1, NOT 0.

c is the value of the third term.

Let's work out an example together:

$$\text{Find the roots of } 4x^2 - 2x - 5 = 0$$

a is equal to _____

b is equal to _____

c is equal to _____

Now plug these values into the formula:

The **discriminant** in a quadratic equation, $b^2 - 4ac$, provides us with information about the roots, or zeroes, of an equation.

If $b^2 - 4ac < 0$ then the two roots are imaginary (complex)

If $b^2 - 4ac = 0$ then there is only one real root

If $b^2 - 4ac > 0$ then there are two distinct, real roots

If $b^2 - 4ac =$ a positive perfect square then there are two distinct real, rational roots

Common Quadratic Equations:

$$(x + a)(x + a) \text{ or } (x + a)^2 = x^2 + 2ax + a^2$$

$$(x - a)(x - a) \text{ or } (x - a)^2 = x^2 - 2ax + a^2$$

$$(x + a)(x - a) = x^2 - a^2$$

Quadratic Functions | Overview

Factoring by Grouping

We can use the Factoring by Grouping on a wide variety of equations, even ones that are not in the standard quadratic form. Take a look at the example below:

For what real value of x is the following equation true: $2x^3 - 12x^2 + 5x - 30 = 0$

Step 1: Pull out the GCF from the first two terms. (If there is no GCF, switch the order of the terms so that you are able to pull out a GCF from the first two.)

Step 2: Pull out the GCF from the next two terms. (You will know you have done it correctly if the binomial inside the parentheses is the same for both.)

Step 3: Combine the GCF from the first two terms with the GCF from the last two terms to create a binomial.

Step 4: Multiply the binomial from Step 3, by the common binomial in Steps 1 and 2 and then set the product equal to 0 to solve for the roots if necessary.

Quadratic Functions | Overview

Another option if you are unable to factor out a GCF from all of the terms is to factor using the Rainbow Technique. To do so, follow the steps below:

Example:

$$4x^2 + 20x + 21 = 0$$

Step 1: Multiply the leading coefficient by the constant term.

Step 2: Using the value from Step 1, find a set of factors of it that add together to give you the coefficient of the x term.

Step 3: Rewrite the equation separating the x term into a sum of the factors from Step 2.

Step 4: Factor by grouping. (See the previous page if you need a reminder.)

No matter which technique we may use to factor a quadratic equation, the format is always the same:

$$a(x^2 - (\text{sum of the roots})x + (\text{product of the roots}))$$

where a is the leading coefficient of the x^2 term and has been factored out of each of the other terms.

Another way to think about finding the sum of the roots of a quadratic equation is by solving for it using:

$$\frac{-b}{a}$$

Quadratic Functions | Rules Review

1. If $x^2 + 4x + 4 = 0$, what are all possible values of x ?

2. If $(2x - 4)(x + 3) = 0$, what are all possible values of x ?

3. Factor the equation $r^2 - 36 = 0$

$$8x^2 + 16x + 24 = 0$$

4. In the quadratic equation above, what is the value of the sum of all the roots?

5. If $p < 0$ and $p^2 - 16 = 0$, what is the value of p ?

6. Factor the following equation:
 $3xyz^2 - 6xy^3z + 9x^4yz = 30xyz$

7. Simplify the equation $\frac{16k^4j^3 + 4kj}{8k^2j^2}$

$$2x^2 + 5x - 11 = 0$$

8. In the quadratic equation above, what are the values of the roots?

9. What is the sum of the solutions of $x^2 + x - 20 = 0$?

10. If $x > y$, $x^2 - y^2 = 63$, and the sum of x and y is 9, what is the value of x ?

QUADRATICS



SKILL SET

1

$$5x(2x + 6) - 2(4x - 1) = ax^2 + bx + c$$

In the equation above, a , b , and c are constants. If the equation is true for all values of x , what is the value of c ?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

2

$$(x - 5)^2 = 6x - 23$$

What is one possible solution to the equation above?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

3

$$\frac{x^2 - 4}{x + 2} = -8$$

What are all the values of x that satisfy the equation above?

- A) -4
- B) -6
- C) -6 and 2
- D) -4 and 0

4

If $3p + 12q = 27r$, which of the following expressions is equivalent to $p^2 + 8pq + 16q^2$?

- A) $9r$
- B) $9r^2$
- C) $81r$
- D) $81r^2$

5

$$3x^2 + 4x - 10 = 0$$

Which of the following is a solution to the equation above?

- A) $x = 1 + \sqrt{5}$
- B) $x = -6 + \sqrt{3}$
- C) $x = 6 + \sqrt{3}$
- D) $x = -1 - \sqrt{5}$

6

What is the sum of all values of p that satisfy $4p^2 + 8p + 24$?

- A) -8
- B) -2
- C) 2
- D) 8

QUADRATICS



SKILL SET

7

$$6x^3 - 24x^2 + 8x - 32 = 0$$

For what real value of x is the equation above true?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

316

8

$$g = pq^3 - 2p^2q$$

$$h = pq + 2p^2q^2 + pq^3$$

What is the value of the greatest common factor of g and h ?

- A) $p + 2q$
- B) $q - 2p$
- C) $p + q$
- D) pq

9

If $g + h = 3$, and $g - h = 7$, what is the value of $(g + h)^2(g^2 - h^2)$?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

10

What are the zeroes of the equation

$$3x^2 + 4x - 10 = 0$$

- A) $x = \frac{-2 \pm \sqrt{34}}{6}$
- B) $x = \frac{-2 \pm \sqrt{34}}{3}$
- C) $x = \frac{-4 \pm \sqrt{34}}{3}$
- D) $x = \frac{-2 \pm \sqrt{136}}{3}$

11

$$-p^2w - 2pq = wq^2 - 2pqw$$

In the equation above, w , p , and q are each greater than 1. Which of the following is equivalent to w ?

- A) $\frac{1}{p + q}$
- B) $p^2 + 2pq$
- C) $\frac{-2pq}{(q - p)^2}$
- D) $2pq - p^2$

12

Which of the following is an equivalent form of the expression $(4x - 3)^2 - (4x + 3)$?

- A) $2x^2 - 7x + 2$
- B) $(2x - 3)(4x - 1)$
- C) $8x^2 - 14x + 3$
- D) $2(2x - 3)(4x - 1)$

Exponential Functions | Overview

What is Exponential Growth?

Exponential growth happens when the rate of growth increases more rapidly in proportion to a growing total. Therefore, the larger the total you have, the larger the rate of growth. Exponential growth is NOT a linear function, as the number does not increase by the same amount each time.

A commonly tested type of exponential growth is the amount of interest accrued on a bank account over time.

The formula for interest is

$$P = C \left(1 + \frac{r}{n}\right)^{nt}$$

where:

P = Future Value

C = Initial Deposit

r = Interest Rate (in decimal form)

t = Number of years invested

n = Number of times per year the interest is compounded

If you are told that the interest is compounded “annually,” this means that the interest is added to the total only one time per year. Therefore, a simpler way to think about that equation would be

$$P = C (1 + r)^t$$

What is Exponential Decay?

Exponential decay is the opposite of exponential growth. Instead of the rate of growth increasing as time passes, the rate of decay increases as time passes. Therefore, instead of the quantity increasing, it is decreasing.

The general formula for exponential decay is very similar to the formula for growth. However, instead of adding the rate of change, you must subtract it:

$$P = C (1 - r)^t$$

EXPONENTIAL FUNCTIONS



SKILL SET

1

Of the following four types of radioactive decay schedules, which option would yield exponential decay?

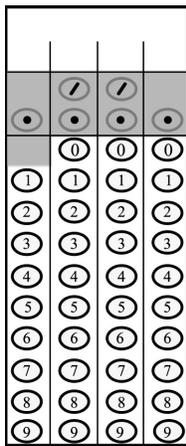
- A) Each successive year, 15 milligrams of the substance decays.
- B) Each successive year, 2.5% of the original amount of the substance decays.
- C) Each successive year, 3.6% of the current amount remaining of the substance decays.
- D) Each successive year, 1.5% of the current amount is added to the remaining substance.

Questions 2 and 3 refer to the following information.

Nina opened a bank account that earns 6% interest compounded annually. Her initial deposit was \$250. She uses the model $\$250(x)^t$ to assess the value of the account after t years.

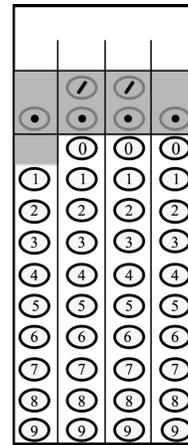
2

What is the value of x in the expression above?



3

Nina's sister Lisa opened an account at a bank next door and deposited \$250 on the same day that Nina did. Lisa's bank offers a 4.5% interest rate compounded annually. After 25 years, how much more money will Nina have in her account than Lisa? (Round your answer to the nearest dollar and ignore the dollar sign when gridding your response.)



4

The population of bacteria in a laboratory study is calculated over the course of 50 days, as shown in the table below.

Time (Days)	Bacteria Population
0	20
10	60
20	180
30	540
40	1,620
50	4,860

Which of the following best describes the relationship between time and the bacteria population during the 60 days?

- A) Exponential growth
- B) Exponential decay
- C) Increasing linear
- D) Decreasing linear

EXPONENTIAL FUNCTIONS



SKILL SET

5

Tara was given \$2,700 by her grandparents when she turned 5 years old. Her parents invested it for her at a 3% interest rate compounded annually. No deposits or withdrawals were made. Which expression can be used to determine how much money Tara had in the account when she turned 18?

- A) $2700(1 + 0.03)^{13}$
 B) $2700(1 - 0.03)^{13}$
 C) $2700(1 - 0.03)^{18}$
 D) $2700(1 + 0.03)^{18}$

6

A radioactive substance being studied in a lab decays at an annual rate of 7%. If the initial amount of the substance is equal to 428 milligrams, which of the following functions models the amount remaining after a total of 8 years?

- A) $f(8) = 428(1.07)^8$
 B) $f(8) = 428(1.7)^8$
 C) $f(8) = 428(0.93)^8$
 D) $f(8) = 428(8)^{07}$

7

A city planner estimates that, starting from the present, the population of the city will increase by 6% every 15 years. If the current population of the city is 76,000, which of the following expressions represents the city planner's estimate of the population t years from now?

- A) $76,000(.06)^{15t}$
 B) $76,000(1.06)^{15t}$
 C) $76,000(.94)^{\frac{t}{15}}$
 D) $76,000(1.06)^{\frac{t}{15}}$

8

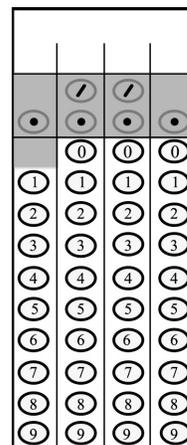
$$P = 750 \left(1 + \frac{r}{52}\right)^{52t}$$

The expression above models the amount of money, in dollars, accrued in a year after an initial \$750 deposit in an account that pays an annual interest rate of r compounded weekly. Which of the following expressions represents the difference between the amount of money accrued in this account, versus one offering the same interest rate but compounded daily?

- A) $750 \left(1 + \frac{r}{52}\right)^{52t} + 750 \left(1 + \frac{r}{365}\right)^{365t}$
 B) $750 \left(1 + \frac{r}{52}\right)^{52t} - 750 \left(1 + \frac{r}{365}\right)^{365t}$
 C) $750 \left(1 + \frac{r}{52}\right)^{52t} - 750 \left(1 + \frac{r}{52}\right)^{365t}$
 D) $750 \left(1 + \frac{r}{52}\right)^{52t} - 750 \left(1 - \frac{r}{365}\right)^{52t}$

9

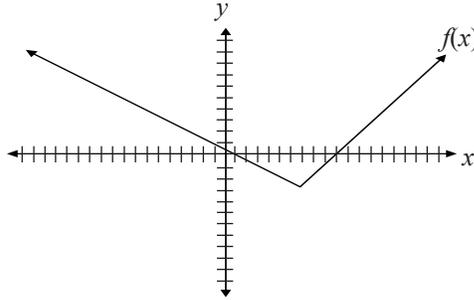
Hillary deposited x dollars into her son's college fund on September 1, 2019. The amount of money in the account tripled each year until there was a total of \$102,060 in his account when he was ready to go to college on September 1, 2025. What is the value of x ?



Function Graphs | Overview

Functions can be represented graphically on a coordinate plane, with the values on the x -axis representing the *inputs*, or those numbers in the *domain*, while the y -axis represents the outputs, or the values of $f(x)$ that compose the *range*.

The SAT may test your understanding of this concept by giving you a graph and asking you to use the graph to evaluate a function. Take a look at the example below:



In the graph above, what is the value of $f(10)$?

- A) -2
- B) 0
- C) 1
- D) 2

Is $f(10)$ the input or the output of the function above? _____

Does this mean we will get our answer from the x -axis or the y -axis? _____

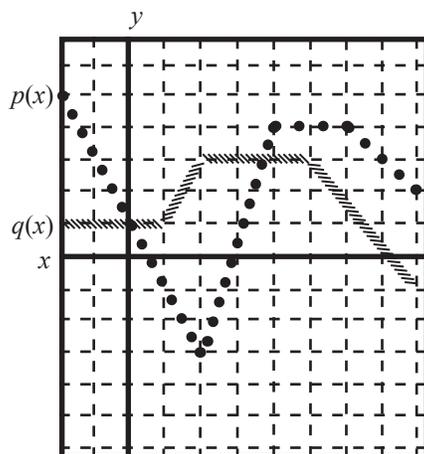
Therefore, the value of $f(10)$ is equal to _____.

FUNCTION GRAPHS



SKILL SET

1

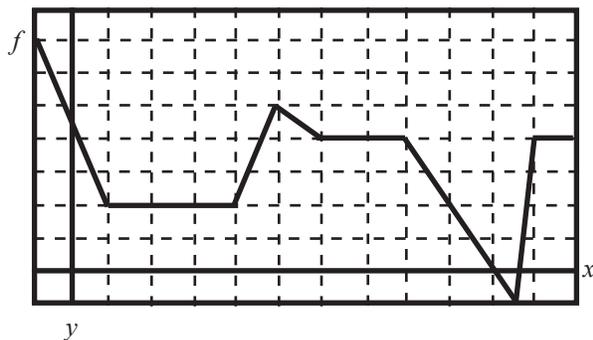


Graphs of functions p and q are shown in the xy -plane above. For which of the following values of x does $p(x) + q(x) = 0$?

- A) -1
- B) 2
- C) 3
- D) 7

2

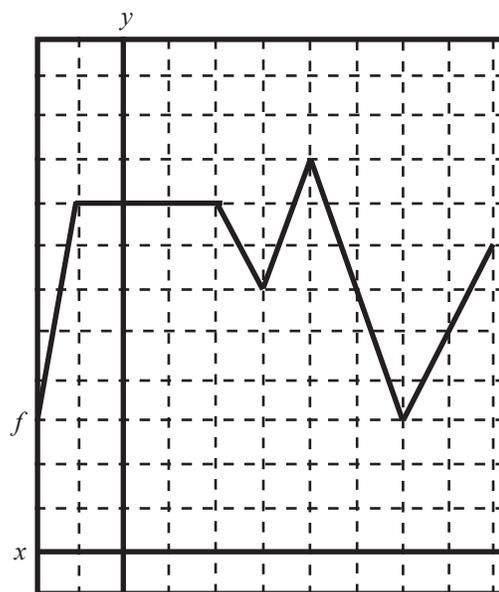
The complete graph of the function f is shown below. Which of the following is/are equivalent to 0?



- I. $f(10)$
- II. $f(1) - f(4)$
- III. $f(3.5)$
- IV. $2f(5) - f(10)$

- A) I only
- B) III and IV only
- C) I and II only
- D) I, III and IV only

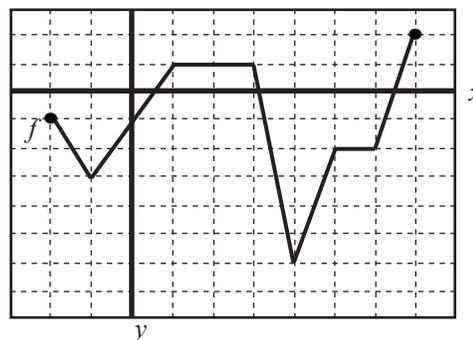
3



The complete graph of the function f is shown in the xy -plane above. For what value of x is the value of the function at its maximum?

- A) 1
- B) 4
- C) 8
- D) 9

4



The complete graph of the function f is shown in the xy -plane above. For what two values of x , will the sum of their $f(x)$ values be equal to 0?

- A) -1 and 1
- B) -1 and 0
- C) 2 and 4
- D) 7 and 5

Quadratic Function Graphs | Overview

Sometimes you may not be given a graph to accompany a function equation in a question. In these situations, on the calculator section of the exam, you can actually graph these functions as opposed to using algebra to solve them.

Prior to taking the exam, make sure that you are completely comfortable with how to graph on your calculator. Below is a step-by-step guide as to how to graph using a TI 83 or 84 graphing calculator.

Graph the following expression: $2f(x) = 4x^2 + 6$

Step 1: Manipulate the equation to put it in terms of $f(x)$ or y , depending on which format you are given in the question.

Step 2: Click the $Y =$ button that is located on the upper left corner of your calculator.

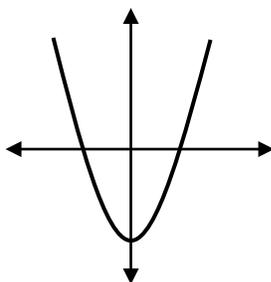
Step 3: On the first line, where it says $Y_1 =$, enter your equation: $2x^2 + 3$. (Use the X,T,θ,N button to get the x variable.)

Step 4: Press the GRAPH button that is located on the upper right corner of the calculator.

When working with the graphs of quadratic functions, we can add to this basic plan a couple of steps that will help us solve for the roots or turning point (also called the minimum, maximum, or vertex) of a particular function.

Quadratic Function Graphs | Overview

The graph of a quadratic equation is a non-linear shape called a parabola:



The solutions to a quadratic equation (also called roots or zeroes) on a graph are the locations at which the graph crosses the x -axis. Therefore, instead of factoring to solve for the solutions algebraically, you can graph the equation on your calculator. (This holds true for algebraic equations raised to any degree: The number of real roots an equation has is equal to the number of times the graph crosses the x -axis.)

To graph a quadratic equation on the calculator, the equation **MUST** be set equal to 0. If it is not, first manipulate the equation to move everything to one side so that it is equal to 0.

Step 1: Follow Steps 1 – 4 on the previous page.

Step 2: To find the exact points at which the graph crosses the x -axis, click 2ND, TRACE (CALC), and select number 2: zero.

Step 3: This will take you back to the screen with the graph, and you will see a blinking cursor on the parabola. Locate the leftmost location where the parabola crosses the x -axis, and using the left arrow button, move the cursor so that it is anywhere to the left of that point. Then press ENTER.

Step 4: Now move the cursor so that it is to the right of that point, and press ENTER again. Make sure that the cursor is only to the right of the first intersection, and is **NOT** also to the right of the second point of intersection.

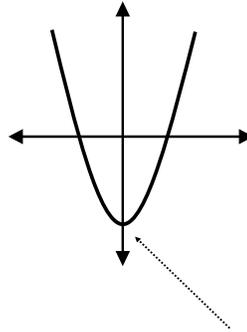
Step 5: The calculator will prompt you to Guess. Press ENTER again. It will then display your first zero as the x value on the lower left corner of the screen.

Step 6: Repeat steps 2 – 5 to calculate the second point of intersection.

Quadratic Function Graphs | Overview

Turning Point (Vertex)

The turning point (minimum, maximum, or vertex) is the point on a parabola at which the curve changes direction. The x -coordinate of the vertex will always be the midpoint between the two zeroes. In the example below, the arrow is pointing to the turning point.



There are two ways to find the turning point of a graph: algebraically and graphically.

Algebraically

To solve algebraically, you can use the formula below to find the x -coordinate of the turning point, and then plug that value back into the given equation to find the corresponding y -coordinate.

$$\boxed{\frac{-b}{2a}}$$

where a is the leading coefficient in the quadratic equation and b is the coefficient of the x term.

Graphically

Step 1: Follow Steps 1 – 4 on page 321.

Step 2: Click 2ND, TRACE (CALC), and select number 3 or 4, maximum or minimum. If the graph opens upward, choose minimum, and if it opens downward, choose maximum.

Step 3: This will take you back to the screen with the graph, and you will see a blinking cursor on your graph. Using the left arrow button, move the cursor anywhere to the left of the turning point. Press ENTER.

Step 4: Move the cursor to the right of that point, and press ENTER again.

Step 5: The calculator will prompt you to Guess. Press ENTER again. It will then display the x and y coordinates of the turning point.

Quadratic Equations in Vertex Form

The vertex form of a quadratic equation is as follows:

$$f(x) = a(x - h)^2 + k, \text{ where } (h, k) \text{ is the vertex of the parabola, and } a \text{ is the coefficient of the } x^2 \text{ term.}$$

Quadratic Function Graphs | Overview

Quadratic Graph Transformations

The graphs of quadratic equations may be shifted up, down, to the left, or to the right. These shifts are denoted by different additions to the standard parabolic equation, $y = x^2$.

The equation $y = x^2$ has a vertex located at the origin and opens upward.

Vertical Shift: We can shift this parabola vertically, meaning that the vertex of the parabola will move up or down. If we were to move the parabola up a units, the equation would look like:

$$y = x^2 + a$$

If we were to shift it down a units, the equation would look like: $y = x^2 - a$

Horizontal Shift: We can shift this parabola horizontally, meaning that the vertex of the parabola will move right or left. If we were to move the parabola to the right b units, the equation would look like:

$$y = (x - b)^2$$

If we were to shift it to the left b units, the equation would look like: $y = (x + b)^2$

Opening Upwards/Downwards: A regular parabola opens upwards, like a smile. However, in order to make a parabola open downwards, the coefficient of the x^2 term must be negative like:

(Reflection over x -axis)

$$y = -x^2$$

As a general rule, when you negate the graph of $f(x)$, $-f(x)$ is reflected over the x -axis.

Widening a Parabola: To make a parabola open wider, the coefficient of the x^2 term must be between -1 and 1.

$$y = 0.5x^2$$

$$y = -0.25x^2$$

Narrowing a Parabola: To make a parabola open narrower, the coefficient of the x^2 term must be less than -1 or greater than 1.

$$y = 5x^2$$

$$y = -10x^2$$

Reflection over Line $y = x$: A function is reflected over the line $y = x$ when $-x$ is plugged into the function for x .

QUADRATIC GRAPHS



SKILL SET

1

$$y = x^2 - 14x - 32$$

The equation above represents a parabola in a standard xy -plane. Which of the following equivalent forms of the equation displays the x -intercepts of the equation as constants or coefficients?

- A) $y + 32 = x^2 - 14x$
- B) $y = x(x - 14) - 32$
- C) $y = (x - 16)(x + 2)$
- D) $y + 14x = x^2 - 32$

2

In the xy -coordinate plane, the graph of function g has x -intercepts at -5 , -2 , and 7 . Which of the following could define g ?

- A) $g(x) = (x - 7)(x - 5)(x - 2)$
- B) $g(x) = (x - 7)(x + 5)(x + 2)$
- C) $g(x) = (x - 7)(x + 5)(x - 2)$
- D) $g(x) = (x + 7)(x - 5)(x - 2)$

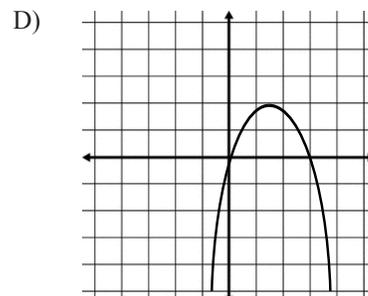
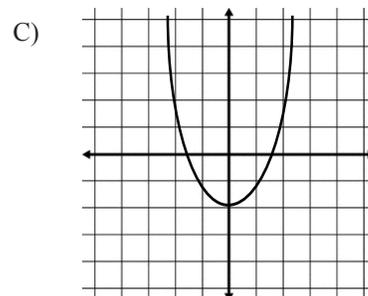
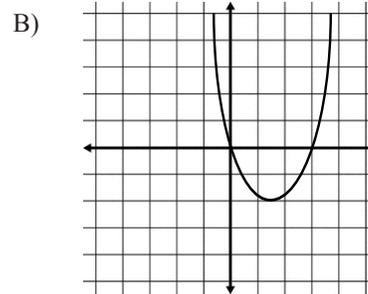
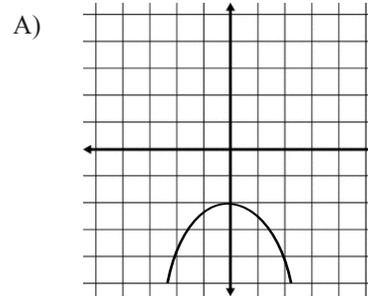
3

The graphs in the xy -plane of the following quadratic equations each have zeroes of 1 and 5. The graph of which equation has the shortest distance between the vertex and the origin?

- A) $f(x) = 3(x - 5)(x - 1)$
- B) $f(x) = 0.25(x - 5)(x - 1)$
- C) $f(x) = -2(x - 5)(x - 1)$
- D) $f(x) = 6(x - 5)(x - 1)$

4

The range of the polynomial function g is the set of real numbers greater than or equal to -2 . If the roots of g are 0 and 3, which of the following could be the graph of function g ?



QUADRATIC GRAPHS



SKILL SET

5

The polynomial $r^4 + 12r^3 + 32r^2 - 48r - 144$ can be written as $(r^2 - 4)(r + 6)^2$. If the polynomial were to be graphed on an xy -plane, at what points would it intersect the x -axis?

- A) -2 and -6
- B) -2, 2 and -6
- C) 4 and -6
- D) -4 and 6

6

$$f(x) = x^2 - 2y$$

In the equation above, y is a positive constant and the graph of the equation in the xy -plane is a parabola. Which of the following is an equivalent form of the equation?

- A) $(x + \frac{2}{y})(x - \frac{2}{y})$
- B) $(x - 4y)^{\frac{1}{2}}$
- C) $(x - \sqrt{2y})^2$
- D) $(x - \sqrt{2y})(x + \sqrt{2y})$

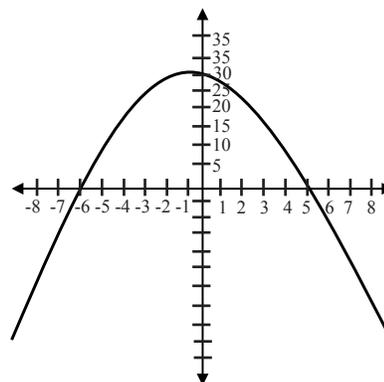
7

$$f(x) = (x + b)^2 - 2$$

In the equation above, b is a constant. Which of the following is true about the graph that represents the equation?

- A) It is a parabola with a vertex and $(-2, b)$
- B) It is a parabola with a vertex at $(-2, 0)$ and passes through point $(b, 0)$.
- C) It is a parabola with a vertex and $(-b, -2)$
- D) It is a parabola with a vertex at $(2, 0)$ and passes through point $(0, b)$.

8



Which of the following is the equation for the graph shown above?

- A) $-(x^2 - x - 30) = 0$
- B) $x^2 - x - 30 = 0$
- C) $-(x^2 + x - 30) = 0$
- D) $x^2 + x + 30 = 0$

9

$$g(x) = -(x + 3)(x - 8)$$

Which of the following is an equivalent form of the function g above in which the maximum value of g appears as a constant or coefficient?

- A) $g(x) = (x - 32)^2 + 2.5$
- B) $g(x) = -(x - 2.5)^2 + 32$
- C) $g(x) = -(x + 2.5)^2 + 30.25$
- D) $g(x) = -(x + 30.25)^2 + 2.5$

QUADRATIC GRAPHS



SKILL SET

1

If the function g has six distinct zeroes, which of the following could represent the complete graph of g in the xy -coordinate plane?

- A)
- B)
- C)
- D)

2

Which of the following is an example of a function whose graph in the xy -plane has one x -intercept?

- A) A quadratic equation with one imaginary root
 B) A quadratic equation with one real root
 C) A cubic polynomial with three real roots
 D) A linear function with a slope of zero

3

$$g(x) = (x - 5)(x + 7)$$

The function g is defined by the above equation. The graph of g in the xy -plane is a parabola. Which of the following intervals contains the x -coordinate of the vertex of the graph of g ?

- A) $-2 < x < 0$
 B) $0 < x < 2$
 C) $2 < x < 4$
 D) $4 < x < 7$

4

In the xy -plane, the parabola with the equation $f(x) = (x + 3)^2$ intersects the line $y = 49$ at two locations, G and H . What is the measure of the distance between G and H ?

- A) 4
 B) 6
 C) 10
 D) 14

5

$$a(x + 7)(x - 3)$$

In the quadratic equation above, a is a nonzero constant. The graph of the equation in the xy -coordinate plane is a parabola with vertex (p, q) . Which of the following is equal to pq ?

- A) $75a$
 B) $50a$
 C) $25a$
 D) $2a$

Advanced Function Graphs | Overview

Inequality functions can also be graphed on a standard xy -coordinate plane. There are only two differences between graphing an inequality and graphing a normal line or quadratic equation. First, after graphing the inequality, we must shade in the area containing the range of values that satisfy the inequality. Second, if the inequality uses \geq or \leq , we graph using a solid line, but if it includes $>$ or $<$, we graph using a dashed line.

Check out the example below to see how we can use a calculator to graph inequalities:

Graph the inequality: $f(x) \geq x + 2$

Step 1: Follow Steps 1 – 3 from the previous section.

Step 2: Once you enter an equation, on the left side next to Y_1 you should see a slash, or \

On the TI-83:

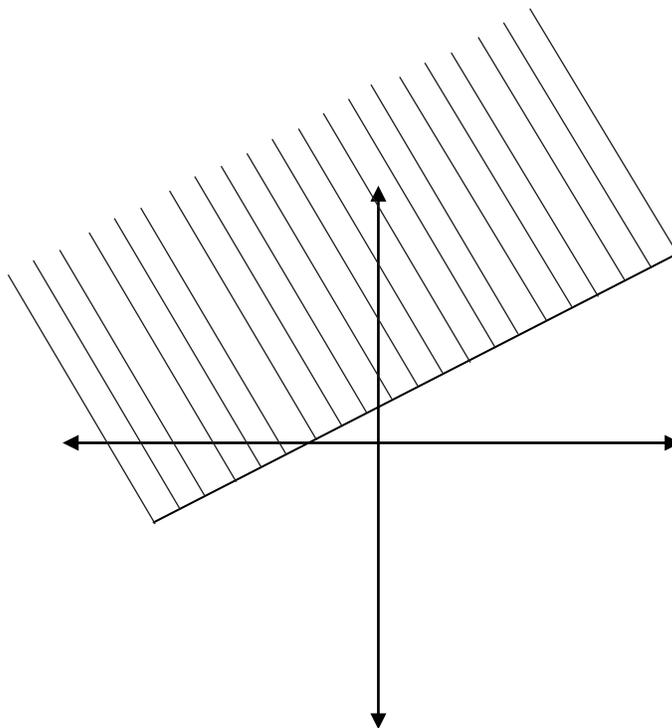
Scroll to the left until you are on top of that slash and it is blinking. Press ENTER until you see \geq . This symbol means \geq . If the equation is \leq press ENTER one more time and select \leq .

On the TI-84 CE:

Scroll to the left until there is a blinking box around the color box, the slash and Y_1 . Press ENTER and it will take you to a menu screen. Scroll down to the Y box and scroll to the right until you see the correct inequality symbol. Then scroll down and press OK.

Step 3: Press GRAPH, which is located in the top right corner of your calculator.

The graph of the inequality function is below:



Advanced Function Graphs | Overview

Systems of Equations

We have already worked on graphing systems of linear equations as a means of solving them. However, the test may ask you to work with systems of quadratic equations, or systems of one quadratic and one linear equation. We can graph these in much the same way we did the linear functions. (As a reminder, take a look at the steps below.)

Step 1: Enter the two equations in $Y=$. Put one equation in Y_1 and the other in Y_2 .

Step 2: Click 2ND - TRACE (CALC).

Step 3: Select 5: INTERSECT.

Step 4: The cursor will show up on the first curve and you will be asked “First curve?” Press ENTER. Do the same for the second curve. The calculator will then ask you to GUESS. Press ENTER again.

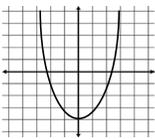
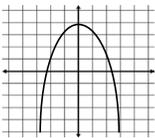
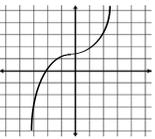
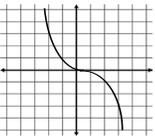
Your answer will be displayed as the x and y coordinates at the bottom of the screen.

Systems of Inequalities

To graphically find the solution to a system of inequalities, first graph each inequality. Then to find the solution set, locate the area on the graph where the shading from both inequalities overlaps.

End Behavior of a Function Graph

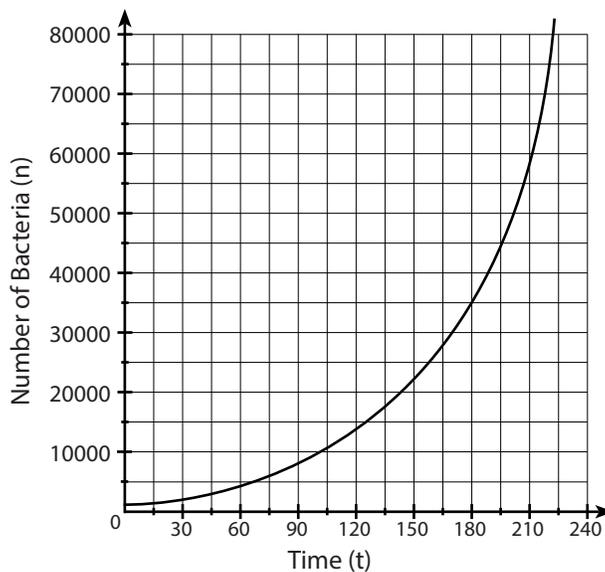
The end behavior of a polynomial function is the behavior of the graph of $f(x)$ as x approaches infinity and negative infinity. The degree of the polynomial (the highest exponent to which x is raised) and the leading coefficient determine the end behavior of the graph.

Degree	Leading Coefficient	End Behavior	Graph Example
Even (Example: x^2)	Positive	As $f(x)$ approaches ∞ , x approaches $-\infty$. As $f(x)$ approaches ∞ , x approaches ∞ .	
Even	Negative	As $f(x)$ approaches $-\infty$, x approaches $-\infty$. As $f(x)$ approaches $-\infty$, x approaches ∞ .	
Odd (Example: x^3)	Positive	As $f(x)$ approaches $-\infty$, x approaches $-\infty$. As $f(x)$ approaches ∞ , x approaches ∞ .	
Odd	Negative	As $f(x)$ approaches $-\infty$, x approaches ∞ . As $f(x)$ approaches ∞ , x approaches $-\infty$.	

Advanced Function Graphs | Overview

Exponential Growth

On a graph, exponential growth looks like this:

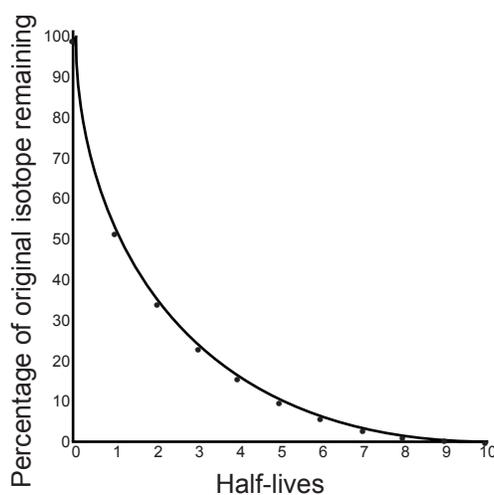


Notice that this graph is not linear. The y -axis represents the amount of what we are measuring, and the x -axis represents the time.

What information does the y -intercept of the graph tell us? _____

Exponential Decay

On a graph, exponential decay looks like this:



Notice that again, this graph is not linear. As with the growth graph, the place where the line crosses the y -axis is the initial amount of the substance.

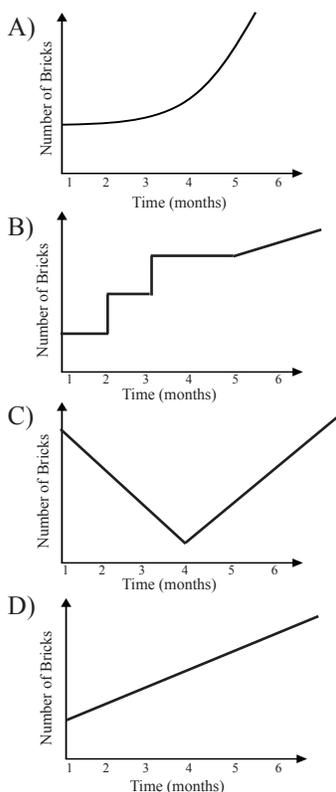
ADVANCED GRAPHS



SKILL SET

1

The number of bricks at a construction site triples every month during the building period. Which of the graphs below could model the number of bricks present at the site throughout the building period?



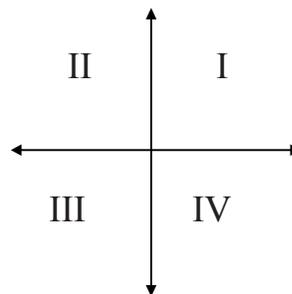
2

$$\begin{aligned} x^2 + 6y &= 12 \\ 3y &= -5x + 14 \end{aligned}$$

Which value is a y -coordinate of a solution to the system of equations above?

- A) $-\frac{2}{5}$
- B) $\frac{4}{3}$
- C) 2
- D) $\frac{26}{3}$

3



If the system of inequalities $y < 3x + 6$ and $y \geq (x - 4)^2 + 3$ is graphed on the xy -plane shown above, which quadrant would contain the solutions to the system?

- A) Quadrant I
- B) Quadrant II
- C) Quadrant III
- D) Quadrant IV

4

In the xy -plane, the graph of $y = 4x^2 - 10$ intersects the graph of $y = -4x - 2$ at the points $(-2, 6)$ and (x, y) . What is the value of x ?

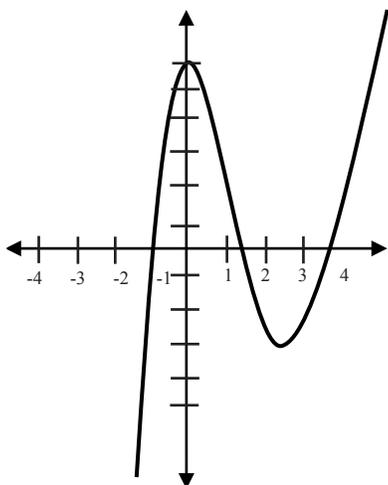
	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

ADVANCED GRAPHS



SKILL SET

5



The function $g(x) = x^3 - 4x^2 - .25x + 6$ is graphed in the xy -plane shown above. If k is a constant and $g(x) = k$ has two real solutions, which of the following could be the value of k ?

- A) -4
- B) -1
- C) 3
- D) 6

6

In the xy -plane, a line with the equation $y = k$, when k is a constant, intersects the graph of $y = -2x^2 + 8x + 3$ in exactly one spot. What is the value of k ?

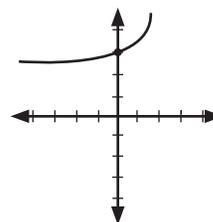
	✓	✓	
●	●	●	●
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

7

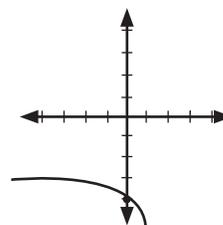
$$f(x) = 3^x + 2$$

The function f is defined by the equation above. Which of the following is the graph of $y = -f(x) - 1$?

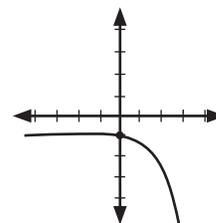
A)



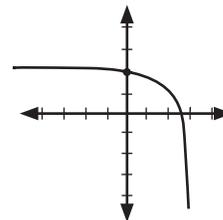
B)



C)



D)

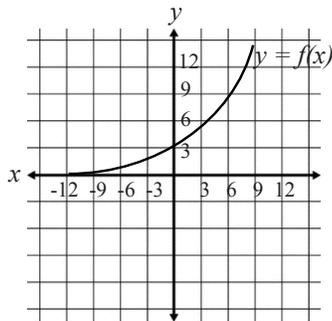


ADVANCED GRAPHS



SKILL SET

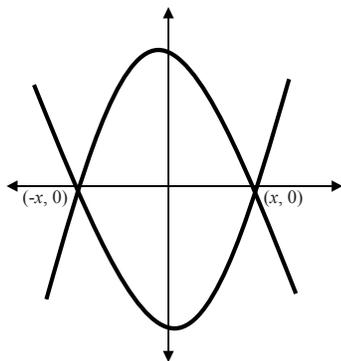
1



The graph of $y = f(x)$ is shown in the xy -plane above. What is the value of $f(6)$?

- A) 1
- B) 3
- C) 6
- D) 9

2



The functions p and q , defined by $p(x) = 3x^2 - 9$ and $q(x) = -3x^2 + 9$, are graphed in the xy -plane above. The graphs of p and q intersect at points $(x, 0)$ and $(-x, 0)$. What is the value of x ?

- A) 1
- B) $\sqrt{3}$
- C) 3
- D) $2\sqrt{3}$

3

$$y = x^2 + 5x - 18$$

$$y = 3x + 6$$

Which of the following is the sum of the y -coordinates for all points of intersection in the xy -plane, of the graphs of the equations above?

- A) -12
- B) 0
- C) 6
- D) 16

4

$$y = x^2 - 13x + 21$$

$$24x + y = -9$$

The system of equations above is graphed in the xy -plane. Which of the following is the difference of the y -coordinates of the points of intersection (x, y) of the graphs of the two equations?

- A) 0
- B) 24
- C) 111
- D) 135

5

$$y = 7x - 3$$

$$y = (5x^2 - 3)(x + 1)$$

How many ordered pairs (x, y) satisfy the equations shown above?

- A) 1
- B) 2
- C) 3
- D) Infinitely many

Imaginary (Complex) Numbers | Overview

Imaginary (complex) numbers (denoted by i) are formed as a result of taking the square root of a negative number.

Example:

$$\sqrt{-16} = 4i$$

$$\sqrt{-25} = 5i$$

Working with imaginary numbers is similar to working with any other variable, with a couple of exceptions:

1. The most commonly tested rule is that $i^2 = -1$.

Example:

$$(7i)(10i) = 70i^2 = 70(-1) = -70$$

2. Imaginary numbers raised to other exponents have meanings as well.

$$\begin{aligned} i &= \sqrt{-1} \\ i^2 &= -1 \\ i^3 &= -\sqrt{-1} \\ i^4 &= 1 \end{aligned}$$

Following i^4 , the values continue to cycle in loops of 4.

$$i^5 = \underline{\hspace{2cm}}$$

$$i^6 = \underline{\hspace{2cm}}$$

$$i^7 = \underline{\hspace{2cm}}$$

$$i^8 = \underline{\hspace{2cm}}$$

3. When imaginary numbers are in the denominators of fractions, the fractions must be *rationalized*. To rationalize a denominator, an imaginary binomial expression must be multiplied by its *conjugate*.

Example:

$$\frac{3}{i-7}$$

Step 1: Multiply both the numerator and denominator by the conjugate.

Step 2: Simplify using your knowledge of imaginary numbers raised to exponents.

4. If complex numbers show up on the calculator section, you can find the answer using the calculator. To type in i , hit 2ND and then the period (.) button.

Imaginary (Complex) Numbers | Rules Review

1. Evaluate: $\sqrt{-121}$

4. Simplify: $\frac{11 + 4i}{1 - 3i}$

2. $(6 + 2i)(3 - 4i) =$

5. $(2 + 3i)(2 - 3i) =$

3. $(4 + 7i)^2 =$

6. $11 + i(7 - i) =$

IMAGINARY NUMBERS



SKILL SET

1

For $i = \sqrt{-1}$, what is the difference of $(9 - 4i)$ and $(-6i - 5)$?

- A) $14 - 2i$
- B) $4 + 2i$
- C) $4 - 10i$
- D) $14 + 2i$

2

For $i = \sqrt{-1}$, what is the sum of the complex numbers $6 + 12i$ and $-7i - 15$?

- A) $-1 - 3i$
- B) $-9 + 5i$
- C) $13i + 27$
- D) $-i - 3$

3

Which of the following complex number is equal to the sum of $15 + 3i$ and $-6i - 3$, for all $i = \sqrt{-1}$?

- A) $12 + 3i$
- B) $18 - 6i$
- C) $18 + 3i$
- D) $12 - 3i$

4

If $i^2 = -1$, which of the following is equivalent to $(2 + i)^2 - (2 - i)^2$?

- A) 0
- B) 2
- C) $4i$
- D) $8i$

5

Which of the following complex numbers is equivalent to $\frac{5i + 6}{3i - 4}$?

- A) $\frac{38i + 9}{-25}$
- B) $\frac{38i - 9}{-25}$
- C) $\frac{38i - 9}{16}$
- D) $\frac{38i + 9}{16}$

6

$$\frac{2i + 4}{i - 5}$$

If the expression above is written in $a + bi$ form, where a and b are real numbers, what is the value of

$\frac{a}{b}$? (Note: $i = \sqrt{-1}$)

- A) $-\frac{9}{13}$
- B) $-\frac{7}{9}$
- C) $\frac{9}{7}$
- D) $\frac{13}{7}$

4e

**GEOMETRY &
TRIGONOMETRY:**

**LINES & ANGLES, TRIANGLES,
CIRCLES, POLYGONS,
COORDINATE GEOMETRY,
3D GEOMETRY, TRIGONOMETRY**

Geometry | Overview

Geometry questions often rely on your knowledge of formulas and rules dealing with a limited number of shapes. The majority of the formulas you need are provided at the beginning of each math section. The reference information you are given looks like this:

$A = \pi r^2$
 $C = 2\pi r$

$A = lw$

$A = \frac{1}{2}bh$

$c^2 = a^2 + b^2$

Special Right Triangles

$V = lwh$

$V = \pi r^2 h$

$V = \frac{4}{3}\pi r^3$

$V = \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}lwh$

The number of degrees of arc in a circle is 360.
 The number of radians of arc in a circle is 2π .
 The sum of the measures in degrees of the angles of a triangle is 180° .

Geometry | Overview

Use the following approach to attack geometry questions:

- 1. Draw the figure and label any necessary information.**

Not all geometry problems give you a figure. When they don't, draw your own so you can visualize the problem. The figure is a great place to begin solving by writing in all the given information as well as any information you can deduce.

- 2. Write down all the formulas you may need.**

Many geometry problems require the use of one formula or another. Write down any you may need for a given problem.

- 3. Plug numbers into the appropriate formula.**

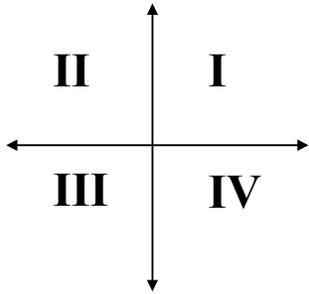
Plug the information from your figure and from the problem into the formulas you have written down.

- 4. Solve for the values that you can solve for.**

While you may not get the answer from one formula, the value you solve for may be pivotal in leading you to the final answer.

The most commonly tested type of geometry is coordinate geometry, a topic that is not covered in the given reference information.

Coordinate Geometry | Overview

Term	Definition
Equation of a Line	_____, where m is the _____ and b is the _____ This is also known as slope-intercept form.
y-intercept	The y -intercept of a line is point _____ where the line crosses the y -axis
x-intercept	The x -intercept of a line is point _____ where the line crosses the x -axis.
Slope	_____ or _____ Vertical lines have a(n) _____ slope. Horizontal lines have a slope equal to _____. Perpendicular lines have slopes that are _____. Parallel lines have slopes that are _____.
Midpoint Formula	The midpoint of a line segment in the coordinate plane can be found by taking the averages of the x coordinates and y coordinates of the two endpoints: $x_{av} = \frac{x_1 + x_2}{2} \quad y_{av} = \frac{y_1 + y_2}{2}$
Distance Formula	_____ where (x, y) is one endpoint and (x_1, y_1) is the other.
Equation of a Circle	_____ where h and k represent _____ respectively and r represents the _____
Quadrants	The quadrants in a coordinate plane are numbered as shown in the diagram to the right. 

Coordinate Geometry | Overview

Equation of a Circle

The equation of a circle on a coordinate plane is as follows:

$$(x - h)^2 + (y - k)^2 = r^2$$

Sometimes a question may ask you to determine information about the center of a circle or the length of the radius but will give you an equation that looks very different from the standard form. Look at the example below:

$$x^2 + y^2 - 4x + 6y = 4$$

The equation of a circle in the xy -coordinate plane is shown above. What is the radius of the circle?

On first glance it may seem like the radius is equal to 2 since the number to the right of the equal sign is the radius squared in the equation of a circle. However, that is only true when the equation is in the standard form. Therefore, to solve this equation, we must manipulate it to put it in standard form.

To handle questions like these, we can use a technique called **Completing the Square**.

$$x^2 + y^2 - 4x + 6y = 4$$

Step 1: Move the constant to the side of the equal sign opposite the rest of the terms if it is not there already. In this case, the constant is already there so we do not need to worry about that.

Step 2: Rearrange the terms so that all of the terms with x 's are next to one another and all of the terms with y 's are next to one another.

Step 3: Find half of the coefficient of the x term and square it. Then add that term to both sides. Repeat this process for the y terms.

Step 4: Factor the x and y polynomials individually to get each in “binomial squared form.”

Step 5: Now that the equation is in standard form, we can identify the center or the radius, depending on what the question is asking for.

The center of the equation above is _____

The radius of the equation above is _____

Coordinate Geometry | Rules Review

1. What is the slope of a line that passes through points (4, 6) and (9, 7)?
2. What is the length of a line segment with endpoints at the origin and (5, 12)?
3. What is the y -intercept of the line with the equation $10y = 5x - 12$?
4. What is the equation of a circle with a center at (8, 5) and a radius of 4?
5. If a line with slope $\frac{4}{3}$ also passes through point (15, 4), what is the equation of that line?
6. What is the slope of a line with a y -intercept of 5 and an x -intercept of -4?
7. Line r is perpendicular to the x -axis and passes through point (-6, 12). What must be the equation of line r ?

COORDINATE GEOMETRY



SKILL SET

1

If line p contains points in Quadrants III and IV, but no points from Quadrants I or II, which of the following must be true?

- A) The slope of line p is positive.
- B) The slope of line p is negative.
- C) The slope of line p is zero.
- D) The slope of line p is undefined.

2

A line in the xy -coordinate plane passes through the point $(1,5)$ and has a slope of -4 . Which of the following points lies on the line?

- A) $(5, -9)$
- B) $(7, -19)$
- C) $(9, -22)$
- D) $(11, -32)$

3

$$x^2 + y^2 = 100$$

The equation above represents a circle in the xy -plane that has center $(0,0)$. What is the radius of the circle?

- A) 5
- B) 10
- C) 25
- D) 50

4

Chef Liam is catering a dinner party. In order to decide where to purchase the food and rent waiters and silverware from, he created the table below.

Company Name	Cost of Food, F (dollars)	Rental Cost of Waiters, W (dollars per hour)	Rental Cost of Silverware, S (dollars per hour)
X	1,250	22	19
Y	1,625	14	16
Z	1,420	31	15

The total cost, y , for buying the food and renting the waiters and silverware in terms of the number of hours, x , is modeled by the equation $y = (W + S)x + F$.

If the relationship between the total cost, y , of buying the food and renting the waiters and silverware for x hours is graphed on the xy -plane, what does the slope of the line represent?

- A) The cost of buying food
- B) The total cost of catering the dinner party
- C) Chef Liam's profit from catering the dinner party
- D) The cost of renting the waiters and silverware

5

The graph of line g on an xy -plane has an x -intercept at a and a y -intercept at b . If $b - a$ is equal to 0, which of the following is true about the slope of line g ?

- A) It is positive.
- B) It is negative.
- C) It is undefined.
- D) It equals zero.

COORDINATE GEOMETRY



SKILL SET

6

In the xy -plane, square $DEFG$ has a center at point H . The coordinates of points D and H respectively, are $(5, 9)$ and $(2, 5.5)$. What is the slope of the diagonal connecting points E and G ?

- A) $-\frac{6}{7}$
 B) $-\frac{9}{5.5}$
 C) $\frac{7}{6}$
 D) It cannot be determined from the given information.

7

In the xy -plane, the line determined by the points $(3, b)$ and $(b, -14.5)$ passes through the point $(5, 3)$. Which of the following could be the value of b ?

- A) -2
 B) 4
 C) 7
 D) 10

8

Which of the following represents a circle in the xy -coordinate plane with a center at $(-2, 5)$ and a diameter with endpoint $(-6, 14)$?

- A) $(x + 2)^2 + (y + 5)^2 = \sqrt{97}$
 B) $(x - 2)^2 + (y + 5)^2 = 97$
 C) $(x + 2)^2 + (y - 5)^2 = \sqrt{97}$
 D) $(x + 2)^2 + (y - 5)^2 = 97$

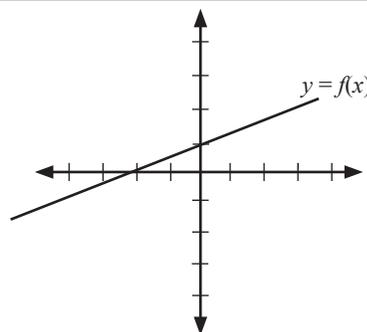
9

$$x^2 + y^2 + 8x - 12y = 11$$

The equation of a circle in the xy -coordinate plane is shown above. What are the coordinates of the center of the circle?

- A) $(6, 4)$
 B) $(-4, -6)$
 C) $(-4, 6)$
 D) $(6, -4)$

10



The graph of the linear function f is shown in the xy -plane above. The graph of the linear function h is perpendicular to the graph of f and passes through the point $(12, -2)$. What is the value of $h(3)$?

- A) 2
 B) 5
 C) 9
 D) 16

COORDINATE GEOMETRY



SKILL SET

1

In the standard xy -plane, the line $2y - 14x = -24$ is perpendicular to a line with the equation

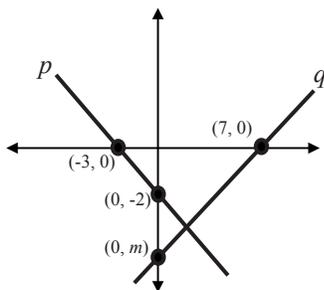
- A) $y = 7x + \frac{1}{12}$
- B) $y = \frac{1}{7}x + 15$
- C) $y = -\frac{1}{7}x - 21$
- D) $y = -7x + 16$

2

The graph of a line in the xy -plane has a slope of -5 and contains the point $(2, 7)$. The graph of a second line passes through the points $(2, 10)$ and $(9, -11)$. If the two lines intersect at the point (m, n) , what is the value of $n - m$?

- A) -16
- B) -5.5
- C) 5
- D) 14

3



In the xy -plane shown above, line p is perpendicular to line q . What is the value of m ?

- A) -7.75
- B) -9
- C) -10.5
- D) -12

4

The line $y = kx - 3$, where k is a constant, is graphed in the xy -plane. If the line contains the point (a, b) , what is the slope of a line perpendicular to the given one in terms of a and b ?

- A) $\frac{a}{3 + b}$
- B) $\frac{3 + b}{a}$
- C) $\frac{a}{-3 - b}$
- D) $\frac{-a}{-3 - b}$

5

Which of the following equations has a graph in the xy -plane for which y is always less than or equal to 4 ?

- A) $y = |2x| + 4$
- B) $y = (-x)^2 + 4$
- C) $y = |x| + 4$
- D) $y = -|2x| + 4$

6

A line with a slope of 0 in the xy -plane passes through the y -axis at point $(0, -13)$. Which of the following points lies on the line?

- A) $(-13, 2)$
- B) $(2, -13)$
- C) $(-13, 0)$
- D) $(-13, 13)$

Lines And Angles | Overview

Below is a chart with the important terms and concepts you will need to know about lines and angles.

Term/Concept	Definition
Parallel	
Perpendicular	
Bisect	
Midpoint	
Vertical Angles	
Supplementary Angles	
Complementary Angles	

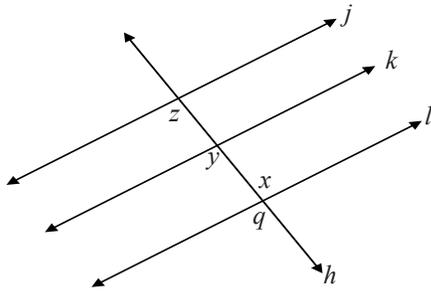
LINES AND ANGLES



SKILL SET

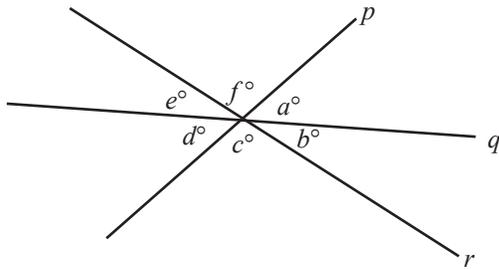
1

In the figure below, parallel lines j , k and l are cut by transversal, h . What is the value of $(x + y) - (z + q)$?



- A) 0°
- B) 90°
- C) 180°
- D) 360°

2



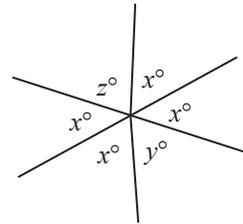
Note: Figure not drawn to scale.

In the figure above, lines p , q , and r intersect at a point. Which of the following must be true?

- A) $a + b + c = a + b + d$
- B) $f - e = c - b$
- C) $f + c = a + d$
- D) $a + c = b + d$

3

If $y = 2x = 3z$, what is the value of z in the six segments that intersect as shown below?

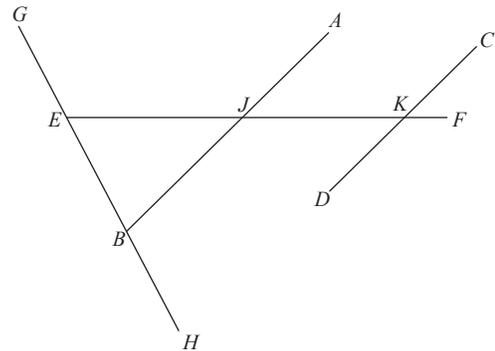


Note: Figure not drawn to scale.

- A) 27°
- B) 36°
- C) 54°
- D) 60°

4

In the figure below, E and B are on line GH and AB and CD are parallel to one another. Points J and K lie on line EF . The measure of angle CKF is 27° and the measure of angle HBJ is 120° . What is the measure of angle GEJ ?



- A) 70°
- B) 83°
- C) 87°
- D) 93°

Triangles | Overview

What is a Triangle?

A triangle is defined as a plane figure with three straight sides and three angles.

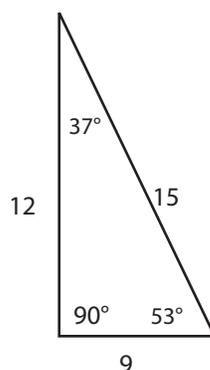
Important Triangle Definitions and Formulas

Term	Definition and Formula
Congruent (\cong)	Equal
Similar Triangles (\sim)	Triangles are similar if they have the same shape, but are of different sizes. The sides of similar triangles are in proportion to one another. Two triangles can be proven similar by proving that _____.
Degrees	There are _____ in any triangle.
Right Triangle	A right triangle has one right (90°) angle.
Isosceles Triangle	An isosceles triangle has two congruent sides and two congruent angles. The congruent angles are opposite (directly across from) the congruent sides.
Equilateral Triangle	An equilateral triangle has three congruent sides and three congruent angles. Each angle in an equilateral triangle measures _____.
Scalene Triangle	A scalene triangle has no congruent sides.
Obtuse Triangle	An obtuse triangle is one in which one angle measures greater than 90° .
Acute Triangle	An acute triangle is one in which all three angles measure less than 90° .
Third Side Rule	The Third Side Rule states that the third side of any triangle will always be greater than the difference of the other two sides, but less than the sum of the other two sides.
Pythagorean Theorem	_____, where c is the hypotenuse of the right triangle.

Side - Angle Relationships

In any triangle, the largest angle is always directly opposite the largest side, and the smallest angle is always directly opposite the smallest side. Any angles across from equal sides are also equal to one another.

Take a look at the triangle below:



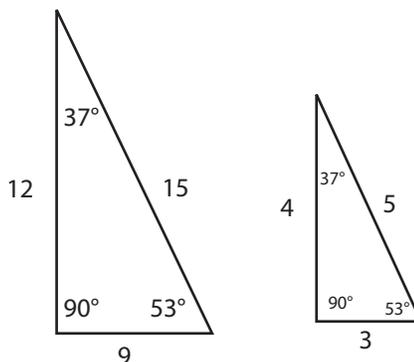
The largest side (15) is directly opposite the largest angle, 90° . The smallest side (9) is directly opposite the smallest angle, 37° .

Triangles | Overview

Similar Triangles

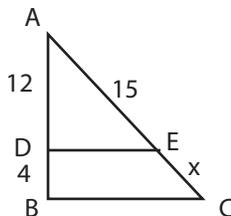
Triangles are *similar* if they have equal angle measures as well as sides that are in proportion to one another. Similar triangles differ from *congruent* triangles in that congruent triangles must have equal angle measures AND equal side measures.

The two triangles in this picture are similar:



When working with similar triangles, you must know which side or angle from Triangle *A* corresponds directly with each side or angle from Triangle *B*. The best way to find this, is to redraw the triangles as two separate figures that have the same orientation.

Whenever one triangle is inscribed, via a parallel line, inside another triangle (as in the example below), the two resulting triangles are similar.



You are able to prove two triangles congruent using the Angle-Angle Theorem. This theorem states that as long as two triangles have two angle measures in common, they are similar.

Which angles in the triangles *ADE* and *ABC* are congruent to one another? _____

Knowing that they are similar, we are able to solve for the missing piece, *EC*. Since we know that the sides of similar triangles are in proportion with one another, we can set up a ratio that follows the pattern:

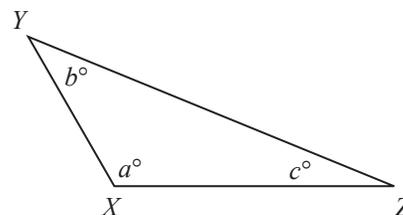
$$\frac{\text{side of } \triangle ADE}{\text{side of } \triangle ABC} = \frac{\text{side of } \triangle ADE}{\text{side of } \triangle ABC}$$

When we solve for *x*, we find that it is equal to: _____

Triangles | Rules Review

1. What is the area of a triangle with a height of 5 and a base of 8?
6. If in triangle ABC , $AB = 9$ and $BC = 7$, what is the range of possible values for AC ?

2. What is the height of a triangle with base 6 and area 30?



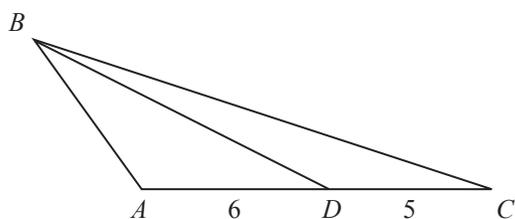
Note: Figure not drawn to scale.

3. If the area of a right triangle with integer sides is 30, what could be the lengths of its legs?

7. If $XY < XZ < YZ$, then what is the proper angle ordering, from least to greatest, in triangle XYZ ?

4. An isosceles triangle has sides of lengths of x , y , and z . If the length of x is 6 and the perimeter of the triangle is 20, what are the possible lengths of each of the sides of the triangle?

8. Triangle A has a height of 10 and a base of 4. If triangle B and A have equal areas and the height of triangle B is half that of triangle A , what is the length of the base of triangle B ?



5. What is the area of triangle ABC in the figure above if the area of triangle ABD is 12?

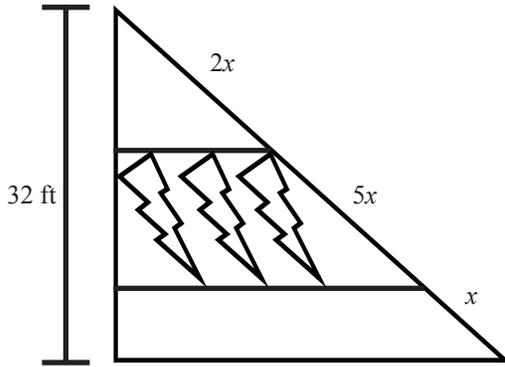
9. In triangle PQR , angles Q and P are equivalent and angle R measures 120° . Point T is the midpoint between Q and P . If line segment TR measures 7, what is the length of line segment QP ?

TRIANGLES



SKILL SET

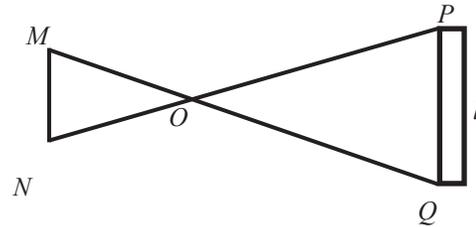
1



For their upcoming homecoming game, the Rockford Bolts are creating a right-triangular flag measuring 32 feet in height. The flag is cut into three sections by two parallel lines. What is the maximum vertical height, in feet, of the lightning bolts they can paint in the middle section?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

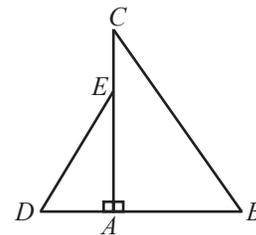
2



An architect wants to find the length l , in feet, of the front desk in a hotel lobby, as represented in the blueprint above. The lengths represented by PO , NO , QO and MN are 48 feet, 12 feet, 52 feet, and 17 feet, respectively. Segments MQ and PN intersect at point O , and angles OQP and OMN are congruent. What is the length of the front desk?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

3



In the figure above, angle ABC and angle ADE are congruent. If $BC = 6$, and the length of line segment AE is two thirds the length of line segment AC , what is the length of line segment DE ?

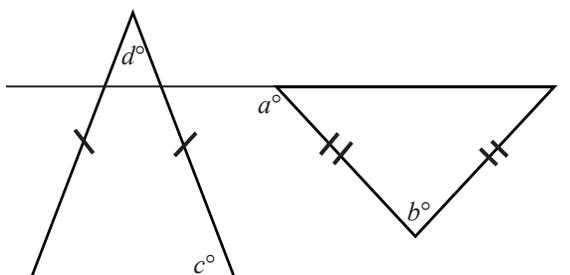
- A) 2
- B) 4
- C) 9
- D) 12

TRIANGLES



SKILL SET

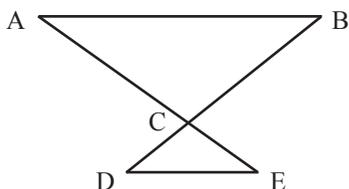
4



Two isosceles triangles are shown above. If $2c + b = 180$ and $d = 40$, what is the value of a ?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

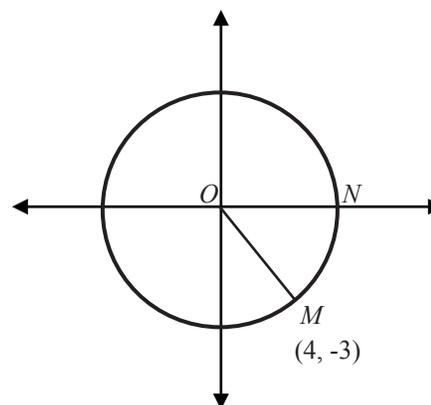
5



In the figure above, line segments AB and DE are parallel to one another and segments BD and AE intersect one another at point C . If CE , AC and CD measure 7, 28, and 5 respectively, what is the difference in the length of AE and the length of BD ?

- A) 10
- B) 12
- C) 15
- D) 35

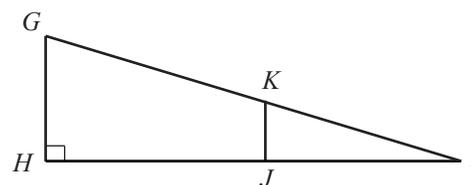
6



A perpendicular line (not drawn) from point M to the x -axis is called point P . What would be the perimeter of triangle OPM ?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

7



In the figure above, line segment KJ is parallel to GH , and the length of JI is one-fourth the length of HJ . If $GH = 25$ and $KI = 13$, what is the measure of HI ?

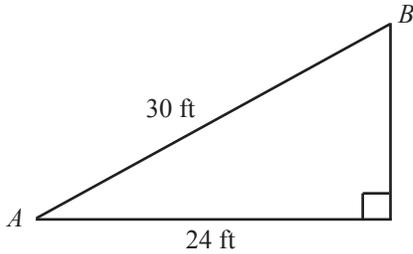
- A) 12
- B) 15
- C) 60
- D) 72

TRIANGLES

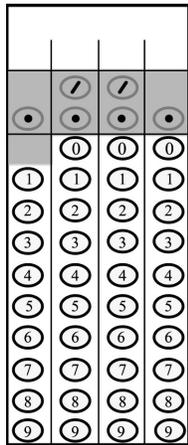


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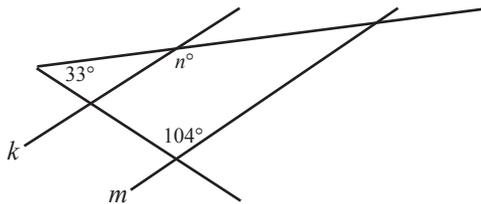
1



The path of a hot air balloon is mapped above. The balloon traveled a distance of 30 feet along a diagonal line from point A on the ground to point B in the sky. This flight path has been mapped with vertical and horizontal vectors above, measuring 24 feet and y feet, respectively. What is the value of y ?



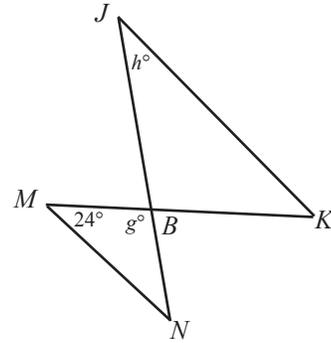
2



In the figure above, lines k and m never cross. What is the value of n ?

- A) 43°
- B) 95°
- C) 118°
- D) 137°

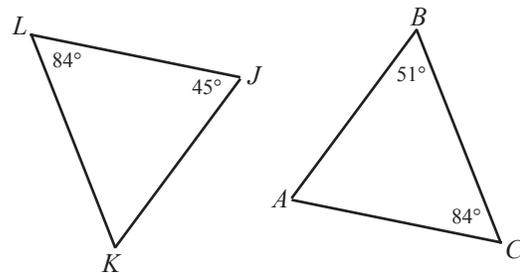
3



In the figure above, line segment MK intersects line segment JN at point B , and line segments JK and MN are parallel. If $g = 93^\circ$, what is the value of h ?

- A) 24°
- B) 48°
- C) 63°
- D) 77°

4

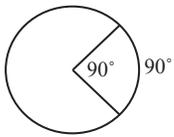
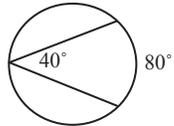
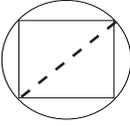
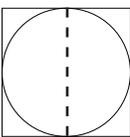


Triangles JKL and ABC are shown above. Which of the following has a ratio equivalent to $AB:CA$?

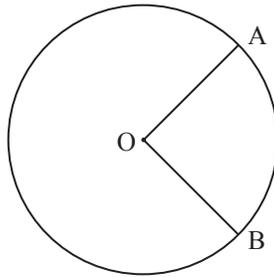
- A) $KL:LJ$
- B) $LJ:KJ$
- C) $KL:KJ$
- D) $JK:LJ$

Circles | Overview

Memorize the following terms, rules, definitions, and formulas, and familiarize yourself with how they are applied to circles.

Term/Rule	Definition/Formula
Diameter	A line from one point on the circle through the center to another point on the circle Twice the radius
Radius	A line drawn from the center to any point on the circle; half the diameter
Area	_____, where r is the radius
Circumference	The distance around the perimeter of the circle _____, where r is the radius and d is the diameter
Degrees in a Circle	There are _____° in a full circle and _____° in a semi-circle.
Arc	A portion of the circumference
Sector	A portion of the area that extends from the center of a circle to the edge, bound by 2 radii.
Chord	A line from one point on the circle to another. The diameter is the longest chord.
Central Angle	 <p>An angle formed by two radii, with the center of the circle as a vertex. The measure, in degrees, of the central angle is equal to the measure, in degrees, of the arc it intercepts. Sometimes the measure of the central angle is given in radians instead of degrees. To convert radians to degrees, replace π with 180.</p>
Inscribed Angles	 <p>Inscribed angles measure half the number of degrees as the degrees in the arcs they intercept.</p>
Arc, Sector and Central Angle Proportions	Arcs, Sectors, and Central Angles have proportionality with the circle as a whole: $\frac{\text{arc length}}{360^\circ} = \frac{\text{circumference of circle}}{\text{circumference of circle}} = \frac{\text{sector area}}{\text{total area}}$
Tangent Line	A line tangent to a circle touches a circle at just one point. When a tangent line meets a radius, the two lines form a _____.
Triangle Inscribed in Semi-Circle	A triangle inscribed in a semi circle is always a _____.
Square Inscribed in a Circle	 <p>When a square is inscribed in a circle, the diagonal of the square is equal to the diameter of the circle. The diagonal of a square cuts it into two 45-45-90 triangles.</p>
Circle Inscribed in a Square	 <p>When a circle is inscribed in a square, the diameter of the circle is equal to the side length of the square.</p>

Circles | Overview



If in the circle shown above with center O the area of the sector AOB is 36π and the radius is 12, what is the measure of the angle AOB ?

- A) 24°
- B) 30°
- C) 45°
- D) 90°

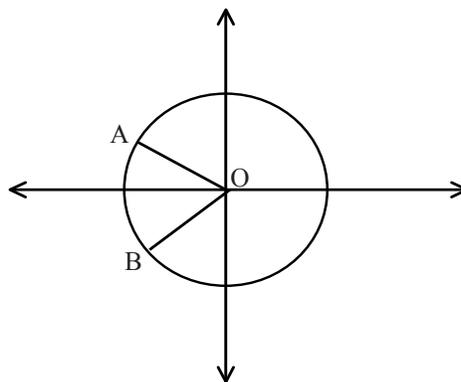
Which two parts of the circle proportions given on the chart on the previous page can we use here?

Plug the given information into the proportion:

356

Therefore, angle AOB is equal to _____.

Now work through another of these proportion questions on your own. Remember to start by identifying what pieces of the proportion you will need to use.



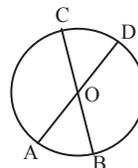
In Circle O shown above, points A and B are points on the perimeter of the circle. If the length of minor arc AB measures 1.5π and the area of the circle is 81π , what is the measure of angle AOB ?

- A) 15°
- B) 30°
- C) 45°
- D) 60°

Circles | Rules Review

- The area of a circle with a diameter of 10 is
- The circumference of a circle with a radius of 12 is
- What is the radius of a circle with an area of 169π ?
- What is the circumference of a circle with an area of 625π ?
- Two segments are drawn from the center of the circle to two distinct points on the edge of the circle. If the sum of the two segments is 26, what is the area of the circle?
- What is the radius of circle A , if a 60° sector in circle A has an area of 7π ?
- A circle has center O and a radius of 5. Angle AOC has a measure of 40° , and arc ABC is a minor arc. What is the perimeter of sector $ABCO$?

8.



In the circle above, O is the center and minor arc CD measures 40° . How many degrees are in angle COD ?

CIRCLES



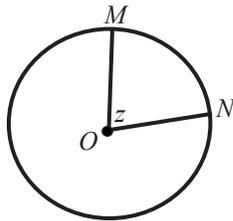
SKILL SET

1

In a circle with center O , central angle AOB has a measure of $\frac{6\pi}{5}$ radians. The length of minor arc AB is what percent of the circle's circumference?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

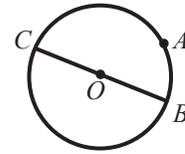
2



In the figure above, the circle has a center at O ; the length of radius NO is between 3 and 4, and the length of minor arc MN is 2π . If the measure of angle z is an integer value, what is one possible value for z ?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

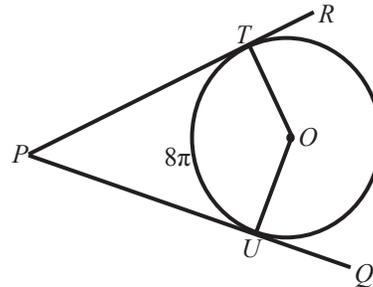
3



In the circle above, segment BOC is the diameter. If the length of arc CAB is equal to 20π , what is the length of the diameter of the circle?

- A) 10
- B) 15
- C) 20
- D) 40

4



In the figure above, point O is the center of the circle; line segments PQ and PR are tangent to the circle at points U and T respectively, and the segments intersect at point P as shown. If the measure of minor arc TU is equal to 8π and the measure of the radius is 10, what is the measure, in degrees, of angle UPT ?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

CIRCLES



SKILL SET

Questions 5 and 6 refer to the following information.

An instrument shows the number of revolutions per minute made by each tire of a car. In each revolution, the car travels a distance equal to the circumference of one of its tires. The radius of the tires on Priya's car measures 0.25 meters.

5

What is the approximate number of revolutions per minute, when she is driving at a speed of 50 kilometers per hour? (1 kilometer = 1000 meters)

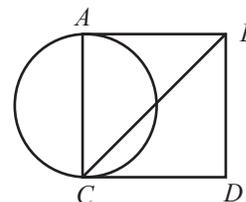
- A) 338
- B) 530
- C) 940
- D) 1,040

6

Priya gets new tires for her car. If the circumference of each new tire is 1.9 meters, what is the approximate percent increase of the radius of one of her old tires to the radius of one of her new tires?

- A) 14%
- B) 21%
- C) 47%
- D) 56%

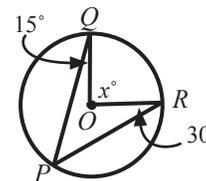
7



In the figure above, line segment AC passes through the center of the circle and line segments AB and CD are tangent to the circle at points A and C respectively. If $AC = AB$, what is the length of the radius of the circle, when $CB = \sqrt{2}$?

- A) $\frac{1}{2}$
- B) $\frac{1}{\sqrt{2}}$
- C) 1
- D) $\frac{2}{\sqrt{2}}$

8



Point O is the center of the circle in the figure above. If the measure of radius OQ is 8 cm, what is the measure, to the nearest whole number, of minor arc QR , in cm?

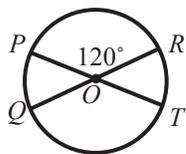
	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

CIRCLES



SKILL SET

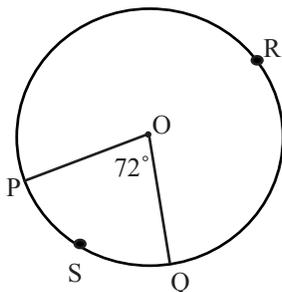
1



The circle above with center O has a circumference of 36π . What is the length of minor arc PQ ?

- A) 3π
- B) 6π
- C) 9π
- D) 12π

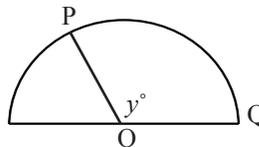
2



In the circle above with center O , major arc PRQ measures 8π . What is the length of minor arc PSQ ?

- A) π
- B) 2π
- C) 4π
- D) 10π

3



In the semicircle shown above, segments QO and PO are radii. The area of section POQ is 14π and the measure of PO is 6. What is the measure of angle y ?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

4

Points C and D lie on the perimeter of a circle with a radius of 10. Minor arc CD has a measure of $\frac{2\pi}{5}$. What fraction of the circumference of the circle is the length of arc CD ?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Other Polygons | Overview

Below is a chart with information about common quadrilaterals (shapes with four sides).

Figure	Sides	Angles	Perimeter	Area
Quadrilateral	4 sides	Total 360°	Sum of exterior sides	bh
Parallelogram	4 sides Opposite sides are parallel and equal.	Total 360° Adjacent angles = 180° Opposite angles are equal.	Sum of exterior sides	bh <i>*where h is the vertical height, NOT the slant height</i>
Rectangle	4 sides Opposite sides are parallel and equal.	Total 360° All angles are 90°	$2l + 2w$ Sum of exterior sides	bh or lw
Square	4 sides All sides are equal. Opposite sides are parallel.	Total 360° All angles are 90°	$4s$ Sum of exterior sides	bh or lw or s^2
Rhombus	4 sides All sides are equal. Opposite sides are parallel.	Total 360° Adjacent angles = 180° Opposite angles are equal.	$4s$ Sum of exterior sides	$\frac{d_1 d_2}{2}$ <i>*where d_1 and d_2 are the diagonals</i>
Trapezoid	4 sides 2 parallel bases	Total 360° Adjacent angles = 180°	Sum of exterior sides	$\frac{b_1 + b_2}{2} h$
Additional Polygon Information				
The measure of the interior angles in any polygon can be found using the formula: $180^\circ(n - 2)$, where n represents the number of sides of the polygon.				
To find the measure of one interior angle in a polygon, divide the result from the equation above by the number of sides in the polygon.				
The sum of the measure of the exterior angles of any polygon = 360°				

Other Polygons | Rules Review

1. A square with a side of 5 will have a perimeter of
2. What is the distance around a square path that encloses an area of 121 square feet?
3. What is the perimeter of a rectangle with area 10 and length 4?
4. A rectangle with an area of 60 and a diagonal of 13 has a perimeter of
5. If a square cloth of area 625 square inches has a square of area 144 square inches cut from its edge, what is the largest perimeter of the larger cloth that can be created?

OTHER POLYGONS



SKILL SET

1

Which of the following variable expressions represents twice the area of a rectangle with a length of $y + 3$ and a width of $y - 6$?

- A) $2y^2 - 6y - 18$
- B) $2y^2 - 3y - 18$
- C) $y^2 - 6y - 36$
- D) $2y^2 - 6y - 36$

2

A square has the same perimeter as a regular octagon. If the area of the square is 289 square inches, how long, in inches, is each side of the octagon?

- A) 7.5
- B) 8
- C) 8.5
- D) 9

3

Cheryl built a rectangular soccer field with a width of 11 feet and a length of 24 feet. She wants to increase the area of the field to 150% of its current size, without changing the length. What will be the new width, in feet, of the field?

- A) 5.5
- B) 16.5
- C) 24
- D) 396

4

$$A = \frac{180^\circ(n - 2)}{n}$$

The measure of an interior angle, A , in any polygon is related to the number of sides, n , of the polygon by the formula shown above. If the measure of an interior angle of a polygon is greater than 140° , what is the smallest number of sides the polygon can have?

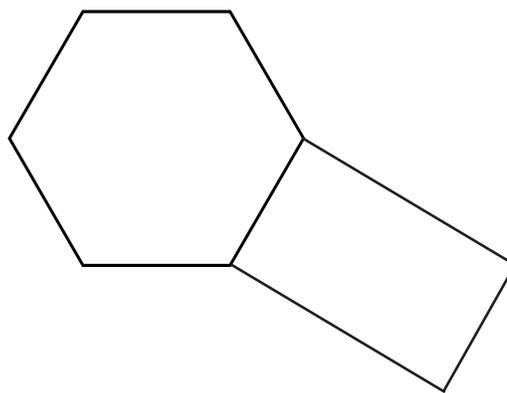
- A) 9
- B) 10
- C) 11
- D) 12

5

A rectangle was altered by decreasing its length by 15 percent and increasing its width by 25 percent. The area of the new rectangle is what percent of the area of the original rectangle?

- A) 10
- B) 36.25
- C) 63.75
- D) 106.25

6



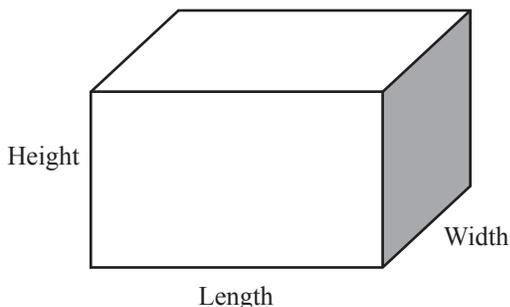
The figure above shows a regular hexagon with sides measuring s and a rectangle with a width of s and a length of 33.6. If the area of the hexagon is $294\sqrt{3}$ square inches, what is the measure of the diagonal of the rectangle?

- A) $18\sqrt{2}$
- B) 36.4
- C) $52\sqrt{3}$
- D) 58

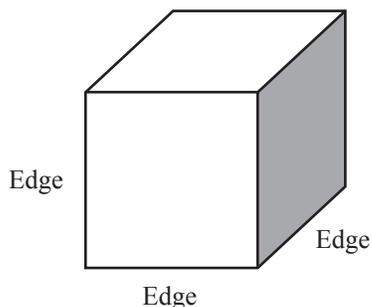
3D Geometry | Overview

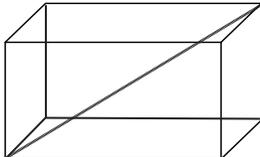
The SAT tests knowledge of volume and surface area, otherwise known as 3D or solid geometry. Relevant information for both volume and surface area can be found in the charts below. Familiarize yourself with this information prior to test day.

Rectangular Prisms

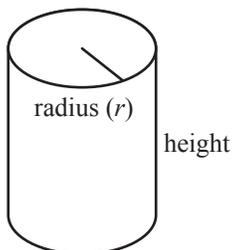


Cubes



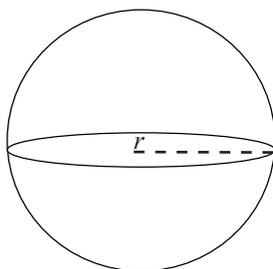
Term	Definition and Formula
Edge	Refers to the length along any “side” of a cube. All edges of a cube are equal.
Volume	(length)(width)(height)
Surface Area	Sum of the areas of the individual faces. All rectangular solids consist of 3 pairs of faces, each pair with equal areas. A cube has 6 faces, all equal in area. Surface Area of a Rectangular Box = $2lw + 2lh + 2hw$ Surface Area of a Cube = $6s^2$
Longest Distance in a Rectangular Solid	$\sqrt{\text{height}^2 + \text{length}^2 + \text{width}^2}$ 

Cylinders



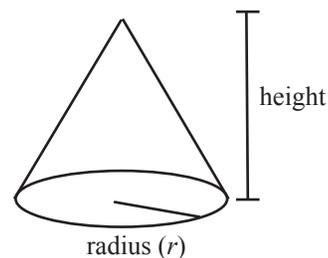
Term	Formula
Volume	$\pi r^2 h$
Surface Area	$2(\pi r^2) + 2\pi r h$ (2 circle areas + area of the “wrapper”)

Spheres



Term	Formula
Volume	$\frac{4}{3} \pi r^3$

Cones



Term	Formula
Volume	$\frac{1}{3} h \pi r^2$

3D Geometry | Rules Review

1. What is the volume of a cube with an edge of 6?
2. What is the length of the edge of a cube with a volume of 1,331?
3. What is the volume of a 10 inch high cylinder with a circular top that has a circumference of 12π ?
4. What is the volume of a box with length 5, width 2, and height 6?
5. What is the surface area of a cube with a volume of 64?
6. What is the difference in the surface area of two cubes, one with edge 15 and one with an edge of 12?

3D GEOMETRY



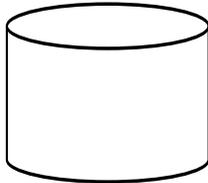
SKILL SET

1

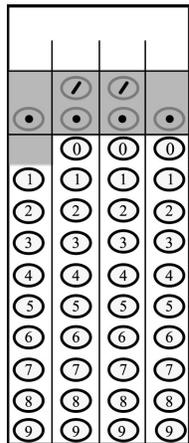
The mass of an object is equal to the product of the object's density and its volume. What is the density, in grams per liter, of an object with a mass of 16 grams and a volume of 64 liters?

- A) 0.25
- B) 6
- C) 256
- D) 1,024

2



The jar of peanut butter above is in the shape of a right circular cylinder. The volume of the peanut butter in the jar is 108π cubic inches. If the area of the bottom of the jar is equal to 16π inches, what is the measure of the height of the jar, in inches?

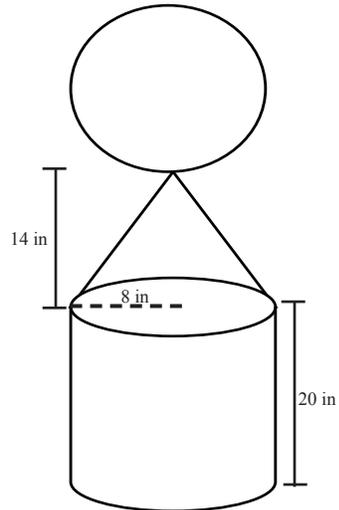


3

Cindy uses a garden hose to fill a one-quart jug of water. She plans to use that water to fill identical spherical water balloons to half of their total capacities. Each balloon has a diameter of 2.5 inches. How many balloons will Cindy be able to fill entirely using just the water in the jug? (Note: There are 231 cubic inches in 1 gallon.)

- A) 7
- B) 13
- C) 14
- D) 15

4



A basketball trophy is constructed with a right circular cylinder topped with a right circular cone. The cone is then topped with a sphere that has the same diameter as the cylinder. The internal measurements are shown in the figure above. Of the following, which is closest to the volume of the trophy, in cubic inches?

- A) 5,560
- B) 6,000
- C) 6,516
- D) 7,100

Trigonometry | Overview

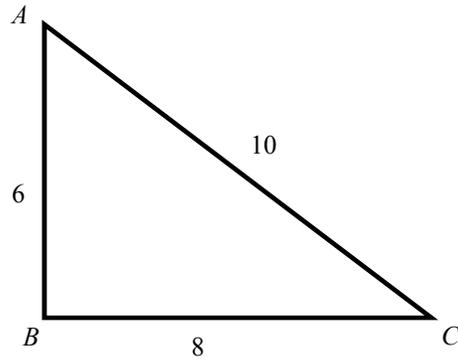
Trigonometry is the branch of math dealing with the relations of the sides and angles of triangles and with the relevant functions of any angles.

Term	Definition
Sine	A trigonometric function equal to the ratio of the side _____ to a specified angle (in a right triangle) to the _____ $\text{Sine} = \frac{\text{opposite}}{\text{hypotenuse}}$ <p>Sine is an <i>odd function</i>, since $\sin(x) \neq \sin(-x)$</p>
Cosine	A trigonometric function equal to the ratio of the side _____ to a specified angle (in a right triangle) to the _____ $\text{Cosine} = \frac{\text{adjacent}}{\text{hypotenuse}}$ <p>Cosine is an <i>even function</i>, since $\cos(x) = \cos(-x)$</p>
Tangent	A trigonometric function equal to the ratio of the side _____ to a specified angle (in a right triangle) to the side _____ to the specified angle $\text{Tangent} = \frac{\text{opposite}}{\text{adjacent}}$ <p>Tangent can also be expressed in terms of sine and cosine using the following ratio: $\text{Tangent} = \frac{\text{Sine}}{\text{Cosine}}$</p>
Cosecant	Cosecant is the reciprocal of <i>sine</i> and can therefore be thought of as $\frac{1}{\text{Sine}} \quad \text{or} \quad \frac{\text{hypotenuse}}{\text{opposite}}$
Secant	Secant is the reciprocal of <i>cosine</i> and can therefore be thought of as $\frac{1}{\text{Cosine}} \quad \text{or} \quad \frac{\text{hypotenuse}}{\text{adjacent}}$
Cotangent	Cotangent is the reciprocal of <i>tangent</i> and can therefore be thought of as $\frac{1}{\text{Tangent}} \quad \text{or} \quad \frac{\text{adjacent}}{\text{opposite}}$
Trigonometric Identity	$\sin^2 x + \cos^2 x = 1$
Inverse Sine, Cosine, and Tangent	Inverse sine, cosine, and tangent are used when we know the measures of the sides, but not of the angles. These operations are denoted by \cos^{-1} , \sin^{-1} and \tan^{-1} . You can use your calculator to find these inverses by hitting the 2nd button, and then either sin, cos or tan, depending on what you are looking to find.
Radians	Radians are another way (in addition to degrees) to measure an angle. π radians = _____ $^\circ$

SOHCAHTOA is the commonly used acronym to help you remember the sine, cosine, and tangent ratios.

Trigonometry | Overview

We can use our knowledge of what sine and cosine mean in a triangle to help us derive an important rule. To do so, let's take a look at the sample triangle below:



What is the sine of Angle A ? _____

What is the cosine of Angle C ? _____

What is the relationship between sine A and cosine C ? _____

This information can be used to help us understand a basic trigonometric rule:

$$\mathbf{\text{sine}(\text{Angle } A) = \text{cosine}(90^\circ - \text{Angle } A)}$$

Since Angle B is equal to 90° , Angle $A + \text{Angle } C$ must add up to _____ $^\circ$ because a triangle has a total of _____ $^\circ$.

Therefore, in the equation above, $90^\circ - \text{Angle } A$ is equivalent to _____.

And as we proved above, the sine of Angle A is equal to the _____.

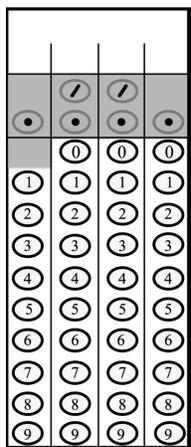
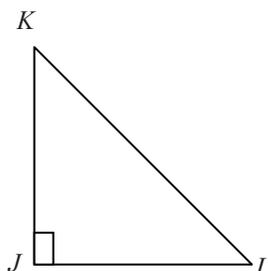
TRIGONOMETRY



SKILL SET

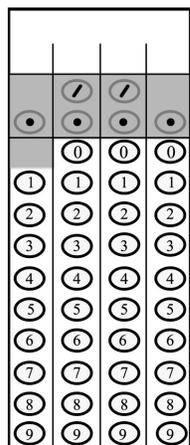
1

In right triangle JKL below, the sine of angle K is equal of 0.2. What is the cosine of angle L ?



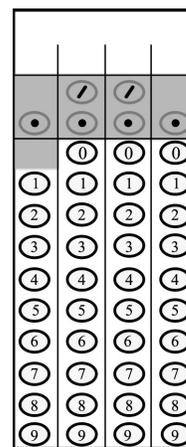
2

The number of radians in a 1080° angle can be written as $x\pi$, where x is a constant. What is the value of x ?



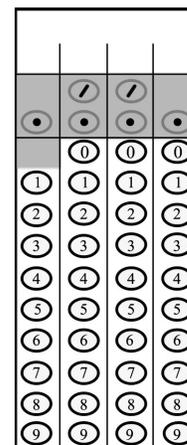
3

In a right triangle, the cosine of angle A measuring x° is equal to $\frac{7}{15}$. What is the measure of $\sin(90^\circ - x^\circ)$?



4

Triangles MNO and PQR are similar, where vertices M, N, O correspond to P, Q, R . The measure of angle N is 90° , the measure of side MN is 10, and the measure of side MO is 26. The measure of each side of triangle PQR is three times the measure of its corresponding side in triangle MNO . What is the value of sine R ?

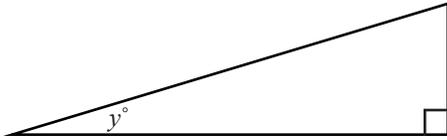


TRIGONOMETRY



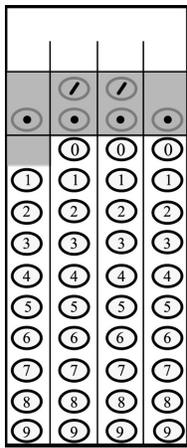
SKILL SET

1

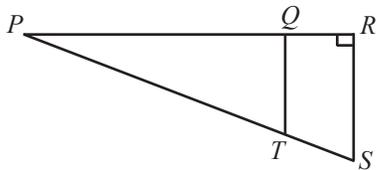


Note: Figure not drawn to scale.

In the figure above, the $\cos(90 - y^\circ) = \frac{20}{25}$. What is the measure of the cosine of angle y ?

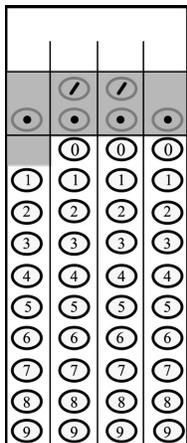


2

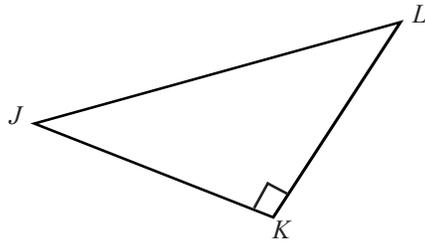


Note: Figure not drawn to scale.

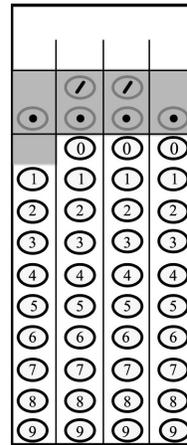
In the figure above, $\cos S = \frac{4}{5}$. If $RS = 6$ and $QR = 3$, what is the length of QT ?



3



In triangle JKL shown above, a point is drawn on JL and is labeled M . What is the value of the cosine $JKM - \cosine MKL$?



4

Angles a and b are acute angles and the cosine of angle a is equal to the sine of angle b . If $a = 3x + 16$ and $b = 2x - 11$, what is the value of x ?

- A) 7
- B) 11
- C) 13
- D) 17

CHAPTER 4

Practice



SUBSTITUTION



PLUGGING IN

1

The monthly fee for docking a boat at Spring Lake is \$50 per boat and \$20 for each tube attached to the boat. Last year, monthly fees were paid for b boats and t tubes. Which of the following expressions gives the total amount, in dollars, collected for monthly fees last year?

- A) $50b + 20t$
- B) $50(b + t) + 20t$
- C) $70(b + t)$
- D) $(50 + 20)(b + t)$

2

Ring-A-Ding Phone Company charges each customer \$160 for telephone installation, plus \$40 per month for service. Dial Tone Phone Company charges \$210 for telephone installation, plus \$30 per month for service. A customer who signs up for Dial Tone will pay the same total amount for his or her telephone as a customer who signs up for Ring-A-Ding if each pays for installation and service for how many months?

- A) 4
- B) 5
- C) 7
- D) 9

3

A toll booth operator collects \$2.25 each time a car passes through the toll. He began the day with d dollars, and did not spend any money. If he ended the day with a total of \$128.25 after allowing 19 cars through the toll, what is the value of d ?

- A) \$0
- B) \$38.00
- C) \$85.50
- D) Cannot be determined from the information given.

4

Maggie has \$9 less than does her brother Ron, who has d dollars on Tuesday. If Ron gives Maggie \$6 on Wednesday, and she does not spend any of her money, which of the following is an expression for the amount of money, in dollars, that Maggie has?

- A) $2d + 6$
- B) $2d - 3$
- C) $d + 15$
- D) $d - 3$

5

Which of the following is equivalent to the expression $3x(x^3 + 2x)$?

- A) $3x^4 + 6x^2$
- B) $3x^3 + 6x$
- C) $3x^4 + 2x$
- D) $3x^3 + 2x^2$

6

A cell phone company charges \$85.00 per month for up to 300 sent text messages. The cost for any additional text message is \$0.08 per message. If t represents the total number of text messages sent and b represents the bill at the end of the month, which linear equation can be used to determine a user's monthly bill?

- A) $b = 85 + 300(.08)t$
- B) $b = 85 + (t - 300)(.08)$
- C) $b = 85 + (300 - t)(.08)$
- D) $b = 85t + (300)(.08)$

SUBSTITUTION



PLUGGING IN

7

Karen is participating in a Math Quiz Challenge Bowl. After the first six rounds, Karen leads all participants with an average of 80.5. After everyone else but Karen competes in the seventh round, Karen is in second place, and the leader has an average of 82. What is the minimum score Karen needs in the seventh round in order to finish alone in first place?

- A) 88
- B) 90
- C) 91
- D) 92

8

If $(x^a)^{30} = (x^3)^5$, and $x > 1$, what is the value of a ?

- A) $\frac{1}{4}$
- B) $\frac{1}{3}$
- C) $\frac{1}{2}$
- D) 2

9

A computer was on sale from 35% off of its original price. If the sale price of the computer was \$403.00, what was the original price? (Assume there is no sales tax.)

- A) \$141.05
- B) \$261.95
- C) \$620.00
- D) \$1,151.43

10

In a basketball game, some shots are worth 2 points each and some are worth 3 points each. J.J. scored a total of 73 points in one game, taking a total of 35 shots, missing only 8. How many 3-point shots did J.J. make during the game?

- A) 11
- B) 13
- C) 16
- D) 19

11

If $4(4x)^2 = b$, what is $4x$ in terms of b ?

- A) $\frac{b}{4}$
- B) $\frac{\sqrt{b}}{2}$
- C) $\frac{\sqrt{b}}{4}$
- D) $2\sqrt{b}$

12

A colony of bacteria known as *Lactobacillus reuteri* grows exponentially when cultivated in laboratory conditions. The number of bacteria, b , rounded to the nearest hundredth, present after w weeks, is shown in the table below.

Number of Weeks, w	Number of Bacteria, b
2	51.34
8	55,585.08
12	5,860,738.77
16	617,940,250.20

If the relationship between the number of bacteria and weeks is modeled by the function $b(w) = x(3)^{yw}$, which of the following could be the values of x and y ?

- A) $x = 5.0, y = 1.06$
- B) $x = 2.1, y = 1.38$
- C) $x = 4.4, y = 2.02$
- D) $x = 6.0, y = 2.24$

SUBSTITUTION



PLUGGING IN

1

Which of the following expressions is equivalent to $-x^3 + 2x^2$?

- A) $-x(x - x^2)$
- B) $-x^2(x - 2)$
- C) $-x^2(2x + 2)$
- D) $x^2(2x + 1)$

2

$$\sqrt{3a^2 + 6 + 40} = -b$$

If $a < 0$ and $b = -7$ in the equation above, what is the value of a ?

- A) -7
- B) -5
- C) -3
- D) -1

3

$$x^2 - (\sqrt{4x}) - 104 = (2y)^2$$

If $x > 0$, and $y = 6$, what is the value of x ?

- A) 12
- B) 14
- C) 16
- D) 18

4

Sloane purchases a new \$600 phone using a payment plan. The down payment on the phone is \$180 and the monthly payments that Sloane owes are \$15 each. Which of the following equations represents the number of monthly payments, m , Sloane must make in order to fully pay off the phone? (Assume there are no additional fees.)

- A) $600 = 15m + 180$
- B) $600 = 180m + 15$
- C) $600 = 180 - 15m$
- D) $600 = 15(180m)$

5

If $(x + 3)^2 - 7(x + 2) - 15 = 0$, which of the following could be a value of x ?

- A) 2
- B) 3
- C) 5
- D) 8

6

Janelle owns an online company where she sells and ships jars of honey. The packaging for each jar costs her \$1.50, and she sells the jars for \$5 each. For international orders, she also pays a shipping fee of \$30 per order. What is the fewest number of jars of honey Janelle needs to sell in an international order in order to make a profit?

- A) 3
- B) 6
- C) 8
- D) 9

7

$$\sqrt{16x^4}$$

If $x > 0$, which of the following is equivalent to the expression shown above?

- A) $2x^4$
- B) $4x^2$
- C) $8x^4$
- D) $8x^2$

8

Which of the following is equivalent to the expression $3x - (5x + 4)^2$?

- A) $25x^2 - 43x - 16$
- B) $-25x^2 + 43x - 16$
- C) $-10x^2 + 37x + 16$
- D) $-25x^2 - 37x - 16$

SUBSTITUTION



PLUGGING IN

9

If a , b , and c are distinct nonzero numbers and

$a = \frac{bc}{b+c}$, which of the following must be equal to b ?

- A) $\frac{c}{ac-1}$
 B) $\frac{c}{ac+1}$
 C) $\frac{ac}{c-a}$
 D) $\frac{ac}{c+a}$

10

Which of the following expressions is

equivalent to $\frac{3x^2 - 26x + 11}{3x + 1}$?

- A) $3x + 11 - \frac{26}{3x + 1}$
 B) $x - 9 + \frac{20}{3x + 1}$
 C) $26x$
 D) $x + 2$

11

Martin and Eddie shared a hotel room at a conference. The price of the room for the one night was x dollars per person. Martin had purchased a soda through room service and owed an additional \$4. However, they decided to split the bill evenly. If they each left a 15% tip for the cleaning staff, which of the following expressions represents the amount, in dollars, each of them paid? (Assume there is no sales tax.)

- A) $x + 1.0$
 B) $5x + 1.2$
 C) $1.15x + 2.3$
 D) $2.25x + 1.8$

12

Last year, Greta made S sales at a car dealership. For each sale, she took home D dollars, and gave C dollars back to the dealership management company. What percentage of the money earned from all of Greta's sales last year went back to the dealership management company?

- A) $\frac{SD}{S(D+C)} \times 100$
 B) $\frac{SD}{(D+C)}$
 C) $\frac{S}{(D+C)} \times 100$
 D) $\frac{SC}{S(D+C)} \times 100$

13

Which of the following expressions is

equivalent to $\frac{2x^2 + 7x - 14}{x + 4}$?

- A) $2x + 7 - \frac{14}{x + 4}$
 B) $x - 3 + \frac{2x + 7}{x + 4}$
 C) $2x - 1 - \frac{10}{x + 4}$
 D) $2x + 14 - \frac{7}{x + 4}$

FRACTIONS



DECIMALS

1

What is the least common denominator of $\frac{7}{10}$, $\frac{1}{12}$, $\frac{1}{5}$ and $\frac{2}{3}$?

- A) 24
- B) 30
- C) 60
- D) 120

2

A 12-pound ball of cookie dough is sliced into quarters and each quarter is sliced into eighths. What is the weight, in ounces, of each final slice? (16 ounces = 1 pound)

- A) 4
- B) 6
- C) 18
- D) 43

3

An architect is constructing a model of a house he plans to build. The actual house will measure 40 feet long by 35.5 feet wide. If the model will be $\frac{1}{8}$ of the size of the house, what is the length of the model, in inches?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

4

Bayside High School		Gender	
		Male	Female
Gym Unit	Volleyball	7	23
	Tennis	21	3

The table above shows the gym unit selected by males and females at Bayside High School. Each student chose to participate in only one of the gym units offered. Of the students who chose to participate in volleyball, what fraction were male?

- A) $\frac{1}{7}$
- B) $\frac{1}{4}$
- C) $\frac{7}{23}$
- D) $\frac{7}{30}$

5

Carmen had a budget of \$850 to spend on event tickets for her and her friends. Concert tickets cost \$25.75 each, and basketball tickets cost \$45.50 each. If there is no tax charged to purchase either type of ticket and Carmen purchases 6 concert tickets, what is the maximum number of basketball tickets she can buy?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

FRACTIONS



DECIMALS

1

What number can be added to the numerator and denominator of $\frac{7}{37}$ to get $\frac{1}{4}$?

- A) -3
- B) 2
- C) 3
- D) 5

2

Manufacturer	Laptops Produced
Factory 1	80,000
Factory 2	50,000
Factory 3	30,000
Factory 4	25,000
Factory 5	75,000
Factory 6	40,000

Using the information in the table, what fraction of the total laptops were made in factory 5?

- A) $\frac{1}{8}$
- B) $\frac{1}{5}$
- C) $\frac{1}{4}$
- D) $\frac{3}{10}$

3

If $p = \frac{5}{8}q$ and $q = 56$, what is the value of $2p + q$?

- A) 35
- B) 72
- C) 91
- D) 126

4

$$\frac{5}{12}g = \frac{1}{4}$$

What value of g is the solution to the equation shown above?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

5

What is the value of n , if $\frac{1}{1 - \frac{1}{5}} = n$?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

FRACTIONS



DECIMALS

6

$$\frac{2}{x+5} + \frac{4}{3x} = 0$$

The value of x satisfies the equation above.
What is the value of $-x$?

	/	/	
.	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

7

$$\frac{3}{x+4} = -\frac{3}{2x-7}$$

What value of x satisfies the equation above?

	/	/	
.	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

8

$$\frac{5}{4x^3} + \frac{2}{6x^3}$$

Which of the following expressions is equivalent to the expression shown about for all $x > 0$?

- A) $\frac{7}{12x^3}$
 B) $\frac{7}{24x^3}$
 C) $\frac{19}{24x^3}$
 D) $\frac{19}{12x^3}$

9

$$\frac{x-3}{2x} = \frac{x+6}{2x} + \frac{x-11}{x+2}$$

Which of the following expressions is equivalent to the expression shown about for all $x \neq 0$ or 6 ?

- A) $\{1\}$
 B) $\{2\}$
 C) $\{2, 4.5\}$
 D) $\{1, 2, 4.5\}$

RATIOS



PROPORTIONS

1

An architect is creating a scale drawing for a new home. The basement measures 23 feet long by 16 feet wide. He is using a scale of 0.3 inches = 1 foot for the scale drawing of the house. What will be the length, in inches, of the basement in the scale drawing?

●	/	/	●
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

2

On a certain map, a distance of 16 miles is represented by 0.125 inches. If the map indicates that the distance from Casey's home to her Aunt Carol's home is 2.25 inches, how many total miles will Casey drive in a round trip visit to Aunt Carol's home?

●	/	/	●
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

3

At a factory, 350,000 cogs are required to produce 5,000 swing sets. How many cogs would be required to produce 32,500 swing sets?

- A) 22,750
- B) 2.275×10^5
- C) 3.436×10^5
- D) 2.275×10^6

4

If the ratio of $0.75 : y$ is equivalent to $4.5 : 33$, what is the value of y ?

- A) 5.5
- B) 6.0
- C) 12.75
- D) 29.25

5

A plumber is draining a full bathtub with a capacity to hold 80 gallons of water into buckets with a capacity to hold 12 liters of water each. How many buckets will the plumber fill completely? (1 gallon = 3.8 liters)

●	/	/	●
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

RATIOS



PROPORTIONS

6

A sailor has two units of measure that he uses when charting a route, fathoms and nautical miles, where one fathom is equivalent to roughly 0.001 nautical miles. If the distance from New York to Miami is 1,092 nautical miles, which best approximates the distance in fathoms between the two cities?

- A) 1.092
- B) 10,920
- C) 109,200
- D) 1,092,000

7

A seamstress purchases 80 yards of fabric to create braided scarves. Every scarf is made up of 3 pieces of fabric, each 120 inches in length. What is the maximum number of scarves the seamstress can create from the 80 yards of fabric she purchased? (1 yard = 3 feet)

- A) 2
- B) 8
- C) 10
- D) 14

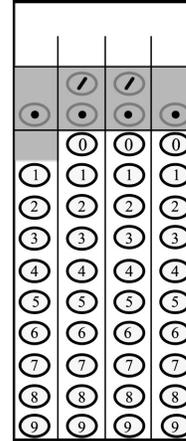
8

The distance in kilometers between New York City and San Francisco is 4,670. Which of the following best approximates the distance, in miles, between the two cities? (1 kilometer = 0.62137 miles)

- A) 2,200
- B) 2,900
- C) 3,800
- D) 7,500

9

If a and b are inversely proportional for $a = 24$ and $b = 6$, what is the value of b when $a = 36$?



10

Principal Wiley polled the students in his school and asked each of the 425 students which one of six school-branded clothing items they would purchase. The principal's survey results are displayed in the table below.

Clothing Item	Number of Students
Hat	82
Sweatshirt	98
T-Shirt	154
Pajama Pants	50
Sandals	24
Gloves	17
Total	425

Principal Wiley will order a total of 2,975 school-branded clothing items in the proportions dictated by the students in the table above. How many sweatshirts will he order?

- A) 98
- B) 105
- C) 476
- D) 686

RATIOS



PROPORTIONS

11

A restaurant has created a new soup. On average, the restaurant receives 72 soup orders each night and each order consists of 2 pints of soup. If the restaurant makes its soup in vats that can hold 3.5 gallons of liquid, what is the least number of vats of soup the restaurant must make in order to ensure that they have enough soup to feed diners on an average night? (Note: 1 gallon = 8 pints)

- A) 3
- B) 4
- C) 5
- D) 6

12

A study conducted at Easton University aimed to determine the number of high school students in the state who play on an organized sports team. The researchers surveyed a group of 850 high school students, and of those, 618 reported playing on an organized sports team. Going into the study, the researchers had hypothesized that 6.2 million high school students in the state played on an organized sports team. If this hypothesis were to hold true, based on the survey results, approximately how many high school students should the researchers expect there to be in the state?

- A) 4.5
- B) 7.1
- C) 7.9
- D) 8.5

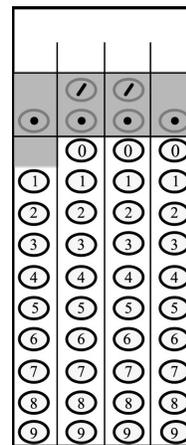
13

Gerald has 14 shirts in his closet, while Fred has 30 shirts in his. The ratio of the number of belts Gerald has to the number of belts Fred has is equal to the ratio of shirts. If Gerald has 77 belts, how many belts does Fred have?

- A) 89
- B) 93
- C) 165
- D) 180

14

On planet Lexicon, the standard measure of volume is called a *jipton*. It is equal to 4.68 milliliters. It is also equivalent to one-fourth of a unit called a *keegon*. Based on these relationships, 116 keegons is equivalent to how many liters, rounded to the nearest hundredth? (1,000 milliliters = 1 liter)



15

One pear tree can produce about 30 pears each year. An orchard has 40 rows of 100 trees each. The owner needs to estimate how many pears he can harvest, so he takes a count of the pears from row 1. There are 2 good pears for every rotten one in row 1. If the ratio remains true for the rest of the orchard, how many good pears can the owner expect?

- A) 80,000
- B) 95,000
- C) 115,000
- D) 120,000

PERCENTS



PERCENTS

1

The calcium saturation level of tap water is found by dividing the amount of calcium the water currently has per ounce by the calcium capacity per ounce of the water and then converting to a percent. If the tap water at Marni's house currently has 6.9 milligrams of calcium per ounce of water and the calcium capacity is 10.6 milligrams per ounce, what is the calcium saturation level, to the nearest tenth of a percent?

- A) 37.1%
- B) 57.9%
- C) 65.0%
- D) 65.1%

2

Zion spent 35% of his 22 hour flight to Australia sleeping. For how many minutes of the flight was Zion awake?

- A) 462
- B) 634
- C) 858
- D) 1,320

3

This year, there were 4% more students accepted to East University than were accepted last year. If 754 students were accepted this year, how many were accepted last year?

- A) 538
- B) 725
- C) 750
- D) 751

4

The table below shows the monthly sales totals (in millions of dollars) for 4 departments at Save-All Department Store during the most recent 3 months.

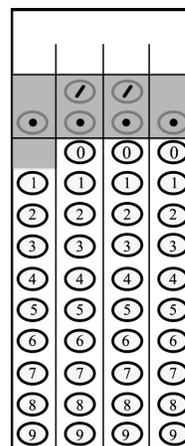
Department	Month Number		
	1	2	3
Clothing	23.4	42.3	36
Makeup	52.5	61.6	62.1
Furniture	11.6	17.5	12.8
Jewelry	34.1	14.5	42.8

Which of the following is closest to the percent increase in jewelry sales from Month 1 to Month 3?

- A) 23%
- B) 26%
- C) 28%
- D) 31%

5

Sasha owns an ant farm. Last year, she had a total of 125 ants in her ant farm. This year, the number of ants increased by 20%. If Sasha expects her ant population to increase at the same rate next year, how many ants does Sasha expect to have in her ant farm next year?



PERCENTS



PERCENTS

6

In her closet, Lucy has 23 sweaters that she has had for longer than 5 years. She has 7 sweaters that are exactly 5 years old, and 22 sweaters that she got within the last 5 years. What percentage of the sweaters in Lucy's closet, to the nearest tenth, are exactly 5 years old?

- A) 7.2%
- B) 13.5%
- C) 15.6%
- D) 17.1%

7

In 2019, the number of stamps that Maritza had in her collection was equal to the number of stamps that Marisol had in hers. From 2015 to 2019, the number of stamps in Maritza's collection rose by 30%, while the number of stamps in Marisol's decreased by 60% after she traded some away. If the number of stamps in Maritza's collection in 2015 was 740, how many stamps did Maritza have in her collection that year?

- A) 385
- B) 962
- C) 1,603
- D) 2,405

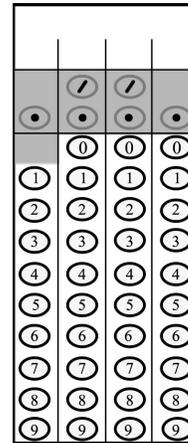
8

Lydia works as a makeup artist and earned \$12 per hour for the first two weeks she worked. Because she was doing such a good job, her boss gave her a 15% hourly raise for the next three weeks. Lydia works a total of 30 hours per week. At the end of the five weeks, she wants to donate 20% of her earnings to charity. After she makes the donation, how much money will Lydia have remaining?

- A) \$392.40
- B) \$853.40
- C) \$1,569.60
- D) \$1,962.00

9

Buster's favorite store is the Hook'n'Claw Fish Shop. Since he is such a frequent customer, he is a member of their loyalty rewards program, which entitles him to a receive a percentage of the money he has spent back. He receives his reward money at the end of each year. In 2018, Buster spent a total of \$4,562 at Hook'n'Claw, and received \$1,049.26 back at the end of the year. If f represents the percentage of Buster's yearly spending that he receives back at the end of the year, what is the value of f ?



10

Marcus wants to buy a \$135 baseball glove. However, he knows that in two weeks the glove will go on sale for 15% off. Marcus also has a coupon for an additional 8% off any sale item. Rounded to the nearest percent, what percent of the original price of the glove would Marcus pay if he waits two weeks to purchase it?

- A) 22%
- B) 23%
- C) 68%
- D) 78%

PERCENTS



PERCENTS

11

At Mondale High School, 35% of all the Juniors and 24% of all the Sophomores listed History as their favorite subject. If one class of Juniors, consisting of 20 students, and two classes of Sophomores, each consisting of 25 students, were polled, what would be the expected number of students who would respond that History was their favorite subject?

- A) 13
- B) 16
- C) 19
- D) Cannot be determined from the information given.

12

Daria's biology grade increased by 15% from her first test to her second test, and by 20% from her second test to her third test. By what percent did Daria's grade increase from her first test to her third test?

- A) 29%
- B) 31%
- C) 35%
- D) 38%

13

On his first history test of the year, Shamir scored a 90. His score decreased by 30% on his second test and then increased by 50% on his final exam. Which of the following expressions represents Shamir's score on his final exam?

- A) $(90)(0.3)(0.5)$
- B) $(90)(0.3)(1.5)$
- C) $(90)(0.7)(1.5)$
- D) $(90)(0.7)(0.5)$

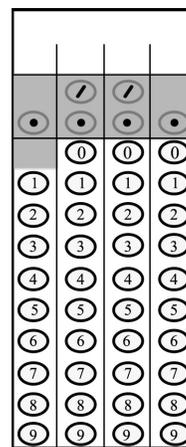
14

The average number of college applications a senior in the United States sends out is 7.7 in 2019. The average number of applications a senior in the United States sent out in 2010 was 5.8. Based on this information, by approximately what percent did the number of applications a senior in the United States sends out increase from 2010 to 2019?

- A) 26%
- B) 32%
- C) 39%
- D) 41%

15

A boutique owner is taking inventory of her merchandise. Of all the merchandise in the store, 20% are dresses, 50% are belts, 10% are purses, and the remaining 42 items are shoes. How many more belts does she have in the store than dresses?



RATES



RATES

1

A student signed up for a study aid for his upcoming AP psychology exam that sends practice questions to his phone in sets of 36 each week. If, at the beginning of January, he has a total of 112 questions on his phone, how many questions will he have after a total of 6 weeks?

- A) 216
- B) 328
- C) 404
- D) 520

2

A water cooler in an office currently holds 138 liters of water. If employees drink the water at a rate of 4.8 liters per hour for a total of 8 hours each day, how many liters will remain after 2 days?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

3

The study guide for the AP US History exam suggests reading 6 pages every day for 12 weeks. If a student follows the study guide's recommendation, how many pages will he or she read in 3 weeks?

- A) 42
- B) 126
- C) 388
- D) 504

4

A model train travels at a constant rate of 8 inches every 10 seconds. At this rate, which of the following is closest to the number of feet the train travels in 5 minutes?

- A) 17
- B) 20
- C) 24
- D) 40

5

Esmerelda and Josephine left for the mall at 2:45pm. When Esmerelda checked her watch at 3:25pm, they had traveled a distance of 60 miles. At this rate, what time would they arrive at the mall if it was a total distance of 180 miles away?

- A) 4:15 pm
- B) 4:30 pm
- C) 4:40 pm
- D) 4:45 pm

Questions 6 and 7 refer to the following information.

An Amtrak train traveling from New York to Boston can reach a maximum speed of 150 miles per hour. The entire trip takes a total of 3.5 hours.

6

What is the maximum speed of the train, in yards per second? Round your answer to the nearest tenth. (1 mile = 1,760 yards)

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

RATES



RATES

7

If the train traveled at its maximum speed for half the duration of the trip, and at one-third of its maximum speed for the remainder of the trip, how many miles is the trip between New York and Boston?

	/	/	
●	●	●	●
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

8

As part of his marathon training, Brandon ran a total of 98 miles in one five-day week. On Monday he ran at a speed of 8 miles per hour for 90 minutes. On Tuesday he ran at a speed of 12 miles per hour for 45 minutes. He ran at the same speed on Wednesday, Thursday, and Friday, for a total of 7 hours across all three days. If Brandon ran for 75 minutes on Wednesday, how many miles, to the nearest tenth did he run that day?

	/	/	
●	●	●	●
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

AVERAGES



AVERAGES

1

The following chart shows the total attendance (in thousands) at various events taking place in Central Park across four months.

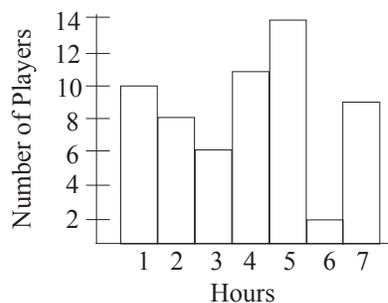
Event	Month			
	July	August	September	October
Pop Concert	125	75	83	69
Movie	38	29	25	18
Rock Concert	90	82	79	44
Rap Concert	80	100	75	82
Triathlon	16	21	8	5

What is the average monthly concert attendance in the months of July and August?

- A) 86,000
- B) 88,000
- C) 90,000
- D) 92,000

2

A survey of members of a football team asked the 60 players how many hours (rounded to the nearest hour) they had spent practicing last week. The 60 responses are summarized by the histogram below.



To the nearest whole number, what is the average number of hours for the 60 survey responses?

- A) 2
- B) 4
- C) 5
- D) 6

3

Calvin drove 880 miles in 16 hours of actual driving time. By driving an average of 15 miles per hour slower for the same distance, it would have taken Calvin how many additional hours to complete the trip?

- A) 4
- B) 6
- C) 12
- D) 22

4

Twelve athletes took part in a challenge to complete as many pull-ups as possible. The mean number of pull-ups was 17. If more than half of the athletes completed fewer than 15 pull-ups, which of the following is true about the mean number of pull-ups completed by the remaining athletes?

- A) It must be less than 17.
- B) It must be equal to 17.
- C) It must be between 17 and 20.
- D) It must be greater than 17.

5

The number of visitors, in thousands, who toured City Museum and Farm Museum in 2014 through 2017 is listed below. What is the positive difference between the mean number of visitors, in thousands, who toured the City Museum and Farm Museum during this time period? (Round your answer to the nearest whole number.)

Museum	2014	2015	2016	2017
City Hall	123.4	109.4	121.7	99.3
Underground	89.7	102.3	96.4	115.7

- A) 6
- B) 8
- C) 10
- D) 12

MEASURES OF



CENTER

1

Cynthia looked at her exam scores shown below for the first and second semester of her history class.

Semester 1: 80, 93, 90, 85, 96

Semester 2: 88, 93, 77, 74, 85, 82, 89

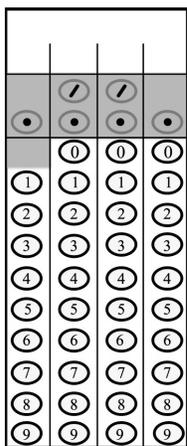
Which statement about Cynthia's performance is correct?

- A) The range of scores for semester 1 is greater than the range of scores for semester 2.
- B) The median score for semester 2 is greater than the median score for semester 1.
- C) The standard deviation for semester 1 is greater than the standard deviation for semester 2.
- D) The third quartile for semester 1 is greater than the third quartile for semester 2.

2

22, 2, 59, 17, p , 108

If the median of the six numbers above is 29, what is the value of p ?



3

Ms. Simmons raised all her students' scores on a recent quiz by 7 points. How were the median and the range of the scores affected?

- A) The median increased by seven and the range increased by seven.
- B) The median remained the same and the range remained the same.
- C) The median remained the same and the range increased by seven.
- D) The median increased by seven and the range remained the same.

4

The table below shows the annual salaries for the 18 lawyers at a firm in terms of thousands of dollars

65	68	71	79	80	82
82	96	101	101	101	112
120	123	126	137	138	166

The firm hires a new lawyer and pays him \$172,000 per year. Which statement about the median and mean is true?

- A) Both the median and the mean will increase.
- B) Only the mean will increase.
- C) Only the median will increase.
- D) Neither the median nor the mean will change.

5

A florist has an end of season sale on rose bushes, tulips, and daisies. There are 8 rose bushes, 9 tulips and 17 daisies. Before the sale, rose bushes are \$22, tulips are \$13, and daisies are \$15.50. If all the flowers are marked down by the same amount, what will happen to the range of the flower prices?

- A) The range will decrease.
- B) The range will increase.
- C) The range will not change.
- D) Cannot be determined from given information.

MEASURES OF



CENTER

6

The median of a set of data containing 7 distinct items was found. Six items were added to the set, four of which were greater than the original median, and two of which were less than the original median. Which of the following statements must be true about the median of the new data set?

- A) It is the mean of all data items in the set.
- B) It is the average of the original median and the new items in the set.
- C) It has not changed from the original median.
- D) It is greater than the original median.

7

Hailey created a list of her 16 test grades from chemistry class. She then divided each grade by 5 to produce a second list of numbers. She then took each of the numbers in the second list and added 4 points to each score to create a third list of numbers. The median of this third set is m . Which of the following expresses the median of Hailey's original chemistry test scores?

- A) $5(m + 4)$
- B) $5m + 4$
- C) $5(m - 4)$
- D) $\frac{m}{5} + 4$

8

The average grades for the top 5 students in Mr. Simon and Mrs. Leed's history classes are shown in the chart below.

Mr. Simon	98.1	97.0	94.2	89.7	82.1
Mrs. Leed	95.5	94.1	92.6	90.9	87.0

Which of the following is true about the standard deviations of the grades across both classes?

- A) The standard deviation of the grades in Mr. Simon's class is larger.
- B) The standard deviation of the grades in Mrs. Leed's class is larger.
- C) The standard deviation of the grades in both classes is equal.
- D) There is not enough information to determine the standard deviation of the grades.

9

Of the 70 students who are enrolled in the Garrison High School Film Club, 38 students have seen more than 0 but fewer than 40 foreign films, 31 students have seen more than 40 but fewer than 100 foreign films, and the remaining student has seen more than 650 foreign films. Which of the following statements is true about the mean and median of the number of foreign films seen by students in the film club?

- A) The median is greater than the mean.
- B) The mean is greater than the median.
- C) The mean is equal to the median.
- D) There is not enough information to determine whether the mean or median is greater.

MEASURES OF

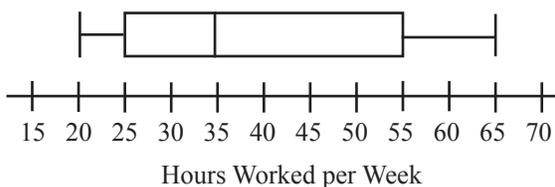


CENTER

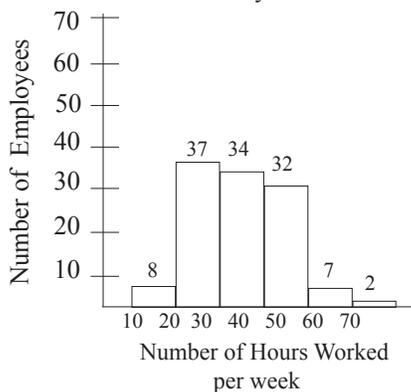
Questions 10 and 11 refer to the following information.

For a company with 2,500 employees nationwide, Farhan and Dasha each conducted a survey about the number of hours employees work each week. Both Farhan and Dasha selected employees at random. Farhan conducted surveys with 120 employees and Dasha conducted surveys with 80 employees. The results from the surveys are displayed below.

Dasha's Survey Results



Farhan's Survey Results



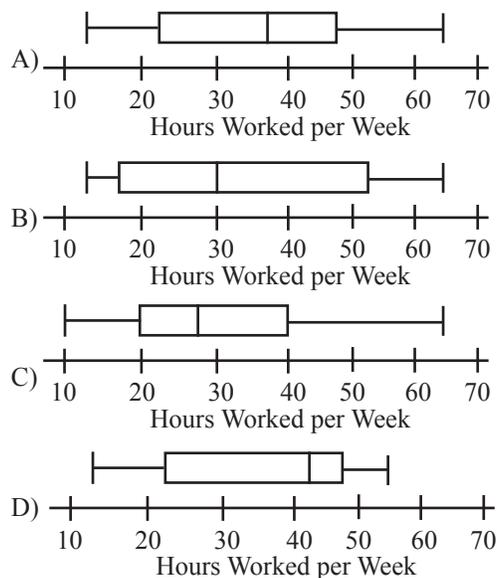
10

Which of the following is true about the median of Farhan's data compared to the median of Dasha's data?

- A) The median of Farhan's data is greater than that of Dasha's.
- B) The median of Farhan's data is less than that of Dasha's.
- C) The median of Farhan and Dasha's data is equal.
- D) Cannot be determined from the information given

11

Which of the following box plots could represent Farhan's data?



391

DATA



COLLECTION

1

The mayor of Greenville wants to upgrade the playground equipment in the town square. Which survey group would be the most biased?

A) 75 working men and women from the town
 B) 150 of Greenville's taxpayers
 C) 100 of the families living in Greenville
 D) 40 stay-at-home moms from Greenville

Questions 2 and 3 refer to the following information.

A scientist conducted a survey of eye color from three towns in northern Norway. The scientist had 400 members of each town participate in his survey and the results are indicated in the chart below.

Eye Color	Town A	Town B	Town C
Brown	83	77	62
Green	96	101	124
Blue	133	160	143
Hazel	88	62	71

2

Which of the following is a reliable conclusion from this survey?

- A) The most common eye color in Norway is blue.
 B) The most common eye color in northern Norway is blue.
 C) The least common eye color in Scandinavia is brown.
 D) The least common eye color in northern Norway is green.

3

If the scientist wanted to make a conclusion about the eye color of all Norwegians, which of the following changes to his survey would produce the best results?

- A) Surveying a fourth town in northern Norway
 B) Surveying a larger number of people from his original three towns
 C) Surveying 6 towns in eastern Norway
 D) Surveying 3 additional towns in southern Norway

4

Two hundred members of a large international book club will be selected to participate in a survey about choosing the books for the upcoming year. Which of the following methods of selecting those to be surveyed would result in a random sample of members of the book club?

- A) Choose, from a list of all members of the book club, the two hundred people who have participated in the most discussions.
 B) Tell all members of the book club that volunteers are needed to participate in a survey. Select the first two hundred people to respond.
 C) Get a list of all members based in the United States. Using a random number generator, select two hundred of those members to participate in the survey.
 D) Get a list of all members in the book club. Using a random number generator, select two hundred of those members to participate in the survey.

5

Mrs. Twig decided to survey three high schools in her city to find out which type of math was the favorite of students. She sent out one survey for each of the 6,200 students at the three schools and received 4,800 replies. She found out that 2,200 students prefer algebra, 1,200 prefer geometry, and 1,400 prefer algebra 2. Which of the following is a reliable conclusion from Mrs. Twig's survey?

- A) The students in her city prefer algebra over other mathematics.
 B) The students in her city dislike geometry.
 C) The students in her city's high schools most likely prefer algebra.
 D) The students in her city haven't taken calculus.

DATA



COLLECTION

6

The members of the PTA wanted to allocate additional funds to the athletics program in the upcoming year. The PTA surveyed 60 parents whose students were on various sports teams at the school. The survey showed that 78% of those surveyed were in favor of allocating additional funds. Which of the following is true about the PTA's survey?

- A) It shows that most parents in the school district are in favor of allocating additional funds to the athletics program.
- B) The sample should have included a larger percentage of the parents whose students are on a sports team.
- C) The sample is biased because it is not representative of all parents in the district.
- D) The survey sample should have included parents from surrounding districts.

7

A researcher selected 350 members of a furniture store's loyalty program at random. The 350 people were shown a photo of a new couch and were then asked whether they liked or disliked the style of it. Of those surveyed, 72% responded that they liked the new style. Which of the following inferences can appropriately be drawn from these results?

- A) At least 72% of people who shop at the store will purchase the new couch style.
- B) A majority of the members of the furniture store's loyalty program will like the style of the new couch.
- C) 72% of people who are looking to purchase a new couch will like the new style that the store created.
- D) No more than 72% of people in the store's loyalty program would dislike the couch style if shown a picture of it.

8

A survey of people exiting a museum was conducted every week for six weeks. If true, which of the following makes the survey results less reliable?

- A) The survey was conducted every Tuesday for six weeks.
- B) The survey was conducted at both exits for the museum.
- C) The survey was conducted on a different day of the week each week.
- D) The survey questions were asked of adults and children.

9

A political scientist surveyed a random sample of voters from a large city about how often they watch the local nightly news. Using the sample data, the political scientist estimated that 34% of the voters in the population watch the local nightly news on a regular basis. The margin of error for this estimation is 6.2%. Which of the following is the most appropriate conclusion about all of the voters in the city, based on the given estimate and margin of error?

- A) It is unlikely that less than 34% of the voters watch the local nightly news on a regular basis.
- B) At least 34%, but no more than 37.1% of the voters watch the local nightly news on a regular basis.
- C) The political scientist is between 27.8% and 40.2% confident that a majority of voters watch the local nightly news on a regular basis.
- D) The political scientist believes that the number of voters who watch the local nightly news on a regular basis is between 27.8% and 40.2% of the population.

DATA



COLLECTION

10

At the end of an information session, a representative from a university asked the high school students attending the session to respond to the question, “Do you want to apply this school?” The representative reported to the dean that 90% of the students responded “Yes,” while 6% of the students responded “No.” Which of the following best explains why the results are unlikely to represent the opinion of all high school students in the state?

- A) The percentages do not add up to 100%, so any possible conclusions are invalid.
- B) The survey did not offer students enough time to answer the question.
- C) Students may have answered “Yes” to that poll about multiple schools.
- D) Those who responded to the poll were not a random sample of high school students in the state.

11

A researcher recently polled 3,000 randomly selected citizens of Chicago and asked each of them whether or not they were satisfied with the public transportation options in the city. Of those surveyed, 64% responded that they were satisfied with the transportation options. Based on the results of the poll, which of the following statements must be true?

- I. Of all the citizens in Chicago, exactly 64% are satisfied with the public transportation options.
 - II. If another 3,000 citizens were polled, more than 1,800 would respond that they were satisfied with the public transportation options.
 - III. If 3,000 citizens from Boston were polled, the expected number of people who would respond that they were satisfied with the public transportation options would be 64%.
- A) III only
 - B) I and III only
 - C) I and II only
 - D) None

12

A study was conducted on the number of floors in office buildings in midtown Manhattan. A random sample of 80 buildings was taken, and the number of floors in each was recorded. 45% of the buildings had more than 18 floors. Which of the following conclusions is best supported by the results of the study?

- A) The majority of all buildings in Manhattan have more than 18 floors.
- B) The average number of floors in buildings in midtown Manhattan is 18.
- C) Approximately 45% of all buildings in Manhattan have more than 18 floors.
- D) Approximately 45% of all buildings in midtown Manhattan have more than 18 floors.

13

A psychologist selected a random sample of high school students from a school and found that the mean number of hours of sleep each got was 6.7 hours with an associated margin of error of 0.28 hours. Which of the following is the best interpretation of the psychologist’s findings?

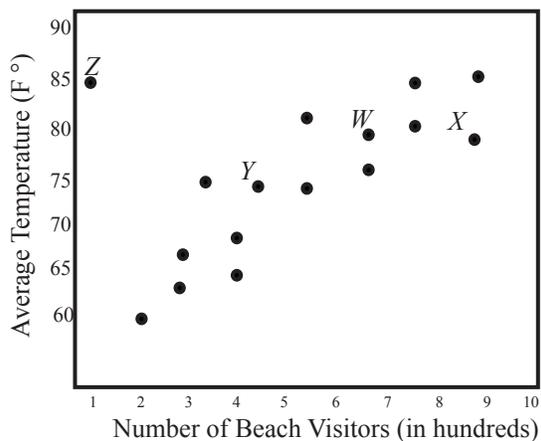
- A) All of the students in the high school get between 6.42 and 6.98 hours of sleep each night.
- B) Any number of hours of sleep between 6.42 and 6.98 is a feasible value for the mean number of hours of sleep a student in the high school gets per night.
- C) Most of the students in the high school get between 6.42 and 6.98 hours of sleep each night.
- D) Any number of hours of sleep between 6.42 and 6.98 is a feasible value for the mean number of hours of sleep a student in the sample gets per night.

SCATTER



PLOTS

Questions 1 and 2 refer to the following information.



1

What is the correlation between the average daily temperature and the number of beach visitors in the graph above?

- A) Negative correlation
- B) Positive correlation
- C) No correlation
- D) Cannot be determined from given information

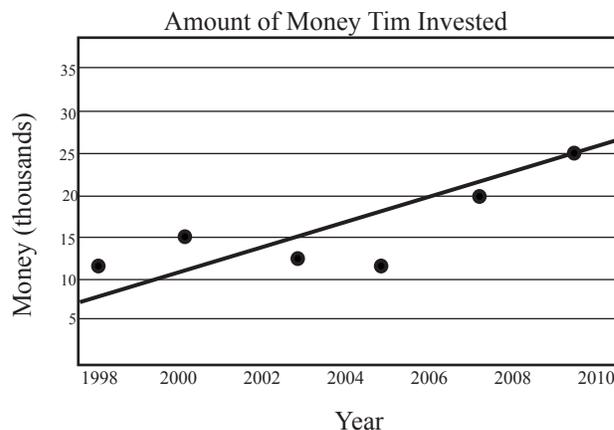
2

Which of the labeled points could be considered an outlier?

- A) *W*
- B) *X*
- C) *Y*
- D) *Z*

3

The scatterplot below shows the amount of money Tim invested (in thousands) for retirement over a number of years.

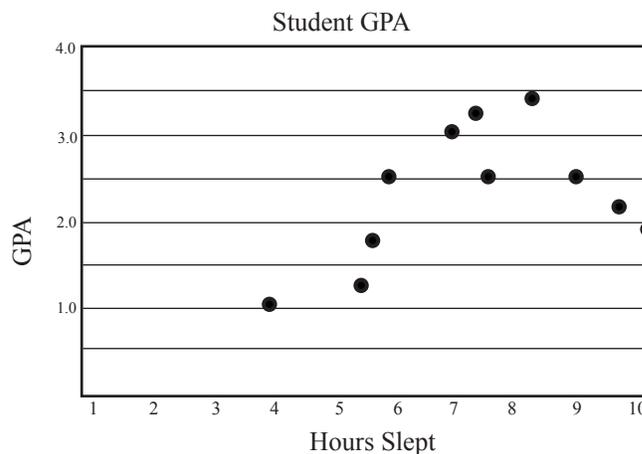


According to the line of best fit, in which year did Tim invest \$15,000 for retirement?

- A) 1998
- B) 2003
- C) 2005
- D) 2009

Questions 4 and 5 refer to the following information.

The scatter plot below shows the relationship between the number of hours slept on an average night and the grade point average (GPA) for 11 students.



SCATTER



PLOTS

4

What is the ratio of hours slept to GPA for the student who sleeps the fewest hours each night?

- A) 2.25
- B) 4
- C) 4.4
- D) 7.33

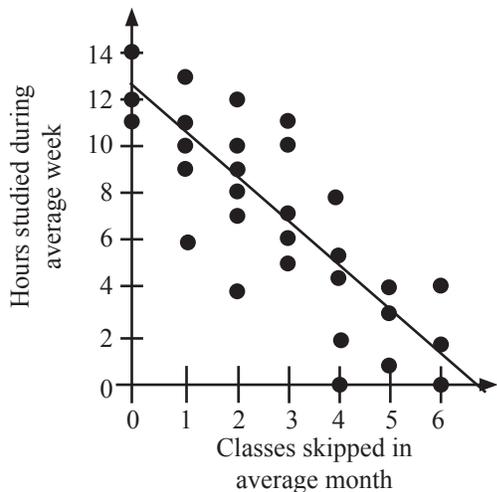
5

Which of the following can be concluded from this scatter plot?

- A) The students who sleep the most have the highest GPA.
- B) The students who sleep the least have the highest GPA.
- C) The students who sleep approximately eight hours each night have the highest GPA.
- D) The students who sleep exactly 7 or 9 hours will get a 4.0 GPA.

Questions 6 and 7 refer to the following information.

A researcher polled 30 college students at a local university. She asked them how many classes they skipped in an average month and how many hours a week they typically studied. The results are shown, along with a line of best fit, in the scatterplot below.



6

A college student at a different university in the same state studies 3 hours in an average week. If the student studies fewer hours per week than what is predicted by the line of best fit, what is the highest number of classes the student could skip in an average month?

- A) 3
- B) 4
- C) 5
- D) 6

7

The line of best fit passes through the point $(7, -0.5)$. Which of the following can be concluded from this?

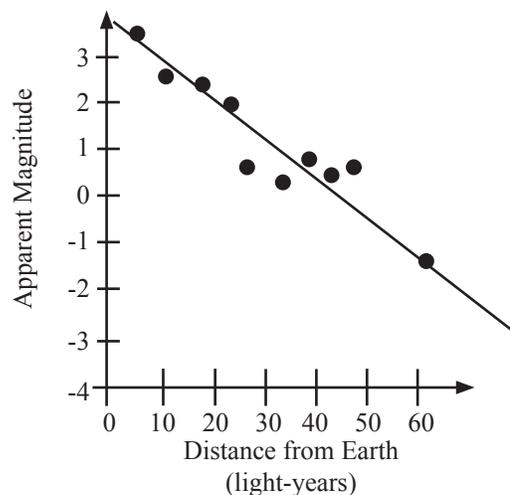
- A) A student who skips 7 classes a month will not study at all during an average week.
- B) A student who skips 7 classes a month cannot study any less.
- C) The line of best fit will not model the weekly study hours well for a student with a larger number of monthly skipped

classes.

- D) A student who studies during the week

Questions 8 and 9 refer to the following information.

The scatterplot below shows the apparent magnitude, the stellar brightness as it appears on Earth, of ten stars, with respect to their distance from Earth, in light-years. The line of best fit is also shown.



SCATTER



PLOTS

8

According to the scatterplot, which of the following statements is true about the relationship between the apparent magnitude of a star and the star's distance from Earth?

- A) Stars that are closer to Earth tend to have a greater apparent magnitude.
- B) Stars that are further from Earth tend to have a greater apparent magnitude.
- C) The apparent magnitude of a star that is twice as far from Earth, is twice as high as that of the other star.
- D) The apparent magnitude of a star and the star's distance from Earth are directly proportional.

9

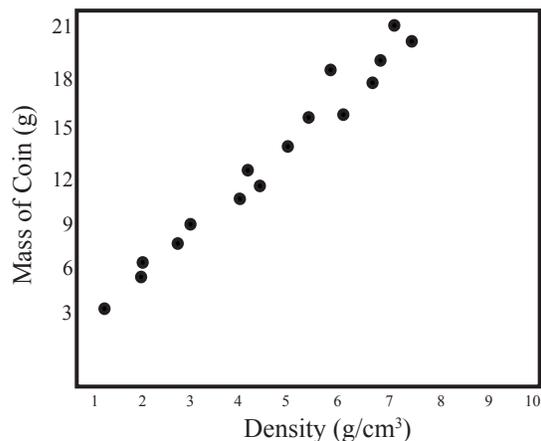
An astronomer has discovered a new star that is 55 light-years away from Earth. Based on the line of best fit, which of the following best approximates the apparent magnitude of the star?

- A) -1.2
- B) -0.8
- C) -0.2
- D) 0.4

10

Object	Volume (cm ³)
Penny	3.1
Quarter	5.7
Euro Coin	7.5
Nickel	6.4

In order to calculate the mass of an object, one can multiply the density of the object by the volume of the object. The table above gives the volume for several coins.



The scatterplot above shows the mass of several unknown coins of a single variety plotted against the density of those coins. The volume of this coin is closest to which of the following types?

- A) Penny
- B) Quarter
- C) Euro Coin
- D) Nickel

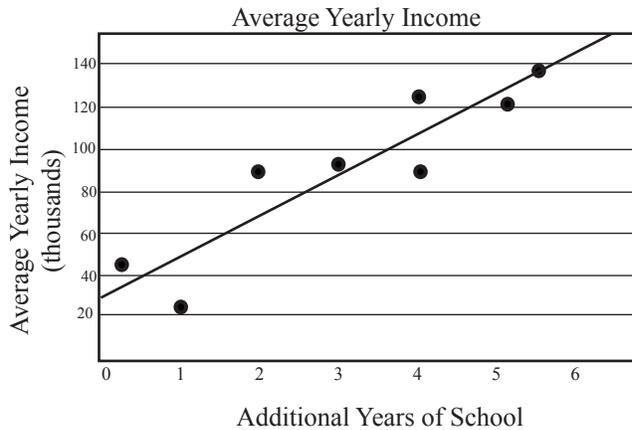
SCATTER



PLOTS

11

The scatterplot below shows data about the average yearly income for eight college graduates along with a line of best fit.

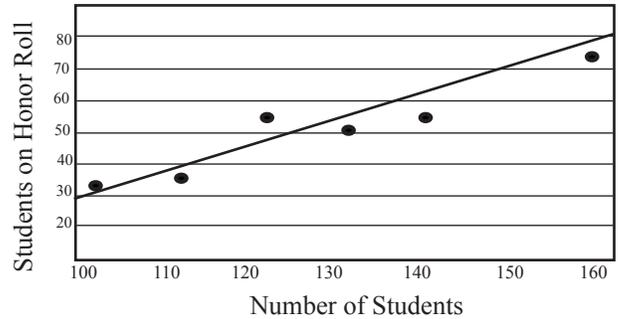


For the graduate who earns the least amount of money per year, which of the following is closest to the difference between the amount earned and the amount predicted by the line of best fit?

- A) \$11.00
- B) \$9,000.00
- C) \$12,000.00
- D) \$23,000.00

12

The scatterplot below shows the number of students at 6 high schools and the number of students at each on the Honor Roll. A line of best fit for the data is also shown.

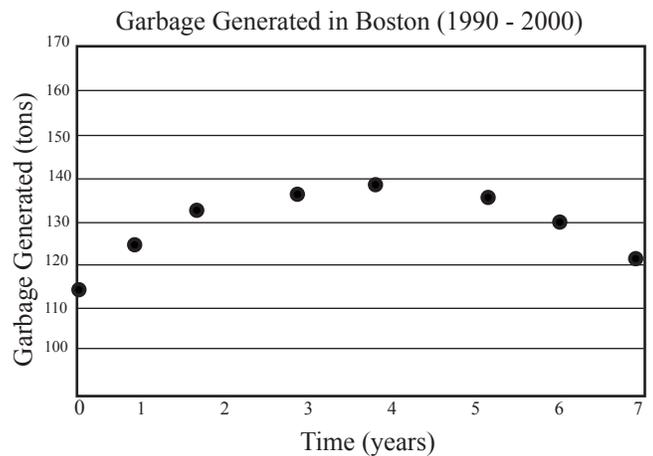


Which of the following could be the equation of the line of best fit?

- A) $y = -0.7x$
- B) $y = 0.2x$
- C) $y = 0.7x$
- D) $y = 1.2x$

13

The scatterplot below shows the amount of garbage generated by citizens of Boston, in million tons, over a 7-year period.



Of the following equations, which best models the data in the scatterplot?

- A) $y = -1.85x^2 + 14.2x + 112.3$
- B) $y = 1.85x^2 + 14.2x + 112.3$
- C) $y = -1.85x^2 - 14.2x + 112.3$
- D) $y = 1.85x^2 - 14.2x - 112.3$

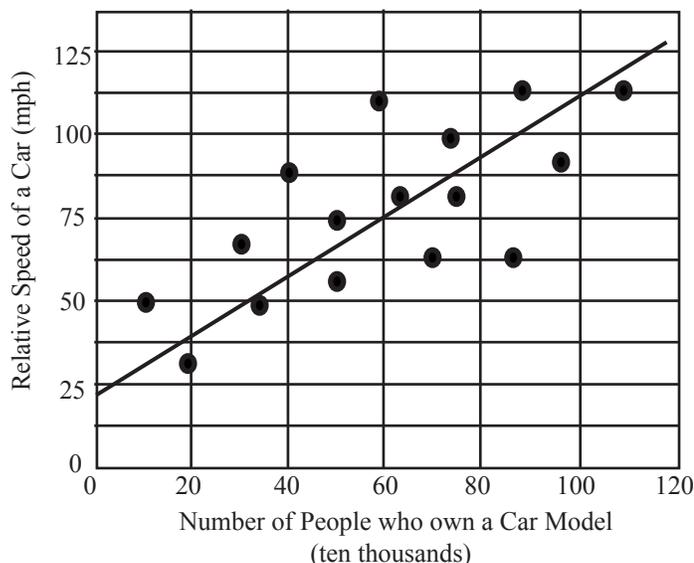
SCATTER



PLOTS

14

The relative speed of a car is defined as the ratio of average speed of a car model, expressed as a percent.

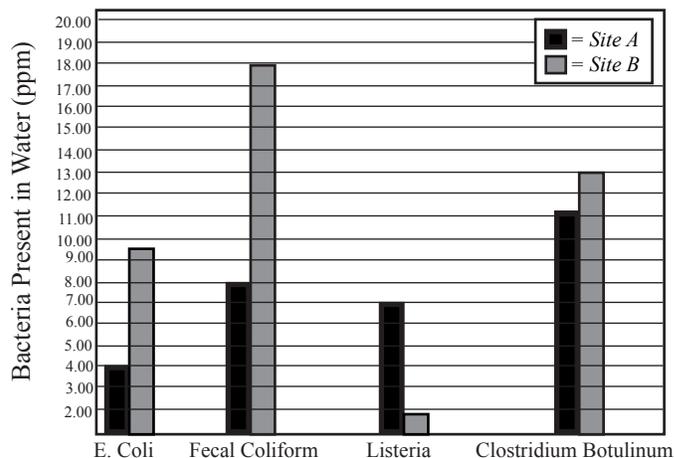


The scatterplot above shows the relative speed of a car and the number of people who own the car across the United States in 2008. The line of best fit is also shown and has the equation $y = .883x + 22$. Which of the following best explains how the number 22 relates to the scatterplot?

- A) In 2008, the lowest car speed was about 22 mph.
- B) In 2008, the lowest car speed was about 22% of the highest car speed.
- C) In 2008, even in car models that were not popular with consumers, car speeds were never below 22% of the average across all models.
- D) In 2008, even in car models that were not popular with consumers, car speeds were likely at least 22% of the average speed across all models.

15

Bacteria Present in Water



The bar graph above shows the bacteria present (in parts per million) in water at Sites A and B in 2014.

If a scatterplot were to be created to represent the data above, where bacteria present in water in 2014 for site A is plotted on the x -axis, and bacteria present in water for site B is plotted on the y -axis for each of the given bacteria types, how many data points would fall below the line $y = x$?

- A) 1
- B) 2
- C) 3
- D) 4

TABLES



GRAPHS

1

The table below shows the number of college athletes, in hundreds, across 4 NCAA conferences.

	Sport			
Conference	Soccer	Football	Basketball	Total
ACC	42	56.5	32.8	131.3
SEC	39.9	78.6	43	161.5
Big East	36.7	49	37.5	123.2
Big 10	46.6	67.7	27.4	141.7
Total	165.2	251.8	140.7	557.7

Based on the table, if a basketball player is chosen at random, which of the following is closest to the probability that he or she was in the ACC?

- A) 0.06
- B) 0.23
- C) 0.30
- D) 0.46

2

The table below summarizes the results of 325 high school seniors who applied to college.

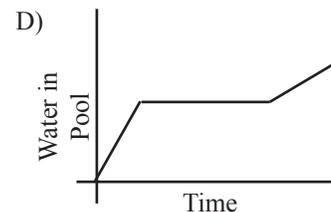
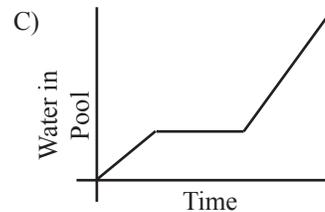
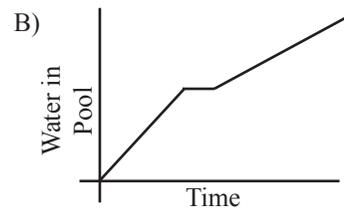
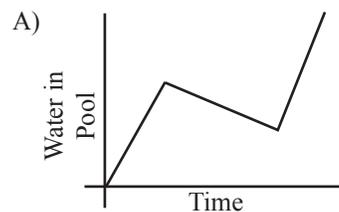
	Took 3+ AP Classes	Took < 3 AP Classes
Accepted Early Decision	72	29
Deferred Early Decision	66	83
Rejected Early Decision	17	58

If one of the surveyed seniors who was accepted early decision is chosen at random to receive a scholarship, what is the probability that he or she took 3 or more AP classes?

- A) 0.22
- B) 0.36
- C) 0.40
- D) 0.71

3

Hailey was working as a lifeguard and was tasked with filling the pool with water at the beginning of the summer. She pumped water into the pool for three hours before deciding to take a break for lunch. After a 1.5 hour lunch break, she began filling the pool again, at a slower rate this time, until it was completely full 6 hours later. Which of the following graphs could model Hailey filling the pool with water?



TABLES



GRAPHS

4

The table below shows the dessert preferences for the students at Weston High School.

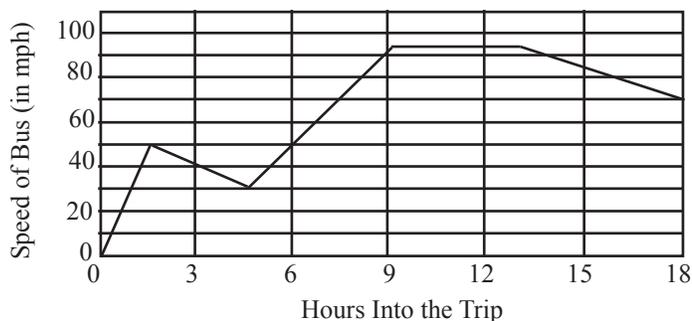
Grade	Pie	Cake	Total
Seniors	57	108	165
Juniors	64	96	160
Sophomores	23	99	122
Freshmen	46	92	139

What fraction of all the students who prefer pie, are juniors?

- A) $\frac{32}{293}$
 B) $\frac{32}{95}$
 C) $\frac{7}{12}$
 D) $\frac{2}{3}$

5

The graph below shows the speed of a train on an 18-hour trip from Boston to Atlanta.



According to the graph, which of the following statements is NOT true about the train trip?

- A) The train traveled faster between hours 9 and 12 than it did between hours 0 and 2.
 B) The train traveled approximately 375 miles between hours 9 and 12.
 C) The train's speed increased the entire time between hours 0 and 9.
 D) The train's speed decreased the entire time between hours 14 and 18.

6

A census taker interviewed 450 families at random from each of three towns. He asked each family how many people live in the household. The results are shown in the table below.

Household Numbers Survey

Number in Household	Silvertown	Goldville	Copperton
1	25	80	50
2	75	140	60
3	115	30	190
4	160	80	40
5	30	60	80
6	45	60	30

There are a total of 1,800 residents in Silvertown, 2,220 residents in Goldville and 1,500 residents in Copperton.

Based on the survey data, which of the following most accurately compares the expected total number of Silvertown families having 3 household members with that of Goldville?

- A) The total number of families with 3 people in the household in Silvertown is 85 more than in Goldville.
 B) The total number of families with 3 people in the household in Goldville is 75 more than in Silvertown.
 C) The total number of families with 3 people in the household in Silvertown is 312 more than in Goldville.
 D) The total number of families with 3 people in the household in Silvertown is 118 more than in Goldville.

TABLES



GRAPHS

7

Chef Liam is catering a dinner party. In order to decide from where to purchase the food, rent waiters, and rent silverware, he created the table below.

Company Name	Cost of Food, F (dollars)	Rental Cost of Waiters, W (dollars per hour)	Rental Cost of Silverware, S (dollars per hour)
X	1,250	22	19
Y	1,625	14	16
Z	1,420	31	15

The total cost, y , of buying the food and of renting the waiters and silverware in terms of the number of hours, x , is modeled by the equation $y = (W + S)x + F$.

What is the smallest number of hours, x , for which the total cost of food and of renting waiters and silverware from Company X will be greater than the total cost of food and of renting waiters and silverware from Company Y ?

- A) 34
- B) 35
- C) 38
- D) 42

Questions 8 and 9 refer to the following information.

Electronics Plus is measuring their video game sales during the holiday season. Their data is collected in the chart below.

Platform	Dec 1	Dec 8	Dec 15	Dec 22
YBox	54,000	25,000	33,000	76,000
Funstation	36,000	?	?	?
Wheeee	81,000	13,000	55,000	12,000

8

The store believes it will sell an average of 50,000 Ybox games per week, between December 1st and December 30th. How many games does it have to sell between December 22nd and December 30th in order to meet that goal?

- A) 22,000
- B) 55,000
- C) 62,000
- D) 78,000

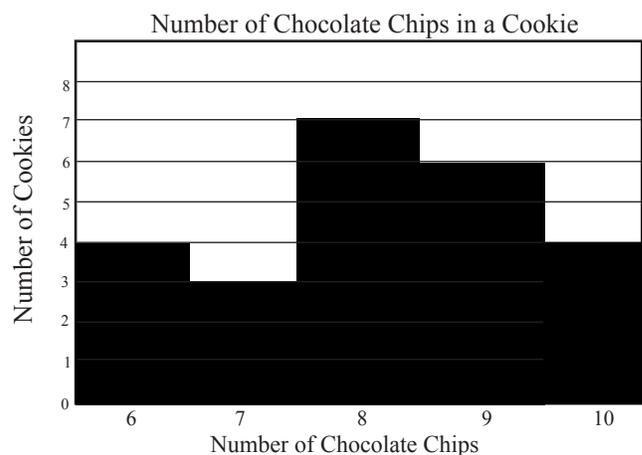
9

The marketing team predicts that every week, Funstation sales will increase by 20% from the previous week. If this prediction is accurate, how many Funstation games will Electronics Plus sell during the week of December 15th?

- A) 7,200
- B) 14,440
- C) 43,000
- D) 51,840

10

The histogram below shows how many chocolate chips are in a certain number of cookies.



How many cookies are represented by the graph?

- A) 5
- B) 18
- C) 24
- D) 40

TABLES



GRAPHS

Questions 11 and 12 refer to the following information.

A wedding venue calculates its profits with regard to the number of people in attendance. The table below shows the amount, in dollars, the venue must spend to accommodate parties of different sizes, and how much money they can charge, in dollars, for parties of those sizes.

Number of Guests	Cost (Dollars)	Price Charged (Dollars)
50	7,500	34,906.25
100	8,100	40,756
150	8,600	45,975
200	8,900	49,256.25
250	9,100	51,506.25

11

The relationship between the cost for the venue, c , in thousands of dollars, and the price it charges clients, p , can be represented by an exponential function. Which of the following functions represents the relationship?

- A) $p(c) = 15c^2 + 345$
- B) $p(c) = (25c)^2 - 250$
- C) $p(c) = (10c)^2 + 855$
- D) $p(c) = 120c^2 - 105$

12

The cost listed for hosting a party for 250 guests is based on the venue receiving a 5% discount from the staffing agency who provides the waitstaff for the event, and a 15% discount off the discounted price for buying the food in bulk. Which of the following best approximates the price, in dollars, that the venue would pay for hosting a party for 250 guests without the given discounts?

- A) \$9,920
- B) \$10,040
- C) \$10,130
- D) \$11,270

13

The lobby of a new apartment building measures 25 feet by 25 feet. The builders tile the floor with black and white polka dotted tiles measuring 1 foot by 1 foot, and no tiles overlap. The builders count the number of black polka dots on ten of the tiles used.

Tile Number	Number of Black Polka Dots	Tile Number	Number of Black Polka Dots
1	39	6	33
2	45	7	57
3	27	8	62
4	52	9	48

Which of the following is a reasonable approximation of the number of black polka dots on the floor of the lobby?

- A) 365
- B) 2,520
- C) 25,200
- D) 36,500

MANIPULATING



EQUATIONS

1

The expression $5(3x - 6) - 4(-x - 2)$ is equivalent to

- A) $11x - 22$
- B) $19x - 22$
- C) $11x + 38$
- D) $19x + 38$

2

$$5p + 12q = 35$$

In the equation above, what is the value of q when $p = -5$?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

3

If $16(a + b) + 12 = 104$, what is the value of $2(a + b)$?

- A) 8.25
- B) 11.5
- C) 14.1
- D) 16.2

4

$$6(x - a) = xb - 14$$

In the equation above, a and b are constants, and the equation has infinitely many solutions.

Which of the following is equal to $\frac{a}{b}$?

- A) $\frac{7}{18}$
- B) $\frac{6}{7}$
- C) $\frac{7}{6}$
- D) $\frac{18}{7}$

5

$$|3x - 6| = 12$$

If the solutions to the equation above are represented as g and h , what is the value of $g + h$?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

6

If $\frac{12}{y} = 480$, what is the value of y ?

- A) 0.025
- B) 2
- C) 40
- D) 250

MANIPULATING



EQUATIONS

7

$$\frac{2}{3}x + 10 = 14 + \frac{5}{12}x$$

What value of x satisfies the equation above?

- A) 0.25
- B) 1
- C) 4
- D) 16

8

$$3bx + 12 = 7(x + 1) + 5(x + 6)$$

In the equation above, b is a constant. If no value of x satisfies the equation, what is the value of b ?

- A) 2
- B) 4
- C) 6
- D) 10

9

$$\frac{x+3}{12} = \frac{x-5}{4}$$

What is the solution to the equation above?

- A) 3
- B) 4
- C) 9
- D) 12

10

$$5x + 12x(k + 2) = -7x$$

In the equation above, k is a constant, and the equation has infinitely many solutions. What is the value of k ?

- A) -3
- B) -1
- C) 1
- D) 3

11

If $\frac{x^2 + 5}{y} = 29$, then which of the following is also true?

- A) $y = 20(x^2 + 5)$
- B) $x = \frac{29}{y}$
- C) $x = \sqrt{29y - 5}$
- D) $y = 5 - x^2$

12

$$abc + ca^2 = cba + bac$$

In the equation above, a , b , and c are each greater than 1. Which of the following is equivalent to a ?

- A) 1
- B) b
- C) \sqrt{abc}
- D) $\frac{cb + bc}{bc + c}$

13

If $\frac{12x + 12x + 12x}{12} = 12$, what is the value

of $12x$?

- A) 1
- B) 12
- C) 36
- D) 48

TRANSLATING



EQUATIONS

1

Theo joined the wrestling team and is starting to gain muscle mass. Each week that he works out he gains 0.9 pounds of muscle. If Theo weighs 134 pounds now, which of the following equations represents Theo's weight in k weeks?

- A) $0.9k + 134$
- B) $134(0.9k)$
- C) $0.9 + 134(k)$
- D) $134 - .9k$

2

A moving company charges a flat rate for moving up to 1,200 pounds, and charges additional fees for all additional weight. A family hires the moving company and has a total of 29 boxes, each weighing the same amount. They also have a bed that weighs 320 pounds and a sofa that weighs 450 pounds. Rounded to the nearest tenth, what is the maximum weight of each of the boxes the family can have, so as not to incur additional fees?

	/	/	
●	●	●	●
	0	0	0
①	①	①	①
②	②	②	②
③	③	③	③
④	④	④	④
⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

3

For her nieces' birthdays, Aunt Greta gave gifts of either \$85 or \$120. This year, Aunt Greta spent a total of \$1675 giving her sixteen nieces birthday gifts. How many gifts of \$120 did she give?

	/	/	
●	●	●	●
	0	0	0
①	①	①	①
②	②	②	②
③	③	③	③
④	④	④	④
⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

4

The average number of members of several knitting clubs in New York City from 1990 through 2010 can be modeled by the equation $y = 0.72x + 13.4$, where x represents the number of years since 1990 and y represents the average number of club members. Which of the following best describes the meaning of the number 13.4 in the equation?

- A) The total number of members in all the knitting clubs in 1990
- B) The average number of members in 1990
- C) The average increase in the number of members each year from 1990 to 2010
- D) The average number of members in 2010

TRANSLATING



EQUATIONS

5

Jackson is moving to college and wants to take some of his books with him. He has one box big enough to fit 25 novels but not his atlas, and another box big enough to fit his atlas along with 18 novels. Jackson decides he will take whichever box weighs less. If the atlas weighs 8 pounds and each novel weighs 2 pounds, what is the weight, in pounds, of the box Jackson takes to college with him?

- A) 50
- B) 49
- C) 44
- D) 40

6

Kaitlin has a bag of cherries. If she makes 5 cherry pies, she will have 15 leftover cherries, but if Kaitlin wants to make 8 cherry pies, she has 45 too few cherries. If all of her cherry pies have the same number of cherries, how many cherries does Kaitlin have?

- A) 90
- B) 115
- C) 140
- D) 200

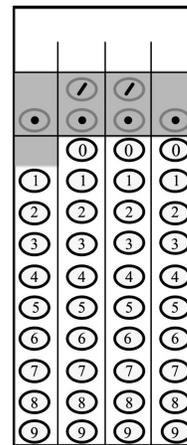
7

In a weekly trivia competition, each team starts off with the number of points they ended with the week before. Each time the team gets a question correct, they receive two points. Each time they pass their turn, no points are added or deducted. Each time they get a question wrong, they lose 5 points. This week the Know-It-Alls answered 12 questions correct, passed on 22 questions, answered 3 questions incorrectly and ended up with a score of 195. What was the value of their score coming into the week?

- A) 174
- B) 179
- C) 186
- D) 204

8

The student council at Hardywood High is hosting a bake sale to raise money for a new gym. They will be baking cookies and selling them for \$1.25 each. Each cookie is made up of a quarter-pound of dough, and the students have budgeted for the use of 36 pounds of dough each day. If the students use all of their dough each day, and sell all of the cookies they have made, how much money will they make in a 5-day week?



9

Machines in a factory work at a constant rate filling bottles of mustard. In a given day, they must fill a total of 23,500 bottles. After 45 minutes, the machines have filled 6% of the total bottles they must fill in the day. Which of the following equations models the number of bottles, b , remaining to be filled m minutes after the machines start up for the day?

- A) $b = 23,500 - 45m$
- B) $b = 23,500(1.06)^{45m}$
- C) $b = 23,500 - \left(\frac{94}{3}\right)m$
- D) $b = 23,500(.06)^m$

TRANSLATING



EQUATIONS

1

Mielle spent a total of \$345 for roundtrip plane tickets to Cozumel during her spring break. Each day of her vacation, she spent f dollars on food. If Mielle's vacation lasted for 5 days, how much money, in dollars, did she spend on the flights and food?

- A) $690 + 5f$
- B) $345 + 5f$
- C) $345f + 5$
- D) $350f$

2

Patricia found 13 baseball cards at an antique shop and decided to start a collection. During the first month of collecting, she bought 10 new cards each week, and she lost an average of 8 cards per week to trades. During the first month of her collection, which of the following equations best models the of cards, c , in Patricia's collection w weeks after her first day?

- A) $c = -w + 13$
- B) $c = w + 13$
- C) $c = 1.25w + 13$
- D) $c = 2w + 13$

3

A baker is frosting her latest batch of 48 cupcakes. It takes her 8 minutes to frost each cupcake, and she has already completed c cupcakes. Which of the following expressions represents the number of additional minutes the baker needs to finish frosting the cupcakes?

- A) $48 - 8c$
- B) $8c + 48$
- C) $8(48 - c)$
- D) $8(48 + c)$

4

A college student is driving home for summer break. The school is 425 miles from his home. If he drives at a constant rate of 60 miles per hour, which of the following equations represents the distance, d , in miles, of the college student from home during his drive?

- A) $425 + 60d$
- B) $(425 - 60)d$
- C) $425 - 60d$
- D) $425d - 60$

5

A florist will create a bouquet of f flowers using a specific type of flower. The florist charges a fee based on the expression $fvlk$, where f is the number of flowers used, v is the type of vase used, l is the cost of labor and k is a constant with a unit of per flower. If the customer asks the florist to use a more expensive flower, which of the variables in the expression would change?

- A) f
- B) v
- C) l
- D) k

6

$$2,650 + 770s = B$$

The equation above gives the number, B , of bricks a builder needs to construct a new apartment complex that is s stories tall. Last year, the builder built Edgewater Condo and Bayside Condo. Edgewater Condo has 5 more stories than Bayside Condo. How many more bricks did the builder use to build Edgewater Condo than Bayside Condo?

- A) 770
- B) 1,0000
- C) 1,540
- D) 3,850

TRANSLATING



EQUATIONS

7

The smaller of two numbers is less than the larger by 6. The difference of three times the larger and twice the smaller is 72. If x is the larger number, which equation below determines the correct value of x ?

- A) $3x - (2x + 12) = 72$
- B) $3x - (2x - 6) = 72$
- C) $3x - (2x + 6) = 72$
- D) $3x - (2x - 12) = 72$

8

The cost of using a prepaid cellphone is \$1.15 per minute. If Kathy needs to buy a phone preloaded with t hours of talking time, which of the following equations represents the cost, c , of the prepaid cellphone?

- A) $c = \frac{1.15t}{60}$
- B) $c = \frac{60t}{1.15}$
- C) $c = \frac{1.15(60)}{t}$
- D) $c = 1.15(60t)$

9

Leslie and Manny have ages that are consecutive even integers. The product of their ages is 2,024. Which equation could be used to find Manny's age, m , if he is the older of the two?

- A) $2m^2 + 1 = 2,024$
- B) $m^2 - 2m = 2,024$
- C) $3m = 2,024$
- D) $m^2 + 2m = 2,024$

10

In order to study for her finals, Julie created a study plan. She plans to increase the number of minutes she will study each week by 75. If she plans to budget a total of 1,305 minutes for studying the week prior to the exam, for how many minutes will she plan to study 16 weeks prior to the test?

- A) 105
- B) 180
- C) 255
- D) 330

11

Stephen has six more quarters than pennies in his pocket, for a total of \$3.84. Which equation could be used to determine the number of pennies, p , in his pocket?

- A) $2.50(6p) + 1.0(p) = 3.84$
- B) $2.50(6 + p) + 1.0(p) = 3.84$
- C) $0.25(6 + p) + 0.01(p) = 3.84$
- D) $0.25(6p) + 0.01(p) = 3.84$

12

$$23,450 - 750p = 16,700$$

In 2000, the population of Watertown was 23,450. The population p years after 2000 was 16,700. Which of the following is the best interpretation of the number 750 in this equation?

- A) The population of Watertown p years after 2000
- B) The average decrease in the population of Watertown per year p years after 2000
- C) The difference between the population of Watertown in 2000 and the population in Watertown p years after 2000
- D) The value of the minimum number of people in Watertown p years after 2000

SYSTEMS OF



EQUATIONS

1

The total cost of an order of french fries and an order of onion rings is \$6.50. The cost of 3 orders of french fries and 1 order of onion rings is \$15.00. What is the cost of 5 orders of onion rings and an order of french fries?

- A) \$11.25
- B) \$12.75
- C) \$15.50
- D) \$16.25

2

A flower shop owner is buying flowerpots and shovels for his store. A flowerpot and shovel cost \$9.00 in total. If the shop owner buys 8 flowerpots and 5 shovels for a total of \$63.00, how much does a flowerpot cost?

- A) \$3.00
- B) \$3.50
- C) \$4.00
- D) \$6.00

3

Rob is in charge of buying food for the company picnic. He decides to spend all of his money on Mystery Burgers and Veggie Dogs. Mystery Burgers cost \$2.40 and Veggie Dogs cost \$1.75. If Rob bought 30 items and spent a total of \$60.30, how many Mystery Burgers did Rob buy for the company picnic?

- A) 6
- B) 8
- C) 10
- D) 12

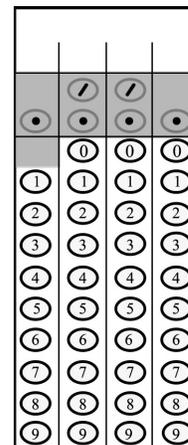
4

Michael and Kristen went out to a restaurant with a group of their friends and they split the bill. Michael spent a total of \$217.00 on four appetizers and six entrées. Kristen spent a total of \$89.50 for one appetizer and three entrées. If each entrée costs the same amount and each appetizer costs the same amount, what is the price of one entrée and one appetizer?

- A) \$17.25
- B) \$23.50
- C) \$42.50
- D) \$62.20

5

Stew's Grocery Store sold a total of 328 apples and bananas. He sold apples for \$0.65 each and bananas for \$1.06 each. If he made \$299.71 from the sale of apples and bananas, how many fewer apples than bananas did Stew sell?



SYSTEMS OF



EQUATIONS

6

A travel agent offers clients two ways to pay for a trip, both of which consist of a flat rate for a flight plus an additional expense charged as a function of the number of minutes the flight lasts. Plan A allows customers to pay a flat rate of \$205 and an additional \$1.25 per minute, while Plan B allows customers to pay a flat rate of \$308 plus an additional \$0.75 per minute. What is the least number of minutes for which Plan B is a better deal for the customer?

- A) 206
- B) 207
- C) 252
- D) 301

7

Lori bought two types of food for her dog: dry food that cost \$2.25 per container and wet food that costs f times as much. When she went to the pet store last week, Lori spent \$40.05 on 5 containers of dry dog food and 4 containers of wet dog food. Based on this receipt, what is the value of f ?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

8

$$\frac{2}{5}x = 12$$

$$y - \frac{4}{5}x = 34$$

The system of equations above has a solution (x,y) . What is the value of y ?

- A) 10
- B) 24
- C) 58
- D) 64

9

$$\frac{3}{4}x = h$$

$$y - x = \frac{2}{3}h$$

In the system of equations above, h is a constant such that $\frac{1}{2} < h < 1$. If (x,y) is a solution to the system of equations, which of the following inequalities represents the possible values of y ?

- A) $-\frac{2}{3} < y < -\frac{1}{3}$
- B) $0 < y < \frac{3}{2}$
- C) $0 < y < 2$
- D) $1 < y < 2$

SYSTEMS OF



EQUATIONS

1

$$\begin{aligned}2x + 3y &= 15 \\4x + 5y &= 18\end{aligned}$$

Which of the following ordered pairs (x,y) satisfies the system of equations above?

- A) $(-10.5, 12)$
- B) $(-12, -10.5)$
- C) $(5.5, 6)$
- D) $(-6, -12)$

2

$$\begin{aligned}x &= 3y + 12 \\ \frac{2x}{3} + 3y &= 8\end{aligned}$$

Which of the following ordered pairs (x,y) satisfies the system of equations above?

- A) $(12, 6)$
- B) $(6, 12)$
- C) $(12, 0)$
- D) $(0, 0)$

3

Which system of equations has the same solution as the system below?

$$\begin{aligned}8x + y &= 21 \\7x - 2y &= 35\end{aligned}$$

- A) $8x + y = 21$
 $21x - 14y = 35$
- B) $8x + y = 21$
 $14x - 4y = 70$
- C) $16x - 2y = -32$
 $7x - 2y = 35$
- D) $x + 2y = 32$
 $7x - 2y = 35$

4

During the 2013 baseball season, the centerfielder Perez earned, p , which was 2.6 million dollars more than the shortstop Simmons earned, s . Together, the two players earned a total of 9.9 million dollars. Which system of equations could be used to determine the amount each player earned, in millions of dollars?

- A) $p + s = 9.9$
 $p + 2.6 = s$
- B) $p + s = 9.9$
 $s + 2.6 = p$
- C) $p + s = 2.6$
 $s + 2.6 + p = 9.9$
- D) $p + s = 9.9$
 $s + 9.9 + p = p + 2.6$

5

For what value b would the following system of equations have infinitely many solutions?

$$\begin{aligned}3x - 7y &= 12 \\6x - 14y &= 4b\end{aligned}$$

0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

SYSTEMS OF



EQUATIONS

6

$$b = 1.25p + 4.50$$

$$g = 1.60p + 3.66$$

In the equations above, b and g represent the price, in dollars, of sending a package through two companies, Box-It-Up and GoGoGo respectively, based on the number of pounds, p , the package weighs. At what weight, in pounds, will the price of sending the package through GoGoGo be equal to sending the package through Box-It-Up?

- A) 2.4
B) 4.7
C) 7.5
D) 9.9

7

$$\frac{3}{4}(x - 4y) = \frac{5}{8}$$

$$x = 8y$$

The system of equations above has solutions (x,y) . What is the value of y ?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

8

$$-3x + y = 7.5$$

$$3x + 6y = -3$$

If (x,y) satisfies the system of equations above, what is the value of y ?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

9

At an airline, each flight to Bermuda costs \$120 more than each flight to Atlanta. If the airline sells a total of 7 flights to Bermuda and 5 flights to Atlanta in one day and makes a total of \$2,280, what is the price of one flight to Atlanta?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

INEQUALITIES



INEQUALITIES

1

The pounds of garbage, p , generated by Centerville in the month of May satisfies the inequality $|p - 75| \geq 49$. Which of the following could NOT be the amount of garbage, in pounds, generated by Centerville in the month of May?

- A) 14
- B) 26
- C) 120
- D) 124

2

If the inequality $a + b > b$, then which of the following *must* be true?

- A) $a = b$
- B) $a > b$
- C) $b < 0$
- D) $a > 0$

3

$$2y + 14x > 26$$

Which of the following inequalities is equivalent to the one shown above?

- A) $y - 14x < 13$
- B) $y + 7x > 13$
- C) $y + 7x > 26$
- D) $2y - 14x < 26$

4

$$\begin{aligned} y &< -3x - 2 \\ y &> 6x + 4 \end{aligned}$$

Which of the following could be a solution to the above inequalities?

- A) (-1, 3)
- B) (3, 5)
- C) (-4, 2)
- D) (2, 1)

5

Kim plans to sell four times as many boxes of cookies as Hallie. If Kim and Hallie need to sell a total of at least 160 boxes of cookies in order to win a free trip, which inequality could be used to determine how many boxes, h , Hallie needs to sell?

- A) $5h \geq 32$
- B) $5h > 32$
- C) $5h < 160$
- D) $5h \geq 160$

6

Natalie is planning a birthday party and wants to have a live band and dinner for everyone who attends. She has found a band that will charge her \$1,250 and a catering service that will provide a full three-course dinner for \$17.50 per person. If her goal is to keep the average cost per person no less than \$30.85 and no greater than \$67.50, how many people, p , must attend?

- A) $22 \leq p \leq 94$
- B) $25 < p < 95$
- C) $25 \leq p < 94$
- D) $15 \leq p < 95$

7

If $24 < 6f - 19$ and f is an integer, what is the least possible value of $11f$?

- A) 88
- B) 77
- C) 65
- D) 42

8

If $3q + 7 \leq 1$, what is the greatest possible value of $5q - 11$?

- A) -24
- B) -21
- C) -18
- D) -16

INEQUALITIES



INEQUALITIES

1

Cassius is taking a calculus class. His goal is to study for at least an average of 8 hours per week for the 12 weeks in the marking period. He studied for 7 hours each the first six week, 14 hours the seventh week, 6 hours each of the next three weeks and the same amount each of the last 2 weeks. Which inequality can be used to represent the number of hours, h , Cassius must study each of the last two weeks to meet his goal?

- A) $\frac{7(6) + 14 + 6(3) + 2h}{4} \geq 8$
 B) $\frac{7 + 14 + 6 + 2h}{12} \geq 8$
 C) $\frac{7(6) + 14 + 6(3) + 2h}{12} \geq 8$
 D) $\frac{7 + 14 + 6 + h}{4} \geq 8$

2

Lily is in charge of organizing the PTA fundraiser. She is staffing a committee of at least 18 parents, with at least 5 from the senior class and 7 from the junior class. The goal of the fundraiser is to raise at least \$7,800 to rebuild the library. The senior parents are expected to raise at least \$435 each, and the junior parents are expected to raise at least \$610 each. Which of the following systems of inequalities represents these conditions if s is the number of senior parents and j is the number of junior parents?

- A) $610j + 435s \geq 7,800$
 $j + s \geq 18$
 $j \geq 7$
 $s \geq 5$
 B) $610s + 435j \geq 7,800$
 $j + s \geq 18$
 $j \geq 7$
 $s \geq 5$
 C) $610j + 435s \leq 7,800$
 $j + s \geq 18$
 $j \geq 7$
 $s \geq 5$
 D) $610s + 435j \geq 7,800$
 $j + s \geq 18$
 $j \geq 5$
 $s \geq 7$

3

Ken is saving up to buy a new bike that costs \$1,500, and aims to earn \$250 per week that he will put towards the bike. In order to earn enough money, he works two jobs, one as a waiter at which he earns \$14 per hour, and one as a mechanic at which he earns \$22 per hour. Because he also goes to school, he can only work at most 15 hours per week. Which of the following systems of inequalities represents this situation in terms of x and y , where x is the number of hours he works as a waiter per week, and y is the number of hours he works as a mechanic per week?

- A) $14x + 22y \geq 250$
 $x + y \geq 15$
 B) $14x + 22y < 250$
 $x + y < 15$
 C) $14x + 22y \geq 250$
 $x + y \leq 15$
 D) $14x + 22y \leq 1,500$
 $x + y < 15$

4

A restaurant buys its fish from a market downtown. The market does not have the capacity to deliver more than 135 pounds of fish per day. Each bass, b , they deliver weighs 4.6 pounds and each trout, t , they deliver weighs 3.9 pounds. If the restaurant wants to purchase at least three times as many bass as trout, which of the following systems of inequalities best represents this situation?

- A) $b \geq 3t$
 $4.6b + 3.9t \leq 135$
 B) $b \leq 3t$
 $3.9b + 4.6t \leq 135$
 C) $3b \geq t$
 $4.6b + 3.9t \leq 135$
 D) $3b \leq t$
 $3.9b + 4.6t \leq 135$

FUNCTIONS



FUNCTIONS

1

The period T , in seconds, of a pendulum is given by the equation $T = (6.3) \frac{\sqrt{L}}{9.8}$, where L is the length of the pendulum in meters. What length, in meters, must the pendulum be for the pendulum's period to be 3.15 seconds?

A) 2.21
B) 4.90
C) 16.88
D) 24.01

2

The thickness of a folded shirt is 22 millimeters. Chase is remodeling his closet and wants to know how high his stack of shirts will reach, in meters, if they are sitting on shelf that is 7 meters off the ground. Which of the following functions gives the total height, $f(t)$, in meters, of the stack of shirts off the floor if the stack is made up of t shirts?

A) $f(t) = 0.022t + 7$
B) $f(t) = 22t + 7$
C) $f(t) = 0.022t + 0.07$
D) $f(t) = 22t + 0.007$

3

The function h is defined as $h(x) = \frac{3x}{5} - 12$. What is the value of $h(-10)$?

A) -18
B) -6
C) 6
D) 12

4

The functions p and r are defined by $p(x) = 3x + 1$ and $r(x) = 6x - 3$. For what value of x does $p(x) + 2r(x) = 25$?

A) 0
B) 2
C) 3
D) 5

5

An oak tree is 2 feet tall at month 0 and grows 0.75 feet each month. Which function(s) below can be used to determine the height, $f(m)$, of the oak tree in m months?

- I. $f(m) = 2 + 0.75m$
 II. $f(m) = 2m + 3(m - 1)$
 III. $f(m) = f(m - 1) + 0.75$ where $f(0) = 2$

- A) I only
 B) III only
 C) I and II only
 D) I and III only

6

x	$f(x)$
2	10
5	31
9	59

Some values of the linear function f are shown in the table above. Which of the following defines f ?

A) $f(x) = 2x + 6$
 B) $f(x) = 3x + 4$
 C) $f(x) = 12x - 3$
 D) $f(x) = 7x - 4$

FUNCTIONS



FUNCTIONS

7

Keyton High School plans to decrease its number of faculty by t members each year beginning in 2020. If there are f faculty members at the end of 2019, which function best models the total number of faculty members, c , Keyton High School plans to have years after 2020?

- A) $c = f - tx$
- B) $c = fx - t$
- C) $c = f - t^x$
- D) $c = f - x^t$

Questions 8 and 9 refer to the following information.

$$B(p) = \frac{1}{3}p + 25$$

$$C(p) = 190 - p$$

The quantity of coffee beans bought by a roaster and the quantity of coffee beans bought by coffee shops are functions of the price of coffee beans. The function $B(p)$ shows how many bushels of coffee beans are bought by the roaster when each bushel costs p dollars, and the function $C(p)$ shows how many bushels of coffee beans are bought by coffee shops when each bushel costs p dollars.

8

How will the number of coffee bean bushels purchased by the roaster change if the price of one bushel is increased by \$18?

- A) The quantity purchased will increase by 6 bushels.
- B) The quantity purchased will decrease by 6 bushels.
- C) The quantity purchased will increase by 12 bushels.
- D) The quantity purchased will increase by 18 bushels.

9

The roaster obtains the coffee beans before the coffee shops can purchase them. Ideally, the roaster would like to purchase a certain quantity of bushels and then sell all of its coffee bean stock to coffee shops. At what price per bushel of coffee beans will the roaster be able to buy and then sell to coffee shops the same number of bushels?

- A) \$88.50
- B) \$99.00
- C) \$115.40
- D) \$123.75

10

At the Valley Pool Club, the average number of people, p , who visit the club on a given day can be expressed as a linear function of the temperature, t , and is given by $p(t) = 60 + 22t$. Which of the following statements is the best interpretation of the number 22 in this context?

- A) The number of people who visit the club when the temperature is 22 degree.
- B) The number of degrees at which the club will be open
- C) The average number of additional people who attend the club when the temperature rises by one degree
- D) The increase in the number of degrees required to make an average of 22 additional people attend the club

11

x	2	5	6	12	20
$f(x)$	-7	11	17	53	101

What is the value of $f(15)$ in the linear function f shown above?

- A) 71
- B) 77
- C) 83
- D) 87

FUNCTIONS



FUNCTIONS

12

$$t(y) = 0.017y + 61$$

Scientists have found that since 1975, the temperature of the earth has been increasing at an alarming rate. The function above is used by scientists to model the temperature $t(y)$, in degrees Celsius, of the Earth y years after 1975. According to the function, which of the following statements is true?

- A) The Earth's temperature increases between 0.015 and 0.020 degrees every year.
- B) The Earth's temperature increases between 1.5 and 2.0 degrees every decade.
- C) The Earth's temperature increases 1.5 and 2.0 degrees every year.
- D) The Earth's temperature increases between 0.15 and 0.20 degrees every decade.

13

Number of Giraffes in Kenya

Year	Number of Giraffes
1990	4,348
2010	2,928

The table above shows the number of giraffes in Kenya for the years 1990 and 2010. If the relationship between the number of giraffes and year is linear, which of the following functions, g , models the number of giraffes in Kenya t years after 1990?

- A) $g(t) = 4,348 - 7.1t$
- B) $g(t) = 4,348 - 71t$
- C) $g(t) = 4,348 - 71(t - 1990)$
- D) $g(t) = 4,348 - 7.1(t - 1990)$

14

$$h(t) = -\frac{1}{100}xt + x$$

A biologist estimates that the number of hairs on a human head decreases at a constant rate after a person turns 25. The function above is used by the biologist to model the number of hairs, $h(t)$, on a human head t years after the person turns 25, where x represents the total number of hairs he or she has at 25. According to the function, which of the following statements is true?

- A) Every year, one-hundredth of the hair someone currently has falls out.
- B) Every year, one-hundredth of the number of hairs someone had at age 25 falls out.
- C) After t years, a person will have one-hundredth of the original number of hairs they had at age 25 remaining.
- D) Every year after the age of 25, a person loses 100 hairs.

15

When Dana throws a ball, the height of the ball in meters, y meters, is modeled by the function $f(x) = 3 + 12x - 5x^2$, where x is the time in seconds the ball has been in the air. According to this model, which of the following times, in seconds, allows the ball to reach the greatest height?

- A) 0.6
- B) 0.8
- C) 1.0
- D) 1.2

16

If $f(x) = 12 - 2x^2$ and $f(x - 2y) = -2x^2 - 8x + 4$, what is the value of y ?

- A) -4
- B) -2
- C) -1
- D) 3

FUNCTIONS



FUNCTIONS

1

$$C = 50p + 2a$$

The formula above gives the monthly income C , in dollars, of a blog owner when he posts a total of p videos and has a ads appear on his page. If, in a particular month, the blog owner made less than \$500 dollars and at least 120 ads appeared on his page, what is the maximum number of videos the blog owner could have posted?

- A) 3
- B) 5
- C) 6
- D) 10

2

The cost of airing a radio spot is modeled by the function $C(n) = 320n + 780$, where n is the number of times the spot is aired. Based on this model, which statement is true?

- A) The radio spot costs \$0 to produce and \$320 per airing up to \$780.
- B) The radio spot costs \$320 to produce and \$780 each time it is aired.
- C) The radio spot costs \$780 to produce and \$320 each time it is aired.
- D) The radio spot costs \$1,100 to produce and can air an unlimited number of times.

3

When Tatiana goes to the gym, she spends a total of 15 minutes stretching, filling her water bottle, and tying her shoes. The equation $t = 5e + 15$ models the time, t , in minutes, Tatiana budgets for a trip to the gym during which she will do e exercises. Which of the following statements MUST be true according to Tatiana's model?

- A) She budgets 5 minutes per exercise.
- B) She budgets 10 minutes per exercise.
- C) She budgets 15 minutes per exercise for cardio and 5 minutes per exercise for strength-building.
- D) She budgets a 15 minute water break after each 5 exercises she completes.

4

If $f(x) = 2x^3 + 3x^2 - 12x$, then $f(-5) =$

- A) -385
- B) -265
- C) -175
- D) -115

5

If $f(x) = x^3 + 6x$, and $g(x) = 2x^2 + \sqrt{x}$, then what is the value of $f(5) + g(9)$?

- A) 10
- B) 45
- C) 295
- D) 320

6

x	$f(x)$	$g(x)$
5	2	-1
6	3	4
7	5	5
8	9	3
9	4	1

The table above shows some values of the functions f and g . For which value of x is $f(x) \cdot g(x) = 2x$?

- A) 6
- B) 7
- C) 8
- D) 9

7

$$a(x) = 2b(x) + 10$$

$$b(x) = 3x + 1$$

The functions a and b are defined above. What is the value of $a(2)$?

- A) 12
- B) 16
- C) 24
- D) 28

EXONENTS



ROOTS

1

$4x^3 \cdot 6x^2y^4 \cdot 5x^5y^2$ is equivalent to which of the following?

- A) $15x^{10}y^6$
- B) $15x^{30}y^8$
- C) $120x^{10}y^6$
- D) $120x^{30}y^8$

2

The normal amount of sodium in the water in a fish tank is 2.3×10^{-7} milligrams per liter. Yesterday, when the water was tested, the sodium level was exactly 1,000 times less than the usual amount. What concentration of sodium, in milligrams per liter, was in the water tested yesterday?

- A) $2.3 \times 10^{-7,000}$
- B) 2.3×10^{-10}
- C) 2.3×10^{-9}
- D) 2.3×10^{-4}

3

The expression $\sqrt[3]{(125a^{15}b^6)}$ is equivalent to

- A) $25a^5b$
- B) $25ab^2$
- C) $5a^5b^2$
- D) $5ab$

4

Which of the following expressions, if any, are equal for all real numbers r ?

- I. $\sqrt{r^4}$
- II. $-|r^2| - 1$
- III. $|-r^2|$

- A) I and II only
- B) I, II and III
- C) I and III only
- D) II and III only

5

$$\sqrt{4g^2 - 44} - h = 0$$

If $g > 0$ and $h = 10$ in the equation above, what is the value of g ?

- A) 3
- B) 6
- C) 8
- D) 15

6

$$\sqrt{x + 32} - 3\sqrt{x + 4} = 0$$

What value of x satisfies the equation above?

- A) -2.0
- B) -0.5
- C) 1.75
- D) 4.25

7

Which of the following is equivalent to

$$\left(\frac{1}{4}a + 8ab\right)^2 ?$$

- A) $\frac{1}{16}a^2 + 64ab^2$
- B) $a\left(\frac{a}{16} + 4ab + 64ab^2\right)$
- C) $a\left(\frac{a}{16} + 64b^2\right)$
- D) $a\left(\frac{a}{16} + 64ab^2\right)$

EXPONENTS



ROOTS

8

Which of the following expressions is equivalent to $(25x^8)^{\frac{1}{2}}$?

- A) $5x^4$
- B) $\sqrt{5x^5}$
- C) $5\sqrt{x}$
- D) $25\sqrt{x^4}$

9

$$\frac{a^{-5}b^{\frac{1}{3}}c^3}{a^3b^2c^4d}$$

In the expression above, a , b , c , and d are all greater than 0. Which of the following is equivalent to the expression?

- A) $\frac{b^{\frac{2}{3}}}{a^8cd}$
- B) $\frac{b^{\frac{3}{2}}c^7}{a^2d}$
- C) $\frac{b^2\sqrt[3]{b}}{a^8cd}$
- D) $\frac{a^8\sqrt[3]{b^2}}{c^7d}$

10

What is the set of all solutions to the equation

$$\sqrt{x+20} = -x?$$

- A) $\{-4\}$
- B) $\{5\}$
- C) $\{-4, 5\}$
- D) There are no solutions to the given equation.

11

For a positive real number p , where $p^3 = 4$, what is the value of p^{12} ?

- A) 16
- B) 36
- C) 64
- D) 256

12

$$\sqrt{9p} = p - 4$$

What are all values of p that satisfy the equation above?

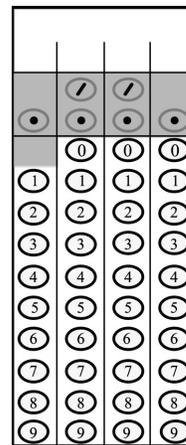
- I. 1
- II. 16

- A) I only
- B) II only
- C) I and II
- D) Neither I nor II

13

$$\sqrt[3]{\frac{4h^5}{3}} = \frac{1}{3}h$$

If $h > 0$, what is the value of h that satisfies the equation above?



14

Which of the following expressions is equivalent to $(-3x^4)^{\frac{4}{3}}$?

- A) $3x^5 \cdot \sqrt[3]{3x}$
- B) $-3x^5 \cdot \sqrt[3]{3x^2}$
- C) $27 \cdot \sqrt[3]{3x^{16}}$
- D) $9x^3 \cdot \sqrt[3]{x^5}$

POLYNOMIALS



POLYNOMIALS

1

$$16x^4 + 24x^2y^3 + 9y^6$$

Which of the following expressions is equivalent to the one shown above?

- A) $(4x + 3y^3)^4$
- B) $(4x^2 + 3y^3)^2$
- C) $(4x^2 + 3y^3)^4$
- D) $(4x^4 + 3y)^6$

2

Which of the following expressions is equivalent to $5g^2 + 3h^3 + 12g - 4h(h^2 + 3h) - g^2$?

- A) $6g^2 + 7h^3 + 12g - 12h^2$
- B) $4g^2 + h^3 + 12(g + h^2)$
- C) $6g^2 - h^3 + 12g - h^2$
- D) $4g^2 - h^3 + 12(g - h^2)$

3

What is the value of $4x^2 + 7x - 3$ subtracted from $2x^2 + 9x - 1$?

- A) $-2x^2 + 2x + 2$
- B) $-2x^2 - 2x - 2$
- C) $-2x^2 + 16x - 4$
- D) $2x^2 - 2x - 2$

4

What is the result when $(x - 3)^2$ is subtracted from $(2x - 7)^2$?

- A) $4x^2 - 28x + 49$
- B) $x^2 - 6x + 9$
- C) $5x^2 - 34x + 58$
- D) $3x^2 - 22x + 40$

5

If $A = 9x^2 + 7x - 2$ and $B = -6x^2 - x + 12$, then $A + B$ equals

- A) $23x - 14$
- B) $3x^2 + 8x - 4$
- C) $3x^2 + 6x + 10$
- D) $15x^2 + 8x - 14$

6

Which of the following expressions is equivalent to $x^2 + 12x + 27$?

- A) $(x + 9)(x + 3) - 2$
- B) $(x + 12)(x + 1) + 3$
- C) $(x + 4)(x + 8) - 5$
- D) $(x + 6)(x + 6) + 9$

7

Which of the following is equivalent to $5(x^2 - 3x) + 2(x^2 - 3x)$?

- A) $7x^2 - 21x$
- B) $7x^2$
- C) 7
- D) $7x^2 - 3x$

8

$$10x^2 + 7(x + 4) - 3x(x + 1)$$

Which of the following polynomials is equivalent to the expression above?

- A) $10x^2 + 7x + 28$
- B) $7x^2 + 4x + 28$
- C) $10x^2 - 4x + 28$
- D) $7x^2 - 7x + 28$

POLYNOMIALS



POLYNOMIALS

9

$(x^3 + 4x^2 - 13) - (-5x^2 - 14x + 11)$ is equivalent to

- A) $x^3 + 9x^2 + 14x - 24$
- B) $x^3 - x^2 - 14x - 2$
- C) $x^3 - x^2 + 14x - 2$
- D) $x^3 + 9x^2 - 14x + 2$

10

A t-shirt company produces t units of a product per week, where $C(t)$ represents the total cost and $R(t)$ represents the total revenue for the week. The functions are modeled by $C(t) = 120t + 135$ and

$R(t) = -0.75t^2 + 520t - 80$. If the profit is calculated by finding the difference between revenue and cost where $P(t) = R(t) - C(t)$, what is the total profit, $P(t)$, for any given week?

- A) $P(t) = -0.75t^2 + 400t - 215$
- B) $P(t) = 0.25t^2 + 640t - 215$
- C) $P(t) = -0.75t^2 + 640t + 215$
- D) $P(t) = 0.75t^2 - 400t + 215$

11

If $(6x + 4)^2$ is written in the form $ax^2 + bx + c$, where a , b , and c are integers, $(a + b) - c$ is equal to what value?

- A) 4
- B) 28
- C) 68
- D) 72

12

$$C(x) = -(1.3x - 3)^2 + 16$$

The above equation represents the projectile path of a catapult launched from a height of 29 meters. Which of the following is an equivalent equation?

- A) $C(x) = 1.69x + 13$
- B) $C(x) = -1.69x^2 + 7.8x + 7$
- C) $C(x) = -1.69x^2 - 3.9x - 9$
- D) $C(x) = 1.69x^2 + 7.8x + 16$

13

$$(x^3 - y^3)(z^3 + y^3)$$

Which of the following expressions is equivalent to the above equation?

- A) $(xyz)^3 - y^6$
- B) $(yx)^3 + (xz)^3 - (yz)^3 - y^6$
- C) $x^3 - y^3 + xz^2 + zy^3 + y^6$
- D) $x^3y^3 + z^3 - y^3$

14

If $z^2 + y^4 = q$ and $zy^2 = r$, which of the following is equivalent to $25q + 50r$?

- A) $(5z + 5y^2)^2$
- B) $(5z + 10y)^2$
- C) $(25z + 25y^2)^2$
- D) $(5z + 5y)^4$

QUADRATIC



FUNCTIONS

1

What are the values for y that satisfy the equation $(y - 2g)(y + 3h) = 0$?

- A) $-2g$ and $-3h$
- B) $-2g$ and $3h$
- C) $2g$ and $-3h$
- D) $\frac{1}{2}g$ and $-3h$

2

Which of the following quadratic equations has solutions $x = 4p$ and $x = -2q$?

- A) $x^2 - 8pq = 0$
- B) $x^2 - 2x(q + 2p) + 8pq = 0$
- C) $x^2 + 2x(q + 2p) - 8pq = 0$
- D) $x^2 + 2x(q - 2p) - 8pq = 0$

3

$f(x)$	x
-2	0
0	-3
2	-5
4	-11

The function f is defined by a polynomial. The chart above shows some values of $f(x)$ and x . Which of the following must be a factor of $f(x)$?

- A) $x + 3$
- B) $x + 2$
- C) $x - 3$
- D) $x - 2$

4

$$x(x + 3) = 18$$

Which of the following lists all the solutions of the equation above?

- A) -6 and 3
- B) 6 and -3
- C) 9 and 2
- D) -9 and -2

5

$$x^2 - 6x - 40$$

If h is a solution to the equation above, and $h > 0$, what is the value of h ?

	/	/	
	.	.	.
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

6

If $g(x) = x^2 - 8x + 3$ and d is a negative integer greater than -4 , what is one possible value of $g(d)$?

	/	/	
	.	.	.
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

QUADRATIC



FUNCTIONS

7

$$f(v) = 3v^2 - 25v - 88$$

The path a wrecking ball swings on at the end of its chain can be represented by the equation above. Which of the following equations is equivalent to the one given above?

- A) $f(v) = (v + 9)(v - 7)$
- B) $f(v) = v^2 - 24v - 26$
- C) $f(v) = (v + 8)(3v - 11)$
- D) $f(v) = (v^2 + 8)(3v - 12)$

8

For all $x > 8$, $\frac{(x^2 + 2x - 8)(x + 6)}{(x^2 + 10x + 24)(x + 2)} = ?$

- A) $\frac{(x + 6)}{(x + 4)}$
- B) $\frac{1}{(x + 2)}$
- C) 1
- D) $\frac{(x - 2)}{(x + 2)}$

9

$$\begin{aligned} p^2 - q^2 &= 91 \\ p + q &= 7 \end{aligned}$$

What is the value of $p - q$?

- A) 13
- B) 17
- C) 35
- D) Cannot be determined from the information given.

10

If $(x + 4)$ is a factor of $2x^2 + kx - 24$, what is the value of k ?

- A) -1
- B) 2
- C) 4
- D) 6

11

What is the sum of the 2 solutions of the equation $x^2 - 4x - 21$?

- A) -7
- B) -4
- C) 0
- D) 4

12

If $a + b = 6$ and $a - b = -4$, what is the value of $a^2 - b^2$?

- A) -24
- B) -10
- C) 2
- D) 12

13

$$\frac{(x + 2)}{(x^2 - 24x + 128)}$$

Which of the following is a value of x for which the expression above is undefined?

- A) -8
- B) -2
- C) 2
- D) 16

14

$$\sqrt{x + j} = x + 7$$

If j is equal to 19, what is the solution set of the equation above?

- A) $\{-10, -3\}$
- B) $\{-10, 0\}$
- C) $\{0\}$
- D) $\{3, 10\}$

QUADRATIC



FUNCTIONS

15

$$\frac{3x}{(x^2 + 5x + 6)} + \frac{5}{(x + 3)}$$

Which of the following expressions is equivalent to the one shown above, where x is not equal to -2 or -3 ?

- A) $\frac{2(4x + 5)}{(x + 3)(x + 2)}$
 B) $\frac{(8x + 10)}{(x + 3)}$
 C) $\frac{(2x + 4)}{(x + 2)}$
 D) $\frac{(8x + 5)}{(x + 3)(x + 2)}$

16

$$px^3 + qx^2 + rx + s = 0$$

In the equation above, p , q , r , and s are constants. If the equation has the roots -7 , 6 , and 2 , which of the following is a factor of $px^3 + qx^2 + rx + s = 0$?

- A) $x - 7$
 B) $x + 6$
 C) $x - 2$
 D) $x + 2$

17

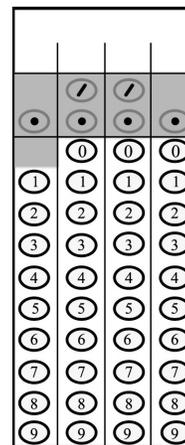
$$q(x) = x^2 + 14x + k$$

In the function above, k is a constant. If -6 is a root of the function, what is the value of k ?

- A) -48
 B) -8
 C) 8
 D) 48

18

The function g is defined by $g(x) = (x + 9)(x - 3)^5$. If the expression $(y + 1)$ is a factor of the function g , what is the value of y if $y > 0$?



19

$$\frac{1}{4}x^2 = \frac{1}{2}fx - \frac{3}{2}g$$

In the equation above, f and g are constants. What are the solutions for x ?

- A) $x = f \pm \sqrt{(f^2 - 6g)}$
 B) $x = -f \pm \sqrt{(f^2 - 24g)}$
 C) $x = 2f \pm \sqrt{(4f^2 - 6g)}$
 D) $x = -2f \pm \sqrt{(4f^2 - 6g)}$

20

$$(px + 6)(12 - qx) = 6x^2 + rx + 72$$

If the equation above is true for all values of x , and $p + q = -5$, what are the two possible values for r ?

- A) 24 and 66
 B) -84 and 76
 C) -78 and 48
 D) 24 and 114

EXPONENTIAL



FUNCTIONS

1

A landlord charges a late fee on rent payments that are overdue. The equation $r = 2650(1.24)^d$ represents the value, r , of rent owed when it is d days past due. What is the y -intercept of this equation and what does it represent?

- A) 0.24, the percent the landlord increases the rent by each day it is past due
- B) 2650, the maximum amount the landlord can charge for rent
- C) 2650, the regular monthly cost of rent without any late fees
- D) 636, 24% of the regular monthly cost of rent without any late fees

2

A certain family of microorganisms that resides in Lake Erie triples every 10 days. If the population is currently at 120, what will the number of microorganisms be after 40 days?

- A) 360
- B) 960
- C) 1,440
- D) 1,920

3

The current population of TINYTOWN is 23,040. If the population, P , increases by 16% each year, which equation could be used to find the population after t years?

- A) $23,040 + (1.16)^t$
- B) $23,040(1.016)^t$
- C) $23,040(1.16)^t$
- D) $23,040 + (0.84)^t$

4

The breakdown of a radioactive chemical compound is represented by the function $f(t) = 189(0.29)^t$ where $f(t)$ represents the number of milliliters remaining of the substance and t represents the time, in years. In the function $f(t)$, what do 189 and 0.29 represent?

- A) 189 represents the initial amount of the substance, and 0.29 represents the rate of decay of 29%.
- B) 189 represents the number of years the substance has been decaying, and 0.29 represents the rate of growth of 29%.
- C) 189 represents the amount of the substance remaining, and 0.29 represents the initial amount of the substance.
- D) 189 represents the initial amount of the substance, and 0.29 represents the rate of decay of 71%.

5

Josephine invested \$725 in a savings account at a 2.8% annual interest rate, compounded annually. She made no additional deposits or withdrawals on the account for 7 years. What is the value, to the nearest dollar, of the balance in the account after 7 years? (Note: Do not grid the dollar sign.)

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

EXPONENTIAL



FUNCTIONS

6

As president of the PTA, Lizzy was responsible for raising money each year to cover the cost of the senior prom. The first year she raised \$5,600, and for each of the next 4 years, she tripled the amount she had earned the previous year. If $f(d)$ is the amount of money, in dollars, Lizzy earns d years after the first year, which of the following statements best describes the function f ?

- A) The function f is a decreasing quadratic function.
- B) The function f is an increasing exponential function.
- C) The function f is an increasing linear function.
- D) The function f is a decreasing exponential function.

7

Sylvia deposited \$7,650 in an account at Livingstone Banking Center, earning 3.6% interest, compounded annually. If she has made no additional deposits or withdrawals, what equation can be used to find S , her account balance after t years?

- A) $S = 7,650(1.36)^t$
- B) $S = 7,650 + (1.036)^t$
- C) $S = 7,650 + (0.036)^t$
- D) $S = 7,650(1.036)^t$

8

An urban studies expert studies the levels of pollution in the local river. At the start of the experiment, the river had 105 ppm (parts per million) of pollution. The expert observes that this level of pollution doubles every 4 years. Which of the following equations best models the amount, p , of pollution, in ppm, that will be in the river t years after the start of the experiment?

- A) $p = 105(2)^t$
- B) $p = 105(4)^{4t}$
- C) $p = 105(2)^{\frac{t}{4}}$
- D) $p = 105(1.5)^{\frac{t}{4}}$

9

$$G = 720(1.04)^m$$

The equation above models the number of members of an online gaming community, G , m months after the community is founded. Of the following, which equation models the number of members of the community y years after the community has been founded?

- A) $G = 720(2.08)^y$
- B) $G = 720(1.04)^{\frac{y}{12}}$
- C) $G = 720(0.04)^{\frac{12y}{1}}$
- D) $G = 720(1.12)^{\frac{12}{y}}$

10

Which of the following describes an exponential relationship between the variables described?

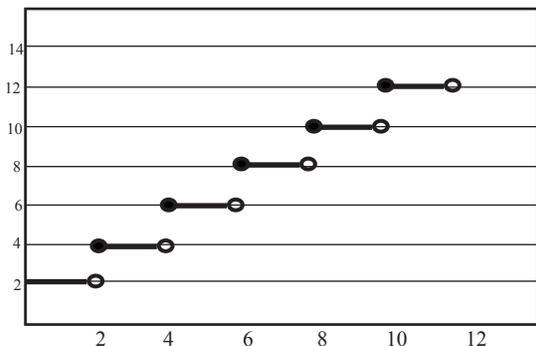
- A) For each minute, m , the height of an airplane, h , increases at a constant rate of 125 meters.
- B) With every 22 foot increase in the height of a building, h , the air pressure, p , increases by 1.8 pounds per square inch.
- C) For each additional pound, p , a package weighs, the cost to ship it, c , increases by 7.5%.
- D) The amount of juice, j , in liters, remaining in a carton decreases by a constant rate of 0.24 liters per day, d .

FUNCTION



GRAPHS

1

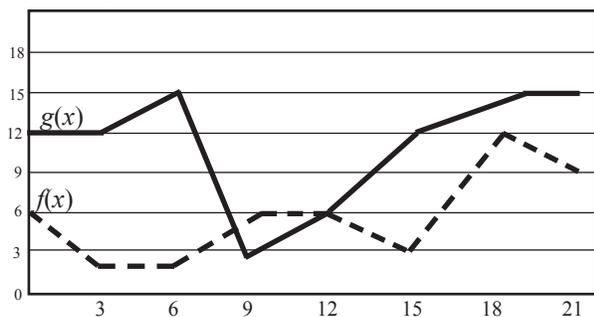


In the graph of function h , shown above, what is the value of $h(2) + h(4) + h(8)$?

- A) 20
- B) 18
- C) 16
- D) 14

Questions 2 and 3 refer to the following information.

The complete graph of functions f and g are shown in the graph below.



2

What is the value of $f(g(15))$?

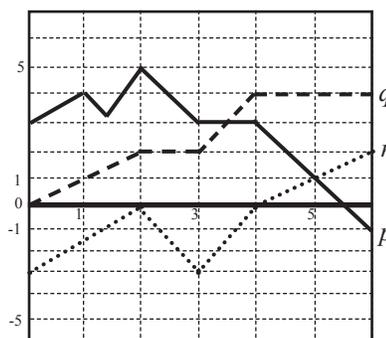
- A) 4
- B) 6
- C) 8
- D) 12

3

Which of the following is true about functions f and g ?

- I. Function g is greater than function f over the interval $0 \leq x \leq 21$.
 - II. Function f is less than function g over the interval $15 \leq x \leq 21$.
 - III. Function g is equal to function f at exactly two points.
- A) I only
 - B) II and III only
 - C) I, II, and III only
 - D) None

4



Where does the sum of the functions of p , q and r equal 0?

- A) $x = 0$
- B) $x = 5$
- C) $x = 2$ or $x = 4$
- D) $x = 3$

QUADRATIC



GRAPHS

4

The graphs in the xy -plane of the following quadratic equations each have x -intercepts of 3 and -6 . The graph of which equation has the greatest absolute value of the y -coordinate of the vertex?

- A) $y = -12(x - 3)(x + 6)$
- B) $y = 22(x - 3)(x + 6)$
- C) $y = -0.25(x - 3)(x + 6)$
- D) $y = 1.5(x - 3)(x + 6)$

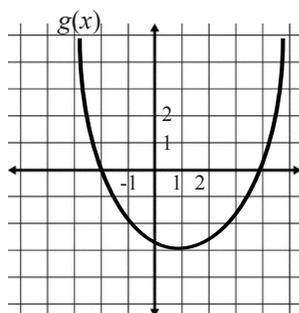
5

What is the vertex of the parabola represented by the equation

$$y = -6x^2 + 24x + 16?$$

- A) $(-2, 35)$
- B) $(-0.5, 16)$
- C) $(0.5, 24)$
- D) $(2, 40)$

6



x	$h(x)$
-3	-4
-1	-6
0	0
2	5
4	4
5	-8

The graph of the function g is shown in the xy -plane above, and certain values for the function h are displayed in the table. For which of the following values of x is the product of $h(x)$ and $g(x)$ positive?

- A) -3
- B) -1
- C) 2
- D) 4

7

$$y = x^2 + 10x + 34$$

The graph of the equation above in the xy -plane is a parabola. Which of the following equivalent forms of the equation include the x and y -coordinates of the vertex as constants?

- A) $y = (x + 5)^2 + 9$
- B) $y = x(x + 10) + 34$
- C) $y = x^2 + 2(5x + 17)$
- D) $y - 34 = x^2 + 10x$

8

$$d(x) = 12x^2 - 13x - 8$$

The quadratic function above models the depth below sea level, d , of a submarine x seconds after it has descended vertically. If $y = d(x)$ is graphed in the xy -plane, which of the following represents the real-life meaning of the positive x -intercept of the graph?

- A) The initial depth of the submarine
- B) The maximum depth of the submarine
- C) The time at which the submarine reaches the surface of the water after its descent
- D) The time at which the submarine reaches its greatest depth

9

If $y = 5x^2 - 6x + 4$ is graphed in the xy -plane, which of the following characteristics of the graph is displayed as a constant or coefficient in the equation?

- A) the x -intercepts
- B) the y -intercept
- C) the x -coordinate of the vertex
- D) the x -coordinate of the axis of symmetry

QUADRATIC

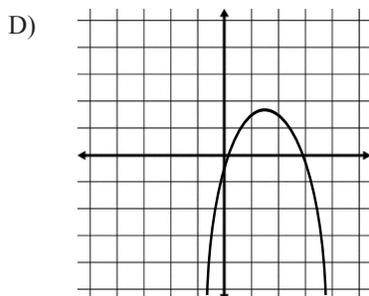
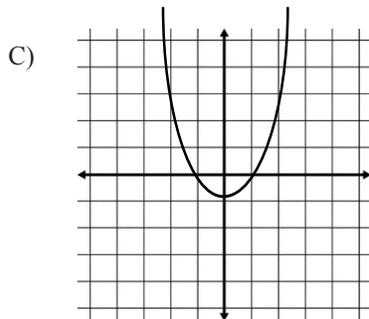
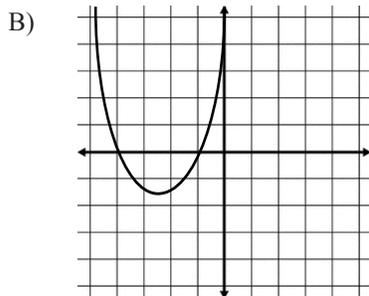
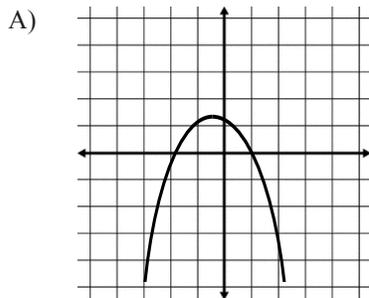


GRAPHS

10

$$g(x) = (x - h)(x + j)$$

The function g is defined above. If h is a negative integer and j is a positive integer, which of the following could represent the graph of $y = g(x)$?

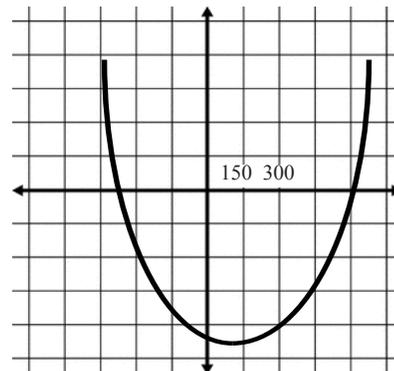


11

In the xy -plane, the graph of the function h crosses the x -axis at exactly two distinct points, $(c, 0)$ and $(d, 0)$, where $c > 0$ and $d < 0$. Which of the following could be the function h ?

- A) $h(x) = (x + c)(x + d)$
 B) $h(x) = (x + c)(x - d)$
 C) $h(x) = (x + d)(x - c)$
 D) $h(x) = (x - d)(x - c)$

12



Based on the graph of function g shown above, which of the following is a factor of $g(x)$?

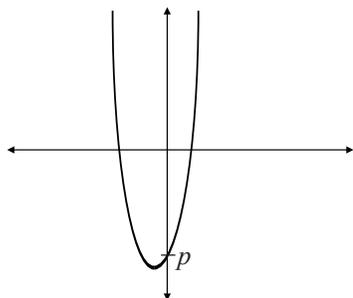
- A) $x - 2.5$
 B) $x + 2.5$
 C) $x - 600$
 D) $x + 600$

QUADRATIC



GRAPHS

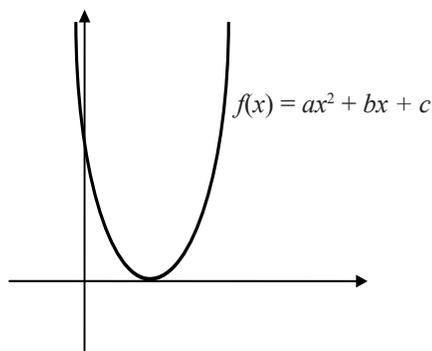
1



The graph of $y = 4x^2 + 5x - 9$ is shown on the xy -plane above. If the y -intercept occurs at the point $(0, p)$, what is the value of p ?

- A) -12
- B) -9
- C) -5
- D) -4

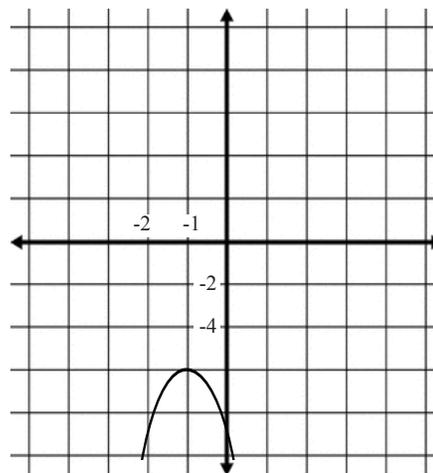
2



The vertex of the parabola shown on the xy -plane above is $(k, 0)$. Which of the following is true about the parabola with the equation $f(x) = -ax^2 + bx - c$?

- A) The vertex is $(0, k)$ and the graph opens downward.
- B) The vertex is $(-k, 0)$ and the graph opens upward.
- C) The vertex is $(0, -k)$ and the graph opens downward.
- D) The vertex is $(-k, 0)$ and the graph opens downward.

3



The graph of the function f in the xy -plane above is a parabola. Which of the following defines f ?

- A) $f(x) = -3(x + 1)^2 - 6$
- B) $f(x) = -2(x + 3)^2 - 6$
- C) $f(x) = -(x - 1)^2 - 6$
- D) $f(x) = (x + 1)^2 - 6$

4

In the xy -plane, the graph of the function $g(x) = x^2 + 11x + 24$ has two x -intercepts, a and b . What is the distance between a and b ?

- A) 3
- B) 5
- C) 8
- D) 11

5

Which of the following equations has a graph in the xy -plane with exactly one x -intercept?

- A) $y = x^2 + 4x + 8$
- B) $y = x^2 - 12x + 36$
- C) $y = x^2 - 3x + 9$
- D) $y = x^2 + 6x - 6$

ADVANCED



GRAPHS

1

What is the x -coordinate of the point in the standard xy -plane at which the lines $y = 3x + 1$ and $y = 4x + 5$ intersect?

- A) -11
- B) -4
- C) -1
- D) 6

2

The equations $y = x^3 - 9x + 16$ and $y = 7x + 16$ intersect at three points. Which of the following is the solution set for the intersection of these two equations?

- A) $(0,16)$, $(-4,-44)$, $(-12,0)$
- B) $(0,16)$, $(-4,-12)$, $(4,44)$
- C) $(4,12)$, $(8,10)$, $(0,0)$
- D) $(-4,12)$, $(0,24)$, $(44,4)$

3

$$\begin{aligned}x^2 + 3y &= 10 \\ 6 + y &= x\end{aligned}$$

Which value is an x -coordinate of a solution to the system of equations above?

- A) -13
- B) -7
- C) 8
- D) 12

4

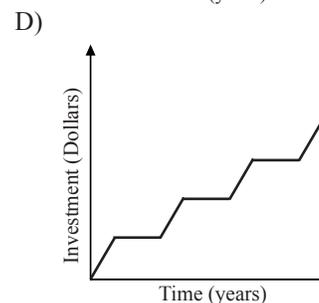
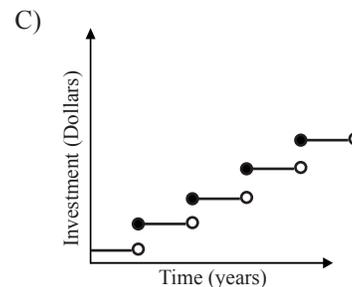
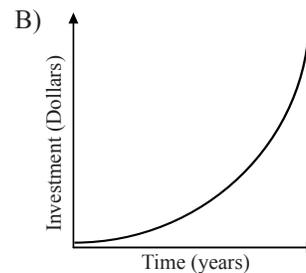
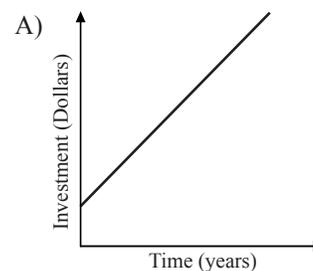
$$\begin{aligned}xk + 3y &= 4 \\ 4k + x^2 &= y\end{aligned}$$

In the system of equations above, k is a constant. If, when the equations are graphed in the xy -plane, the graphs intersect in exactly two locations, which of the following CANNOT be the value of k ?

- A) -8
- B) -1
- C) 0
- D) 3

5

The Lovetrust Matchmaking Company secured an investment from a venture capital firm. The firm promised to invest \$1,500 the first year, and then triple its investment every year for the next y years. Which of the following graphs best models the value of the investment over the next 10 years?

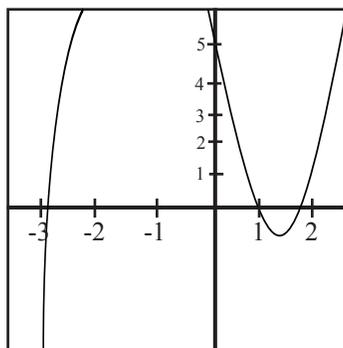


ADVANCED



GRAPHS

6

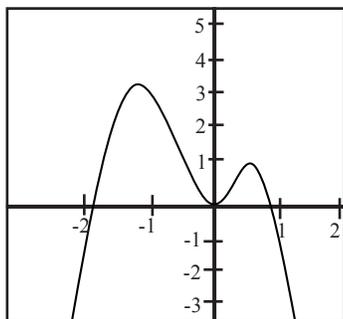


Which of the following equations could be the equation for the graph shown above?

- A) $y = x^3 - 6x + 5$
- B) $y = x^3 - x^2$
- C) $y = 10x(x^2 - 3)$
- D) $y = x^4 - x^2 + 3$

7

The function $f(x) = -4x^4 - 3x^3 + 5x^2$ is graphed in the xy -plane below.

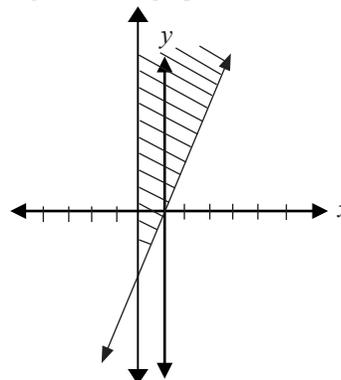


If the answer set for $f(x) = m$ has four possible solutions, which of the following could be the value of m ?

- A) 1
- B) 0.5
- C) -1
- D) -2

8

Which of the following systems of inequalities is represented by the shaded region of the graph below?



- A) $y \geq 3x$ and $x \geq -1$
- B) $y \leq 3x$ and $x \leq -1$
- C) $y \leq 3x$ and $x \geq -1$
- D) $y \geq 3x$ or $x \geq -1$

9

Jesse and Priscilla are each saving money to buy an apartment. The total amount of money Jesse will save is modeled by the function $j(m) = 70 + 10m$. The total amount of money Sarah will save is modeled by the function $p(m) = m^2 + 46$. After how many months, m , will they have the same amount of money saved?

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

ADVANCED



GRAPHS

10

$$y = (x + g)(x - h)^2(x - g)$$

If g and h in the equation above are distinct negative constants, when the equation is graphed on the xy -plane, how many distinct positive zeroes does the graph have?

- A) 0
- B) 1
- C) 3
- D) 4

11

$$y = 4x + 10$$

$$y = (x + 5)(x - 2)$$

When the system of equations above is graphed in the xy -plane, at which of the following points do the graphs of the equations intersect?

- A) $(-4, -6)$
- B) $(-2, 5)$
- C) $(0, 3)$
- D) $(2, 18)$

12

$$y = -7$$

$$y = cx^4 + d$$

In the system of equations above, c and d are constants. For which of the following values of c and d do these equations intersect in exactly one place?

- A) $c = 3, d = 7$
- B) $c = -3, d = 10$
- C) $c = 5, d = -10$
- D) $c = 5, d = -7$

13

$$y \leq 3x$$

$$y \geq 12x - 885$$

In the xy -coordinate plane, if a point with coordinate (x, y) lies in the solution set of the system of inequalities above, what is the maximum possible value of y ?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

14

In the xy -plane, the graph of $y = 4x^2 + 3x$ intersects the line $y = -2x$ at the points $(0, 0)$ and (p, q) . What is the value of $-2pq$?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

ADVANCED

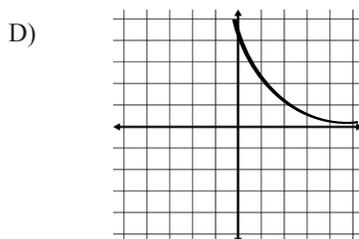
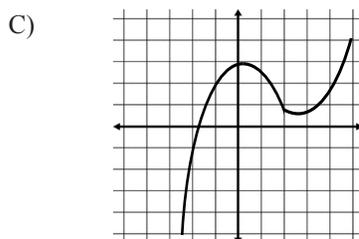
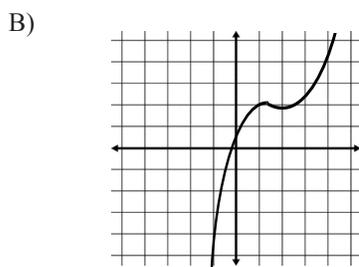
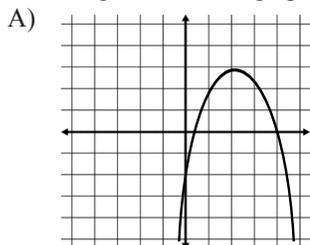


GRAPHS

1

x	$f(x)$
0	g
2	h
4	j

For the function f , the table above shows the values of x and their corresponding $f(x)$ values. If $g > j > h$, which would the following could be the graph of $f(x)$?



2

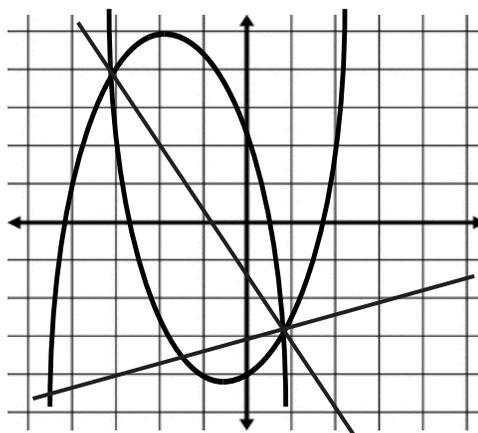
$$y \leq 3x - 6$$

$$y \geq -5x + 3$$

The system of inequalities above is graphed in the xy -plane, and point P is located in the solution set. Which of the following could be the coordinates of point P ?

- A) (0, 8)
 B) (3, -4)
 C) (-2, 5)
 D) (1, 0)

3



A system of four equations is graphed in the xy -plane shown above. How many solutions does the system have?

- A) 0
 B) 1
 C) 2
 D) 3

4

In the xy -plane, the parabola with the equation $y = x^2 - 2x$ intersects the line with the equation $y = 63$ at two points, C and D . What is the length of the line segment that connects C and D ?

- A) 2
 B) 7
 C) 9
 D) 16

ADVANCED



GRAPHS

5

$$\begin{aligned}y &< 6x + 8 \\ 4x &< 15\end{aligned}$$

Which of the following consists of the y -coordinates of all the points that satisfy the system of equations above?

- A) $y < 18.75$
- B) $y < 30.5$
- C) $y < 35.25$
- D) $y > 40.0$

6

$$\begin{aligned}y &= x^2 - 18 \\ 4x + 2y &= 12\end{aligned}$$

If (x, y) is a solution to the system of equations above and $y < 0$, what is the value of $x + y$?

- A) -6
- B) -2
- C) 2
- D) 4

7

$$\begin{aligned}y &= -10 \\ y &= 3x^2 + 11x\end{aligned}$$

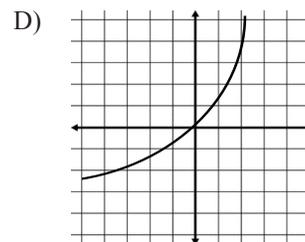
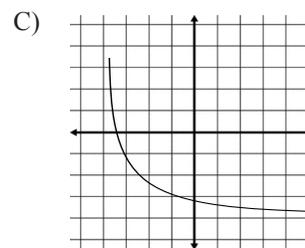
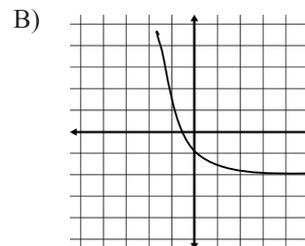
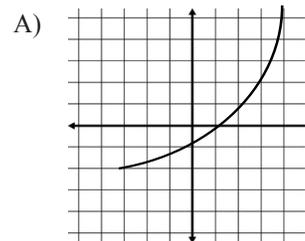
The system of equations above is graphed in the xy -plane. The graphs intersect at point (x, y) , where x and y are both integers. What is the x -coordinate of this point of intersection?

- A) -10
- B) -2
- C) 4
- D) 8

8

$$g(x) = 4^x - 2$$

The function g is defined by the equation above. Which of the following is the graph of $y = g(-x)$?

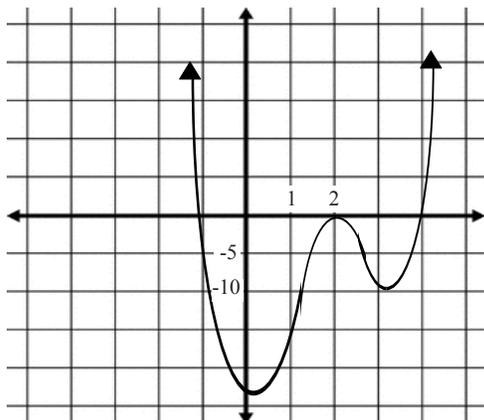


ADVANCED



GRAPHS

9



The graph of function g is shown in the xy -plane above, where $y = g(x)$. Which of the following functions could define g ?

- A) $g(x) = (x - 2)^2(x + 1)(x - 4)$
- B) $g(x) = (x + 2)(x - 1)^2(x + 4)$
- C) $g(x) = (x - 2)(x + 1)(x - 4)$
- D) $g(x) = (x + 2)^2(x - 1)^2(x + 4)$

10

$$y = 3x^2 - 6x + 2$$

$$y + 4x = -5$$

How many solutions are there to the system of equations above?

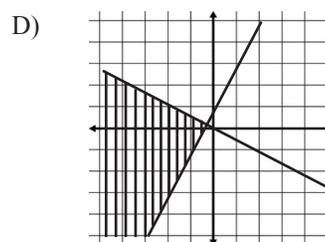
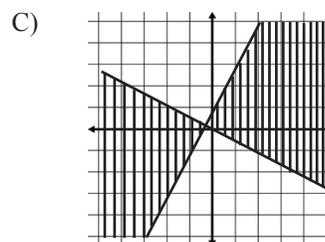
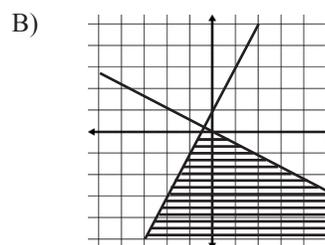
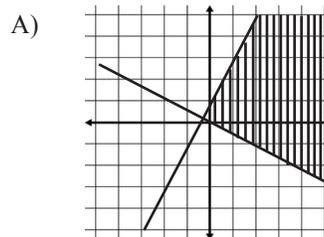
- A) There are an infinite number of solutions.
- B) There is exactly one solution.
- C) There are exactly two solutions.
- D) There are no solutions.

11

$$y \leq 2x + 1$$

$$4y + 3x \geq 0$$

In which of the following graphs does the shaded region represent the solution set to the system of inequalities shown above?



IMAGINARY



NUMBERS

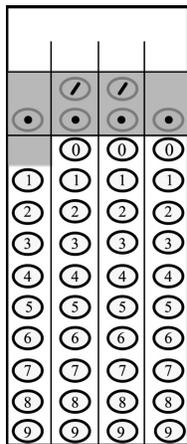
1

For $i = \sqrt{-1}$, what is the sum of complex numbers $65 - 12i$ and $-3 + 6i$?

- A) $62 + 6i$
 B) $67 - 30i$
 C) $62 - 6i$
 D) $30 - 67i$

2

In the complex number system, what is the value of the expression $8i^4 + 3i(2i^3) - 2i^2 + 1$?
 (Note: $i = \sqrt{-1}$)



3

$$\frac{6 - 6i}{i + 3} + (4 + 2i)$$

Which of the following is equivalent to the above expression?

- A) $\frac{16 + 4i}{i + 3}$
 B) $16 + \frac{4i}{i + 3}$
 C) $6 - 6i + \frac{10 + 10i}{i + 3}$
 D) $\frac{52 - 4i}{10}$

4

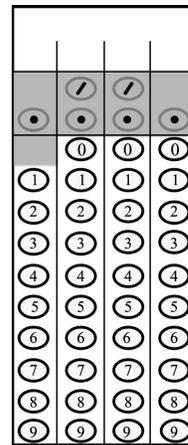
In the complex numbers, where $i^2 = -1$, what is the value of $\frac{i^3}{1 + i} \div \frac{-i}{i - 1}$?

- A) 0
 B) $\frac{1 + i}{1 - i}$
 C) $i + 1$
 D) $\frac{-1}{i + 1}$

5

$$(2 - 4i)(6 + i) = a + bi$$

In the equation above, a and b are real numbers and $i = \sqrt{-1}$. What is the value of $a - b$?



COORDINATE



GEOMETRY

1

In the coordinate plane, function g has a positive slope and a y intercept of 0, while function f has a negative slope and a y intercept of 8. In which quadrant will the two lines intersect?

- A) Quadrant 1
- B) Quadrant 2
- C) Quadrant 4
- D) They won't intersect.

2

$$y = 8x + 3$$

An equation of line a , in the xy -plane is shown above. Another line, line b , has a slope half that of line a , and a y -intercept that is three times greater than that of line a . At which point (x,y) do lines a and b intersect?

- A) (0, 7.5)
- B) (1.5, 15)
- C) (3, 9)
- D) (12, 12)

3

A circle in the xy -plane lies tangential to the x -axis at 9 and the y -axis at 9. What is the equation of the circle?

- A) $x^2 + y^2 = 3$
- B) $x^2 + y^2 = 81$
- C) $(x - 9)^2 + (y - 9)^2 = 81$
- D) $(x + 3)^2 + (y + 3)^2 = 9$

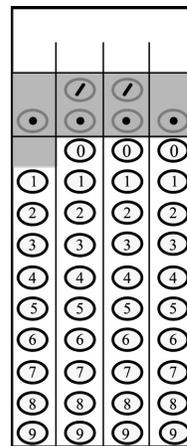
4

What is the area of a circle with the equation $x^2 + y^2 = 64$, on the xy -plane?

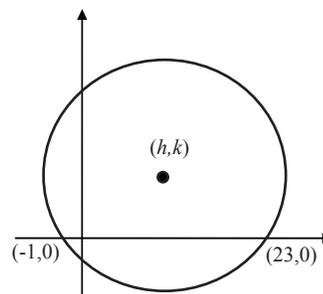
- A) 8π
- B) 16π
- C) 64π
- D) 128π

5

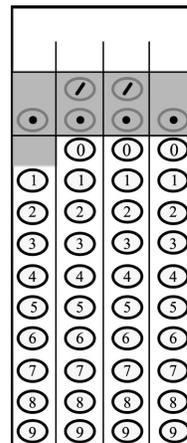
In the xy -plane, line h passes through the point $(8,0)$ and is parallel to the y -axis. If the point $(x,-9)$ is on line h , what is the value of x ?



6



The circle in the xy -plane shown above is centered at (h,k) , has a radius of 15, and passes points $(-1,0)$ and $(23,0)$. What is the value of hk ?



COORDINATE



GEOMETRY

7

In the xy -plane, the graph of the line P is $y = 0.75x + 2.5$ and the graph of the line R contains the points $(-12, -35.4)$ and $(15, 30.75)$. Lines P and R intersect at exactly one point, (a, b) . What is the value of ab ?

- A) 10
 B) $\frac{130}{11}$
 C) $\frac{125}{4}$
 D) 100

8

Square $WXYZ$ lies in the coordinate plane and has vertices $Y(3, 2)$ and $Z(8, 6)$. What is the slope of side XY ?

- A) $\frac{4}{5}$
 B) $-\frac{5}{4}$
 C) $\frac{8}{11}$
 D) $-\frac{11}{8}$

9

A circle in the xy -plane passes through the point $(3, 4)$ and is centered at $(8, 16)$. Determine the length of its diameter.

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

10

In the xy -plane, the graph of line j contains the points $(3, -2)$ and $(6, 10)$. Which of the following is an equation of line j ?

- A) $y = 4x + 10$
 B) $y = 0.25x - 8.5$
 C) $y = 4x - 14$
 D) $y = 0.25x + 2$

11

In the xy -plane, the graph of line h has a slope of 5. Line g is parallel to line h and runs through point $(-2, 7)$. Which of the following is an equation of line g ?

- A) $y = 5x + 7$
 B) $y = -\frac{1}{5}x - 5$
 C) $y = 5x + 17$
 D) $y = \frac{1}{5}x + 2$

12

Lines f and g are perpendicular to one another in the xy -plane. The equation of line f is $3x + 10y = 14$. If line g passes through the point $(-6, 4)$, what is the y -intercept of line g ?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

COORDINATE



GEOMETRY

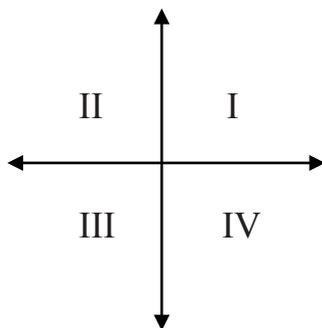
1

In the xy -plane, what are the slope and y -intercept, respectively, of the line with the equation $y = 2x - 3$?

- A) 2 and 3
- B) -2 and 3
- C) 2 and -3
- D) -2 and -3

2

Point A is to be graphed in a quadrant, not on an axis of the xy -plane below.



If the x and y -coordinates of point A have the same sign, then point A MUST be located in

- A) Quadrant I only.
- B) Quadrant II only.
- C) Quadrant III only.
- D) Quadrant I or III only.

3

Which of the following linear equations will NEVER intersect the line $y = 0.6x + 13$?

- A) $y = \frac{3}{5}x - 8$
- B) $y = -\frac{10}{6}x + 13$
- C) $y = |x|$
- D) $y = \frac{x}{3} + 5$

4

What is the equation of the line that passes through the point $(2,5)$ and is parallel to the line $6x = 2y + 8$?

- A) $y = 3x + 1$
- B) $y = 3x - 1$
- C) $y = 6x - 2$
- D) $y = 8x + 2$

5

Which of the following statements is true about the graph of the equation $-6y = -3x + 18$?

- A) It has a negative slope and a negative y -intercept.
- B) It has a negative slope and a positive y -intercept.
- C) It has a positive slope and a negative y -intercept.
- D) It has a positive slope and a positive y -intercept.

6

The graph of a linear equation contains the points $(4,15)$ and $(10,27)$. Which point also lies on the graph?

- A) $(-4,-6)$
- B) $(-5,-11)$
- C) $(-12,-10)$
- D) $(-3,1)$

7

Which of the following graphs contain(s) the point $(-2,2)$?

- I. $y = |x|$
- II. $y = \frac{3}{10}|x| + \frac{7}{5}$
- III. $y = 1.5x^2 - 4$

- A) II only
- B) I and III only
- C) I, II, and III
- D) None

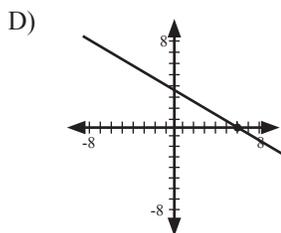
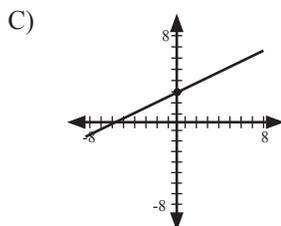
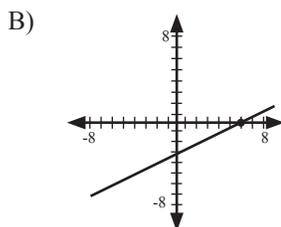
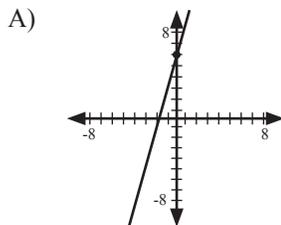
COORDINATE



GEOMETRY

8

Which of the following is the graph of the equation $y = 5x + 6$ in the xy -plane?



9

What is the y -intercept of the line in the xy -plane that goes through the points $(8, -6)$ and $(4, -3)$?

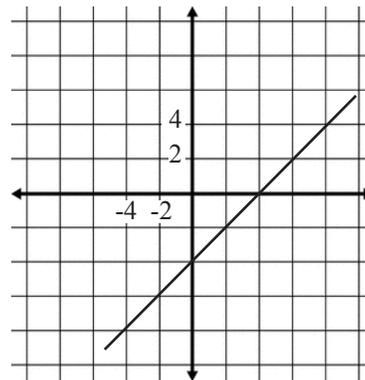
- A) -6
- B) -3
- C) 0
- D) 4

10

In the xy -plane, the point $(4, 8)$ lies on the graph of the line $y = 3kx + 2$, where k is a constant. Which of the following points also lies on this line?

- A) $(-4, 8)$
- B) $(0, 1)$
- C) $(6, 10)$
- D) $(8, 14)$

11



Which of the following is an equation of the line shown in the xy -plane above?

- A) $y = x + 4$
- B) $y + 4 = x$
- C) $y = -4x + 1$
- D) $-4y = x + 1$

12

When designing a new building, an architect first drafted his blueprint onto a coordinate plane. He plotted point A, the southwest corner of the rectangular living room, at point $(7, 15)$. If the dimensions of the room were 6 units by 8 units, which of the following could be the point where northeast corner of the room was plotted?

- A) $(13, 8)$
- B) $(15, 21)$
- C) $(1, 23)$
- D) $(13, 15)$

COORDINATE



GEOMETRY

13

A circle in the xy -plane has a center at $(2, 3)$ and a diameter of 12. Which of the following is an equation of the circle?

- A) $(x - 2)^2 + (y - 3)^2 = 36$
- B) $(x - 2)^2 + (y - 3)^2 = 144$
- C) $(x + 2)^2 + (y + 3)^2 = 6$
- D) $(x + 2)^2 + (y + 3)^2 = 12$

14

$$(x - 9)^2 + (y + 3)^2 = 25$$

The equation above is a circle in the xy -plane. Point S is on the circle and has coordinates $(13, 0)$. If ST is a diameter of the circle, what are the coordinates of point T ?

- A) $(5, -6)$
- B) $(4, -3)$
- C) $(9, -1)$
- D) $(16, 3)$

15

The graph of a line in the xy -plane contains points $(-9, 10)$ and $(-3, 7)$. The line crosses the y -axis at $(0, y)$. What is the value of y ?

	/	/	
●	●	●	●
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

16

A circle in the xy -plane has the equation $(x - 6)^2 + (y + 3)^2 = 36$. Which of the following points does NOT lie in the interior of the circle?

- A) $(2, -2)$
- B) $(9, -1)$
- C) $(14, -3)$
- D) $(6, -6)$

17

In the xy -plane, the points $(6, 5)$ and $(12, -3)$ are the center and endpoint of a radius, respectively, of a circle. Which of the following is an equation of the circle?

- A) $(x - 6)^2 + (y - 5)^2 = 10$
- B) $(x - 6)^2 + (y - 5)^2 = 100$
- C) $(x + 6)^2 + (y + 5)^2 = 400$
- D) $(x - 12)^2 + (y + 3)^2 = 50$

18

In the xy -plane, the graph $x^2 + y^2 - 2x - 4y - 4 = 0$ is a circle. What is the circle's diameter?

- A) 3
- B) 6
- C) 9
- D) 81

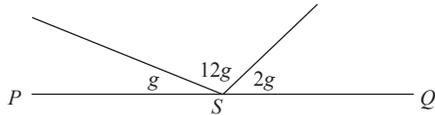
LINES



ANGLES

1

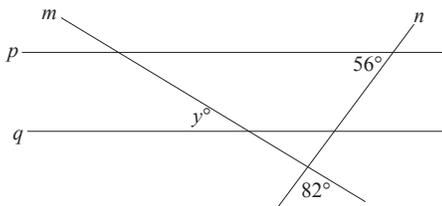
In the figure below, point S lies on line PQ . What is the value of $5g$?



- A) 12°
- B) 60°
- C) 75°
- D) 144°

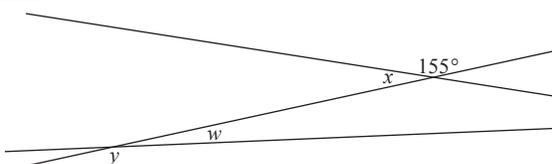
2

In the figure below, lines p and q never intersect. Transversals m and n intersect to form an angle measuring 82 degrees, as shown below. What is the value of y ?



- A) 36°
- B) 42°
- C) 54°
- D) 56°

3

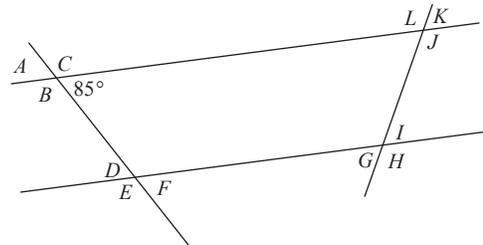


If $y = 4x$ in the figure above, what is the value of w ?

- A) 25°
- B) 80°
- C) 155°
- D) 180°

4

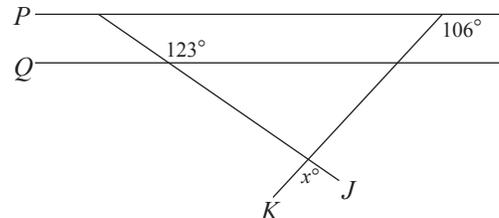
In the figure below, what is the value of $A+B+C+D+E+F+G+H+I+J+K+L$?



- A) 360°
- B) 530°
- C) 1080°
- D) There is not enough information to determine this.

5

In the diagram below, lines P and Q are parallel. Transversal lines J and K intersect, forming an angle, marked x . Two other angle measures are shown below. What is the measure, in degrees, of angle x ?



- A) 45°
- B) 49°
- C) 55°
- D) 85°

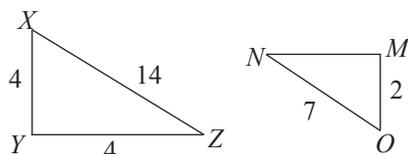
TRIANGLES



TRIANGLES

1

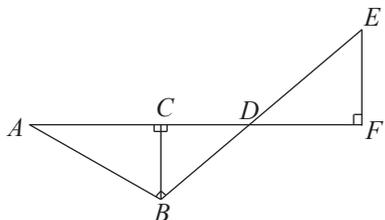
In the diagram below, two similar triangles are shown, with side lengths given in meters. What is the perimeter, in meters, of $\triangle MNO$?



- A) 9
- B) 11
- C) 13
- D) 15

2

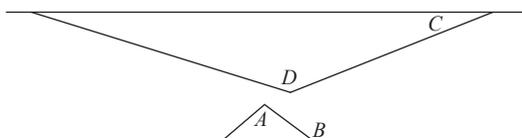
In the figure below, A, C, D and F are collinear. B, D , and E are also collinear. Angles ACB , ABD , BCD and EFD are right angles. Given this information, which of the following statements is NOT justifiable?



- A) Angle CDB is congruent to angle EDF .
- B) $\triangle BCD$ is similar to $\triangle EDF$.
- C) BD is congruent to AB .
- D) AB is perpendicular to BE .

3

In the figure below, there are two isosceles triangles.

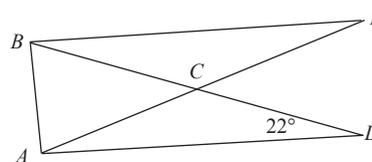


Note: Figure not drawn to scale.

Angle $C = 38^\circ$ and angle $A = 0.25D$. What is the measure of angle B ?

- A) 38°
- B) 77°
- C) 103°
- D) 104°

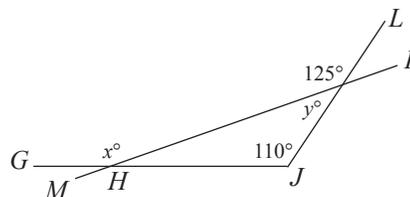
4



In the figure above, AC , CD , and BC are congruent. What is the measure of angle BAD ?

- A) 87°
- B) 90°
- C) 93°
- D) 102°

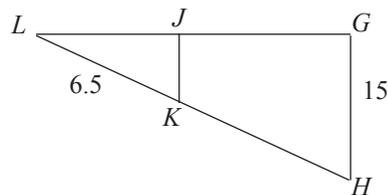
5



In the figure above, line segment KM intersects GJ at H . What is the value of $x - y$?

- A) 55°
- B) 70°
- C) 110°
- D) 165°

6



In the figure above, JK is parallel to GH , and LH equals 39. What is the length of JG ?

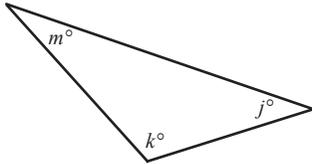
- A) 2.5
- B) 6.0
- C) 30.0
- D) 36.0

TRIANGLES



TRIANGLES

1

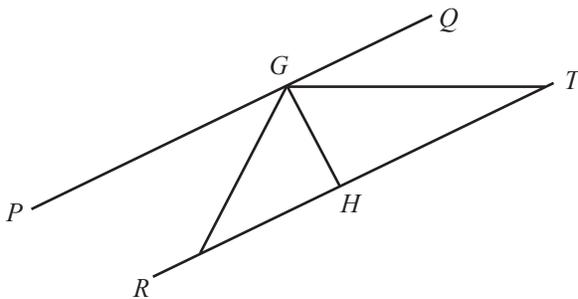


Note: Figure not drawn to scale.

In the triangle shown above, $j = 62^\circ$. If m is equal to half of j , what is the value of k ?

	/	/	
●	●	●	●
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

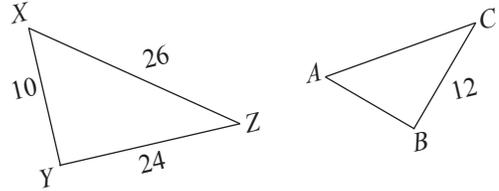
2



In the figure above, line segment PQ is parallel to line segment RT , and line segment GH is perpendicular to RT . If angle HTG measures 25° , and angle HGR measures 42° , what is the measure of angle RGP ?

- A) 25°
- B) 42°
- C) 48°
- D) 61°

3



Triangles XYZ and ABC above are similar. What is the sum of segments XZ and AB ?

- A) 28
- B) 31
- C) 34
- D) 42

4

In triangle FGH , angle F measures 52° , angle G measures 39° , and side FG measures 15 cm. Triangles FGH and PQR are similar. If side PQ measures 5 cm, what is the measure of angle R ?

	/	/	
●	●	●	●
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

CIRCLES



CIRCLES

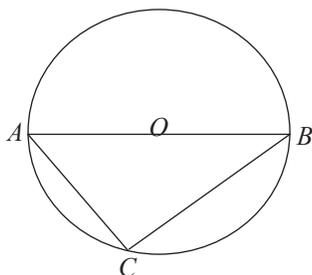
1

Two circles have radii in a ratio of 9:16. What is the ratio of their circumferences?

- A) 3:4
- B) 9:16
- C) 81:256
- D) $9:16\pi$

2

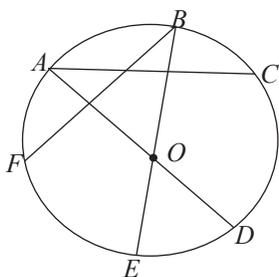
Triangle ABC is inscribed in circle O where AB is the diameter.



Angle ABC measures 30° and $AC = 4$. What is the measure of the diameter of the circle?

- A) 4
- B) 8
- C) $4\sqrt{3}$
- D) $22\sqrt{3}$

3



Note: Figure not drawn to scale.

In the circle above centered a O , angle FBE measures 10° , angle CAD measures 25° , and arc BC measures 60° . What is the measure of arc AF ?

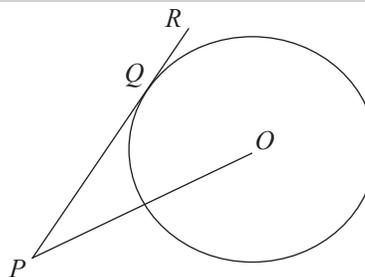
- A) 44°
- B) 62°
- C) 78°
- D) 90°

4

Kathy used a pie pan with an 8-inch diameter to bake an apple pie and then a pumpkin pie. She cut the apple pie into 8 pieces and the pumpkin pie into 6 pieces. If Candace had one slice of each pie, what is the total area of her two pie slices together, rounded to the nearest tenth? (Disregard the thickness of the pies.)

- A) 3π
- B) 4.7π
- C) 18.6π
- D) 22π

5



Note: Figure not drawn to scale.

In the figure above, line segment PR is tangent to the circle centered at O at point Q . If the radius of circle O equals 1.5, and QP equals 2, what is the length of PO ?

	/	/	
.	.	.	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

CIRCLES



CIRCLES

1

The area enclosed by a circular painting is 81π square meters. What is the length, in meters, of the diameter of the painting?

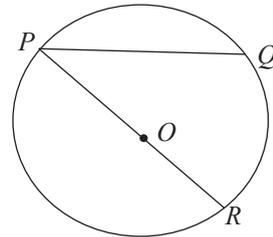
- A) 9
- B) 18
- C) 36
- D) 81

2

The diameter of a circle with center S is marked by endpoints Q and R . Point T lies on the circle and angle QST measures 30° . The shortest distance between Q and T is what percent of the distance between Q and R ?

- A) $8\frac{1}{3}\%$
- B) $16\frac{2}{3}\%$
- C) $33\frac{1}{3}\%$
- D) 50%

3



In the figure above, if angle RPQ measures 33° , minor arc QR is what percent, rounded to the nearest integer, of the circumference of the circle?

	/	/	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

4

The angle formed by two radii in a circle measures 0.9 radians. To the nearest tenth of a degree, what is the measure, in degrees, of the angle?

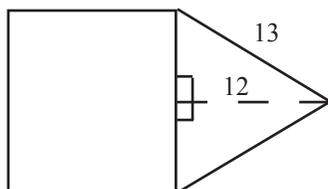
	/	/	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

OTHER



POLYGONS

1



The figure above is the drawing of a kite that Kyle is planning to create and fly in a local competition. The triangular end of the kite has a height of 12 inches, and each of the sides of the triangle has a length of 13 inches. If the remainder of the kite is a square, what is the perimeter, in inches, of the entire kite?

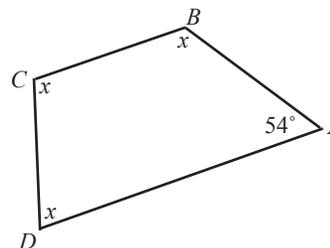
	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

2

Samir cut a rectangular piece of fabric. If the length of Samir's fabric is represented by $3x + 4$ and the width is represented by $5x - 12$, which of the following represents the area of her piece of fabric?

- A) $15x^2 - 16x - 48$
- B) $8x - 8$
- C) $15x^2 + 16x + 48$
- D) $16x - 16$

3



Note: Figure not drawn to scale.

In the figure above, what is the value of x ?

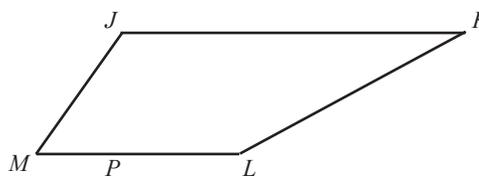
- A) 89°
- B) 97°
- C) 102°
- D) 114°

4

The ratio of the width of rectangle G to a side of square H is 5:6. The ratio of a side of square H to the length of rectangle G is 6:3. What is the ratio of the area of rectangle G to the area of square H ?

- A) 4:1
- B) 5:12
- C) 9:12
- D) 12:5

5



In the quadrilateral shown above, JK is parallel to LM , point P lies on LM , and JM measures $8\sqrt{2}$. If line segment JP were to be drawn perpendicular to LM , it would be equal in measure to segment MP . What is the measure of angle J ?

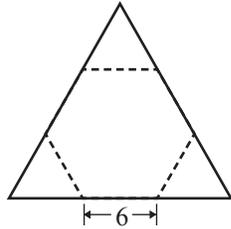
- A) 45°
- B) 105°
- C) 135°
- D) 145°

OTHER



POLYGONS

6

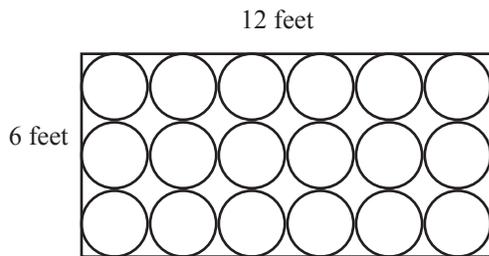


Jeanette needs to create a regular hexagon with 6-inch sides for an art project. She will cut the hexagon from a triangular piece of felt, as shown in the figure above. What is the sum of the areas of the three triangles that will be removed from the original piece of felt?

- A) 27
- B) $27\sqrt{3}$
- C) $54\sqrt{2}$
- D) $54\sqrt{3}$

452

Questions 7 and 8 refer to the following information.



A soda bottling plant is able to package 18 of its bottles in a crate with dimensions 12 feet in length by 6 feet in width, as shown in the figure above.

7

The owner of the plant wants to be able to send out a total of 24 bottles in each crate, as opposed to 18. He plans to increase the length of the crate, while keeping the width constant. How many additional feet does the length of the crate need to measure in order to accommodate the owner's wishes?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

8

The owner of the plant also wants to be able to send 4-packs of soda bottles directly to consumers. In order to avoid being charged for freight shipping, the size of the shipping container must be 30% smaller than the size of the current crate. If the length of the new crate will be twice the width, what will be the length of new container, rounded to the nearest tenth?

	/	/	
•	•	•	•
	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

3D GEOMETRY



3D GEOMETRY

1

Leslie has two cans of soup, both of which are right circular cylinders. The diameter of the base of the chicken noodle soup can is 3 times the diameter of the base of the tomato soup can, and the height of the tomato soup can is 3 times the height of the chicken noodle soup can. The volume of the chicken noodle soup can is how many times the volume of the tomato soup can?

- A) 0
- B) 3
- C) 4
- D) 8

2

The equation for the volume of a cylinder is $V = \pi r^2 h$. How can the positive values of r be expressed in terms of h and V ?

- A) $r = \sqrt{\frac{\pi}{Vh}}$
- B) $r = \sqrt{\frac{Vh}{\pi}}$
- C) $r = \sqrt{\frac{V}{\pi h}}$
- D) $r = \frac{V\pi h}{2}$

3

A moving company charges by the size of the box it must move. If a box is shaped like a rectangular prism and the product of the area of the base of the box and the height is less than or equal to 7,000 cubic inches, it costs \$14.50 to move. If a customer has a box with a height of 70 inches and a width that is one-quarter of its length, which inequality shows the allowable width of the box, w , in inches that will cost the customer \$14.50?

- A) $0 < w \leq 5$
- B) $0 < w \leq 15$
- C) $0 < w \leq 20$
- D) $0 < w \leq 25$

4

A small cube has edges that are one fifth the length of those of a large cube. How many times larger is the volume of the large cube than the volume of the small cube?

- A) 5
- B) 50
- C) 75
- D) 125

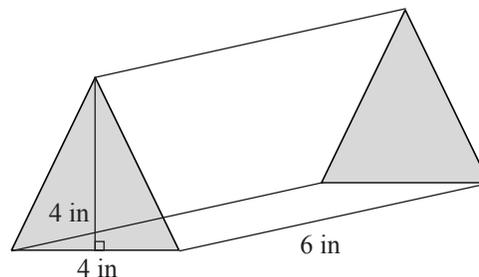
5

The volume of a Ross's right circular ice cream cone is 33π cubic centimeters. If the radius of the cone is 3 centimeters, what is the height, in centimeters, of the cone?

- A) 3
- B) 9
- C) 11
- D) 125

6

The bar of chocolate shown in the diagram below is molded in the form of a right triangular prism. All of its sides are going to be coated with a thin layer of cocoa powder. How many square inches of cocoa powder will be needed to coat the entire chocolate bar?



- A) $20\sqrt{5}$
- B) $20 + 12\sqrt{5}$
- C) 22
- D) $40 + 24\sqrt{5}$

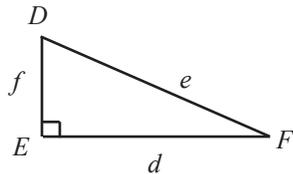
TRIGONOMETRY



TRIGONOMETRY

1

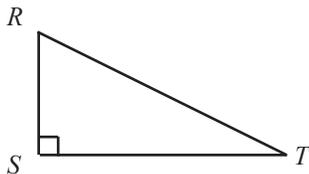
For the right triangle DEF shown below, what is $\cos F$?



- A) $\frac{d}{e}$
 B) $\frac{d}{f}$
 C) $\frac{e}{d}$
 D) $\frac{f}{d}$

2

The hypotenuse of the right triangle RST shown below is 20 feet long. The sine of angle T is $\frac{5}{8}$. How many feet long is RS ?



- A) 7.5
 B) 10.0
 C) 12.5
 D) 16.0

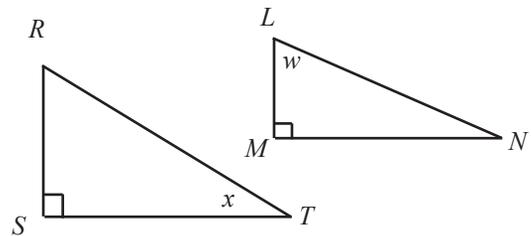
3

If the non-right angles of triangle ABC have degree measures of a and b , and $\cos a = \frac{12}{15}$, what is the value of $\sin b$?

- A) $\frac{15}{12}$
 B) $\frac{12}{15}$
 C) $\frac{9}{15}$
 D) $\frac{9}{12}$

4

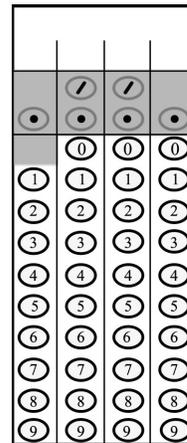
If the two triangles below are similar, but RST is half as large as LMN and $\sin x = \frac{12}{15}$. What is $\cos w$?



- A) 0.8
 B) 0.6
 C) 1.2
 D) 1.25

5

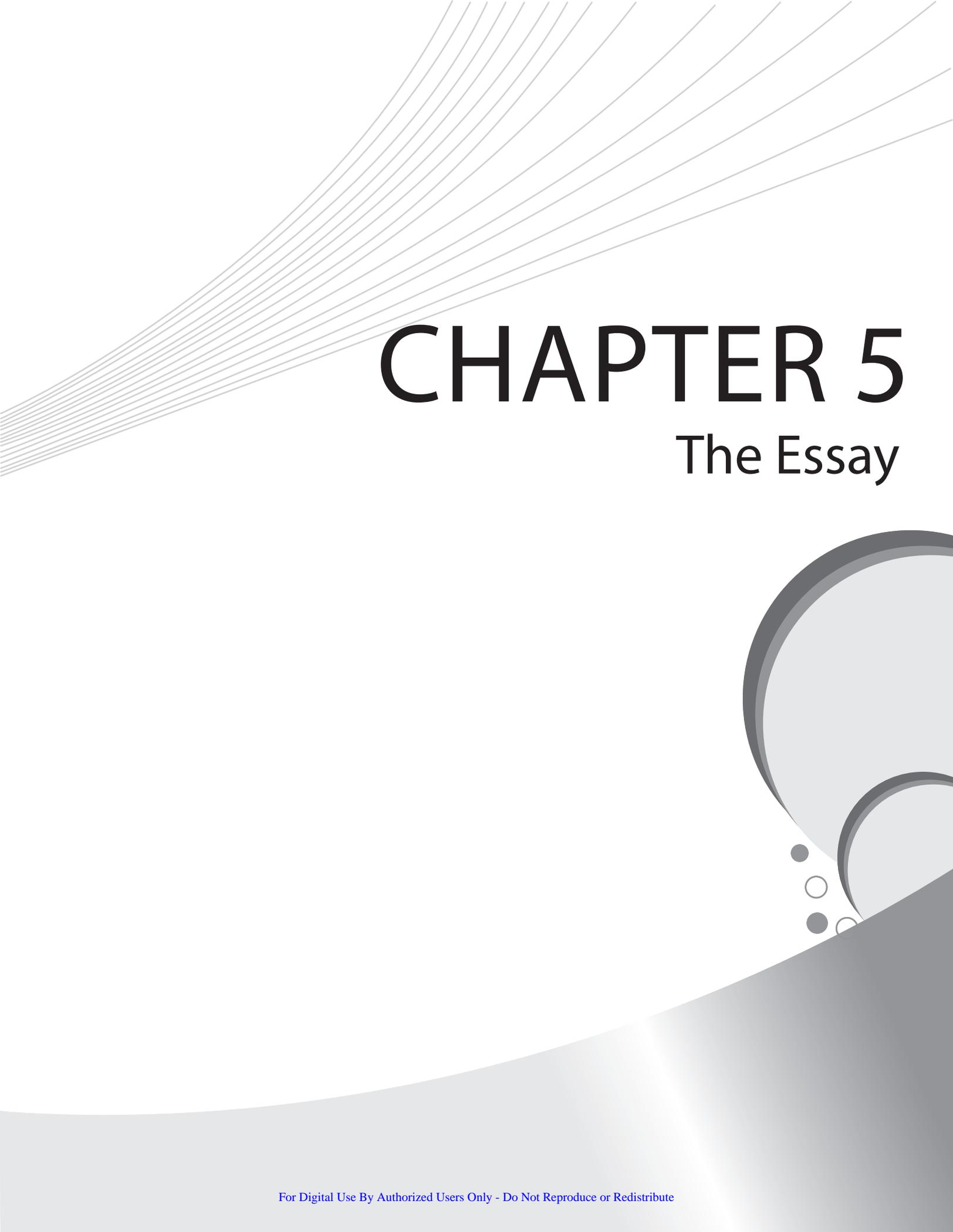
In triangle FGH , angle G measures 90° . If $\tan H = \frac{16}{12}$, what is the value of $\cos F$?



6

If $\cos y^\circ = p$, which of the following must be true for all values of y ?

- A) $\sin(90^\circ - y^\circ) = p$
 B) $\sin y^\circ = p - 1$
 C) $\cos(90^\circ - y^\circ) = 1 - p$
 D) $\sin y^\circ = p$



CHAPTER 5

The Essay

The Essay | Overview

The optional essay gives you 50 minutes to critically analyze a text, much like you would in a college class. As with the other parts of the Evidence-Based Reading and Writing Test, reading and analysis are key to achieving a good score. The essay also tests your ability to communicate your ideas effectively. You will have to demonstrate that you can develop and support a position using the fundamentals of standard English grammar and style. Since all the grammar you need to know stems from the Writing and Language Test, you should already be pretty well prepared. The bigger-picture stylistic elements (sentence structure, transitions, organization, etc.) are nothing to fear either, as they use the same skills as argument questions. Let's take a quick look at the structure of the essay and how to approach it.

So, What's It Worth?

The essay does not count towards your overall score. Instead you are given a score by two different graders ranging from 1–4 for each of three different categories: Reading, Analysis, and Writing. To be successful, your essay must fulfill the following criteria:

Reading: Show how well you understand the main point and smaller details of the passage.
Use textual evidence smartly.
Total Score: 2–8

Analysis: Evaluate how the author makes his/her argument through use of evidence, logic, and other stylistic techniques. Develop and back up your thoughts with effective textual evidence.
Total Score: 2–8

Writing: Be focused and conscientious. Use correct grammar and formatting, and ensure that you vary your sentence structure and wording.
Total Score: 2–8

The great part is that as long as you write a legible essay that addresses the topic, you can only gain points. You cannot lose points on this section!

The Essay | The Rubric

How It's Graded

The essay is graded holistically, based on a rubric that takes multiple factors into account. Below is the rubric for the grades of proficient and advanced, 3 and 4 respectively. Take a look at what the graders are looking for in your essay:

Score	Reading	Analysis	Writing
3	<ul style="list-style-type: none"> • Demonstrates effective comprehension of the source text. • Shows an understanding of the text's central idea(s) and important details. • Is free of substantive errors of fact and interpretation with regard to the text. • Makes appropriate use of textual evidence (quotations, paraphrases, or both), demonstrating an understanding of the source text. 	<ul style="list-style-type: none"> • Offers an effective analysis of the source text and demonstrates an understanding of the analytical task. • Competently evaluates the author's use of evidence, reasoning, and/or stylistic and persuasive elements, and/or feature(s) of the student's own choosing. • Contains relevant and sufficient support for claim(s) or point(s) made. • Focuses primarily on those features of the text that are most relevant to addressing the task. 	<ul style="list-style-type: none"> • Is mostly cohesive and demonstrates effective use and control of language. • Includes a central claim or implicit controlling idea. • Includes an effective introduction and conclusion. The response demonstrates a clear progression of ideas both within paragraphs and throughout the essay. • Has variety in sentence structures. The response demonstrates some precise word choice. The response maintains a formal style and objective tone. • Shows a good control of the conventions of standard written English and is free of significant errors that detract from the quality of writing.
4	<ul style="list-style-type: none"> • The response demonstrates thorough comprehension of the source text. • The response shows an understanding of the text's central idea(s) and of most important details and how they interrelate, demonstrating a comprehensive understanding of the text. • The response is free of errors of fact or interpretation with regard to the text. • The response makes skillful use of textual evidence (quotations, paraphrases, or both), demonstrating a complete understanding of the source text. 	<ul style="list-style-type: none"> • The response offers an insightful analysis of the source text and demonstrates a sophisticated understanding of the analytical task. • The response offers a thorough, well-considered evaluation of the author's use of evidence, reasoning, and/or stylistic and persuasive elements, and/or feature(s) of the student's own choosing. • The response contains relevant, sufficient, and strategically chosen support for claim(s) or point(s) made. • The response focuses consistently on those features of the text that are most relevant to addressing the task. 	<ul style="list-style-type: none"> • The response is cohesive and demonstrates a highly effective use and command of language. • The response includes a precise central claim. • The response includes a skillful introduction and conclusion. The response demonstrates a deliberate and highly effective progression of ideas both within paragraphs and throughout the essay. • The response has a wide variety in sentence structures. The response demonstrates a consistent use of precise word choice. The response maintains a formal style and objective tone. • The response shows a strong command of the conventions of standard written English and is free or virtually free of errors.

The Essay | Example

But the Essay Itself?

The essay always consists of a prompt and a passage. The passage and subject matter will change with each test but will always argue a specific viewpoint using logical reasoning and evidence. The prompt is split between two boxes before and after the passage and is the same on each test. Carefully read the prompt below, so you know exactly what to expect on the day of the test.

As you read the passage below, consider how [the author] uses

- evidence, such as facts or examples, to support claims.
- reasoning to develop ideas and to connect claims and evidence.
- stylistic or persuasive elements, such as word choice or appeals to emotion, to add power to the ideas expressed.

Write an essay in which you explain how [the author] builds an argument to persuade [his/her] audience that [author's claim]. In your essay, analyze how [the author] uses one or more of the features listed above (or features of your own choice) to strengthen the logic and persuasiveness of [his/her] argument. Be sure that your analysis focuses on the most relevant features of the passage. Your essay should not explain whether you agree with [the author's] claims, but rather explain how the author builds an argument to persuade [his/her] audience.

Notice how the essay is explicitly asking for you not to state your opinion. **Do not** present your views on the topic being discussed, but rather concentrate on the author's opinion and how he/she tries to convince us of it. Avoid using "I think" or "in my opinion."

Taking a Look at the Real Thing

On the following pages, we're going to work through a typical passage. As you read, pay close attention to what the author argues and how he/she attempts to convince the audience of something.

The Essay | Example

As you read the passage below, consider how the author, Sarah Duncan, uses

- evidence, such as facts or examples, to support claims.
- reasoning to develop ideas and to connect claims and evidence.
- stylistic or persuasive elements, such as word choice or appeals to emotion, to add power to the ideas expressed.

**Adapted from Sarah Duncan, “Poetry Is Alive.” ©2015 by The New York Sun.
Originally published February 17, 2015.**

- 1 Poetry is thriving in a myriad of communities throughout the country. Why, then, is journalistic discourse dominated by discussions about its supposed death?
- 2 This trend began in 1934, when Edmund Wilson asked the world whether or not verse was a dying technique. In 1988, Joseph Epstein inquired as to who it was that killed poetry. In 1991, Dana Gioia wrote an article on poetry’s worrisome irrelevance to anyone who was not themselves a poet or creative writing teacher. In 1995, Morris Freedman concluded poetry was nearly dead from an oversaturation of academic and high-brow critical pretension, but not wholly without a fighting chance for the future.
- 3 These are but a sample. A quick Google search yields over 50 online articles claiming (or combating the claim) that poetry is dead. 2003: Poetry is Dead. Does Anybody Really Care? Newsweek. 2007: The Death of Poetry, Fullspate. 2013: 10 Reasons Poetry’s Not Dead, Flavorwire. 2015: Poetry is Going Extinct, The Washington Post. The topic has been exhausted.
- 4 And yet, little has been said around the vocabulary—namely the words “popular” and “alive” — being used to address this apparent phenomenon. Declarations of poetry’s untimely death conflate the popularity of an art form with its life without defining this measurement of appeal or vitality. What does it mean for poetry to be unpopular? And if it is so, can it still be alive?
- 5 When compared to other arts, poetry does appear to be more marginal than its creative peers. In a 2012 study conducted by the Survey of Public Participation in the Arts, data revealed that only 6.7% of polled Americans had read any poetry in the past year. In contrast, within the past year, 58% of Americans had seen a movie, 44% of Americans had read a novel, and 21% of Americans had attended a theatrical performance.
- 6 Initially, 6.7% looks like a small number. But the US population is roughly at 320 million; 6.7% of this number works out to be a little less than 22 million people. This number is akin to the populations of a multitude of countries. Australia, for example, has only 23 million people. Chile, The Netherlands, Senegal, Cuba, Israel, Portugal, Jamaica, and more have populations either at or below 22 million. It’s seems unlikely that the individuals christening poetry Dead would comfortably say the current inhabitants of Ireland are of a dying nationality solely because their population amasses at a lower number than the USA. Ireland is simply a small country. Poetry, so to speak, is a small country too. Perhaps poets and poetry lovers should found their own.
- 7 Indigenous cultures across the world have rich histories of oral arts and storytelling. In the 1940s, the Beat Poets took to the stages with their voices and pens to rail against the duplicity of mainstream culture. Spoken word historians Priya Parmar and Bryonn Bain note that during the Harlem Renaissance and the Black Arts Movement of the 1960s and 70s, spoken word poetry and performance art flourished and expanded. In particular, artists like The Last Poets, Gil Scott Heron, Nikki Giovanni, Sonia Sanchez, and others seamlessly linked black liberation with poetic expression.

The Essay | Example

- 8 Liberation of all marginalized groups is a continued theme on stages in the poetry slam scene, and this is at the very least partly because, as Somers-Willett notes in her book, *The Cultural Politics of Slam Poetry: Race, Identity, and the Performance of Popular Verse in America*, the form invites a democratization of poetry as a whole. As with certain genres of music, individuals who have been denied outlets to process and articulate their experiences find this chance waiting for them in spoken word and the community surrounding it. At a poetry slam, anyone can sign up to directly address their audience through poetic art. As such, everyone can be a poet, regardless of education, race, gender, sexual orientation, income, or ability. The open opportunity for expression creates an atmosphere of poetry as personal as political.
- 9 I propose, ultimately, a different take on the age old question. Instead of, “Is poetry dead?” we must ask instead: “Is poetry accessible to everyone?” If the answer is yes, or close to yes, then poetry will continue to breathe steadily for whoever finds solace and excitement in it. Whether that is three people, 22 million people, or 300 million, the amount of people who choose to partake is irrelevant outside of industry. What is relevant is that the option of poetry – in all forms – is consistently and readily available.

Write an essay in which you explain how Sarah Duncan builds an argument to persuade her audience that poetry continues to be a vibrant artform. In your essay, analyze how Duncan uses one or more of the features listed in the box above (or features of your own choice) to strengthen the logic and persuasiveness of her argument. Be sure that your analysis focuses on the most relevant features of the passage. Your essay should not explain whether you agree with Duncan’s claims, but rather explain how Duncan builds an argument to persuade her audience.

Drill | Reading

The reading grade on the essay measures your comprehension. It's not only important to recognize the author's main idea, but also the exchange between those key ideas and supporting details. If this sounds familiar, it is because you have to use similar skills on the Reading section. Apply the techniques you learned in that chapter to the given passage. The grade also measures how effectively you utilize textual evidence. Make sure your quotations are short and relevant.

Instructions: Summarize the following passages in 12 words or fewer. Remember to use language that properly expresses the certainty of the wording and the author's tone. Also avoid inserting your opinion.

1. For decades the selling point of a college education has been the lifetime wage premium that a college degree all but guaranteed. Colleges had a simple marketing pitch: No matter the cost of attendance, getting this credential will provide you benefits for more than one generation. While this dictum may hold true, the economic conditions in the country and the rising cost of college have caused many families to demand more tangible evidence of the return on investment.

2. Many students and families dismiss standardized testing as stressful and time-consuming; some educators agree with this position and point out that it impedes the educational process. While these arguments have merit, they overlook that standardized testing provides a uniform measuring stick for diverse groups of individuals and creates guidance and time management tools for teachers.

3. Many students and families dismiss standardized testing as stressful and time-consuming; some educators agree with this position and point out that it impedes the educational process. These arguments can be strengthened by highlighting that the reliance on such testing encourages a narrowing of curriculum in order to “teach to the test” and fosters an atmosphere in which dishonesty will likely grow.

4. The amount paid for the services of professional athletes is unspeakable. Even more absurd is the money athletes receive as signing bonuses. Athletes are paid millions of dollars each year and they often fail to perform to a level that merits such salaries. In the end, clubs end up wasting money in search of the one player who is actually worth his salary, provided it is even possible for someone to deserve ten million dollars for running around a field or a court with a ball. Thus, clubs should negotiate stratified contracts in which players get paid based on performance. This would give players the incentive to perform to their potential and save the clubs billions of dollars in wasted salaries.

Drill | Analysis

The analysis grade measures your ability to discern and explain how the author makes his/her case for the stance taken in the passage. In order to do this, you will have to recognize the evidence the author uses and understand the author's reasoning. Like the reading grade, this grade also measures how you use textual evidence. Here your quotations have to display how the author builds and supports his/her claims. Never use a quotation without analyzing it. You do not want to summarize the passage, but instead choose the quotations that are most suitable for your position.

Instructions: *In the following drill, write down from each of the paragraphs **what** you have been told, **why** the author told it to you, and **how** it was told to you. Remember that this is not an exercise in opinion but in extracting information from what was given to you in the text.*

It has been proven that the SAT essay does not deduct points for factual errors. It has also been widely written that individuals have received perfect SAT essay scores while including information that any fifth grader could tell you was false. Despite the truth of both of these statements, test-takers would be wise to take this information with a grain of salt as it does not mean that lying is the preferred approach to writing an SAT essay.

1. List three things the author told the reader:

2. List why the author told the reader these things:

3. How would you describe the way in which the author conveyed his message?

One of the most distinguishable characteristics of a culture is its food. It was one of the few things that identified my family as Ghanaian. We would often eat hkatenkwan (groundnut stew), and my mother served tatala (plantain cakes) with everything. However, this link to our heritage weakened as time passed. As my family became more assimilated into American culture, we ate less traditional Ghanaian food. My mother started trading recipes with neighbors during my senior year in high school, and began serving Indian and Italian dishes for dinner.

4. List three things the author told the reader:

5. List why the author told the reader these things:

6. How would you describe the way in which the author conveyed his message?

Drill | Analysis

By journey's end, I will not be the person I was last year, yesterday, or even today. My trip to Haiti will have changed me in ways that I cannot anticipate, perhaps in deep spiritual ways, perhaps in superficial physical ways. Perhaps I will change my accent, perhaps I will walk more confidently. Perhaps my accent will become more Haitian and less French, perhaps my worldview will become more Haitian. But for now I am not one of them.

7. List three things the author told the reader:

8. List why the author told the reader these things:

9. How would you describe the way in which the author conveyed his message?

The true value of a college education is beyond a simple conference of a piece of paper certifying a set of acquired knowledge. The true value of college lies in exposure, the exposure for a young girl from a farm in Alabama to the New York fashion industry and the exposure for the urban boy to the concept of the world-wide agricultural industry. The true value of college lies in the opportunity it provides for exposure to networks for many people who may not otherwise have access to these new networks.

10. List three things the author told the reader:

11. List why the author told the reader these things:

12. How would you describe the way in which the author conveyed his message?

The Essay | Writing

The writing grade measures your ability to make your argument in a clear, cogent, and organized fashion. There are some things you should do and others you should avoid if you want to write a well-crafted essay. Keep these in mind and you will have a good shot at a high writing score.

Do...	Don't...
...write legibly.	...write sloppily.
...use most or all of the time and space provided.	...stop writing with lots of time and space left.
...pick three of the author's supports and stick to them.	...try to discuss too few or too many types of support.
...cite appropriate evidence from the text.	...use inappropriate or too few pieces of evidence.
...transition smoothly into, out of, and between ideas.	...jump between thoughts without explanation, introduction, or conclusion.
...follow standard paragraph format.	...write one giant block of unbroken text.
...use appropriate vocabulary, at the highest possible level you are comfortable with.	...use inappropriate vocabulary, or vocabulary of whose definition you are unsure.
...support your ideas and assertions with evidence and explanation.	...list thoughts without backing them up.
...connect your points and examples to the prompt clearly.	...assume the reader will figure you out how you intend what you're writing will relate to the prompt.

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Common Corrections

In the chart below, we've compiled some common mistakes and undesirable phrases, along with their revisions.

How It's Written...	...How It Should Be Written
the place that & the time that	the place where & the time when
the fact that	that
good & bad	beneficial, valuable, positive & detrimental, negative, worthless
you	one
going on	occur, took place
I myself	I
thing	event, affair, object, matter
pretty much, more or less	fairly, essentially
me as a person	me
the reason for this is (because)	because
really	exceedingly, very
a lot of	many, myriad
for awhile	for a while
irregardless	regardless
the exact same	exactly the same

The Essay | Critical Analysis

Your essay will depend on your ability to identify the author's main point and the ways in which the author tries to back up this claim. Like the prompt states, you are examining the “evidence...reasoning...and stylistic or persuasive elements” used in the passage.

Finding the Main Point

The main point of the passage should be relatively clear from the passage. It will most likely be in the opening paragraphs or at the very end of the passage. Check your interpretation of the main point against the second part of the prompt, which will explicitly identify it in the “explain how [the author] builds an argument to persuade [his/her] audience that [author's claim]” sentence.

Finding the Appeals

The author will support his/her main point through the use of appeals. Appeals are the different methods the author uses to try to persuade you, the reader. They fall under three categories:

Appeal to Reason

This is the most common type of appeal and potentially the most effective. With appeals to reason, the author attempts to use logic, rhetoric, or facts to make his or her case. This is known as *logos*.

Types of Support: factual data, statistics, definitions, literary or historical allusions, deductive reasoning

Appeal to Emotion

This is basically the opposite of the appeal to reason. It depends on connecting with the feelings of the reader. This is known as *pathos*.

Types of Support: personal anecdote, imagery, figurative language, narratives/personal accounts, rhetorical questions, calls to action, irony or humor

Appeal to Credibility

This is designed to establish the author as a reliable source and therefore bolster his/her main point. One way to achieve this is by citing authorities who are in agreement. This is known as *ethos*.

Types of Support: author's qualifications, references to author's character, quotation of authorities, recognition of alternate views

Drill | Critical Analysis

Instructions: In the exercise below, determine whether each statement is an appeal to reason, emotion, or credibility. Then, use the space below that statement to write down which type of support that appeal is.

Statement	Type		
The chimpanzee, our 98.5% identical genetic relative, has a sophisticated set of social rules and habits.	<input type="checkbox"/> Reason	<input type="checkbox"/> Emotion	<input type="checkbox"/> Credibility
Based on my years as a federal judge, I can say that the action was patently illegal.	<input type="checkbox"/> Reason	<input type="checkbox"/> Emotion	<input type="checkbox"/> Credibility
We must act now to stop this dangerous event from occurring during our lifetime.	<input type="checkbox"/> Reason	<input type="checkbox"/> Emotion	<input type="checkbox"/> Credibility
What would we have done without all your hard work?	<input type="checkbox"/> Reason	<input type="checkbox"/> Emotion	<input type="checkbox"/> Credibility
Experts agree that to proceed with the project, we must follow the guidelines laid out.	<input type="checkbox"/> Reason	<input type="checkbox"/> Emotion	<input type="checkbox"/> Credibility
Consider the tragic story of Tony Conigliario and how one single pitch changed the trajectory of his whole career.	<input type="checkbox"/> Reason	<input type="checkbox"/> Emotion	<input type="checkbox"/> Credibility
Everywhere this economic policy has been utilized in the past has experienced rapid growth, so there is no reason to think the same should not be true here.	<input type="checkbox"/> Reason	<input type="checkbox"/> Emotion	<input type="checkbox"/> Credibility
Looking back, I have nothing but fond memories of the summers I spent there: the cool breeze coming off the mountains at night, and the sun setting hazily over the lake.	<input type="checkbox"/> Reason	<input type="checkbox"/> Emotion	<input type="checkbox"/> Credibility
The opposition does raise several valid issues.	<input type="checkbox"/> Reason	<input type="checkbox"/> Emotion	<input type="checkbox"/> Credibility

The Essay | Action Plan

Now that we have a basic understanding of the essay, let's define our Action Plan. The following plan is how you will approach every SAT essay. On the next few pages, we will work on making a checklist and an outline.

1. Write Down Your Appeals Checklist.

Recall the three different categories of appeals and the support types for each.

2. Read the Passage and Fill Out Your Checklist.

Read actively, looking for the author's main point and the types of support he/she uses.

3. Make an Outline.

Write down the author's main point and at least three specific examples of how he/she supports it. Underline brief, effective textual evidence.

4. Write Your Essay.

Using your outline, write a four or five paragraph essay analyzing how the author develops his/her argument. Remember to vary your sentence structure and word usage.

The Essay | Action Plan

Let's take a deeper look at the passage we saw earlier in the chapter.

As you read the passage below, consider how the author, Sarah Duncan, uses

- evidence, such as facts or examples, to support claims.
- reasoning to develop ideas and to connect claims and evidence.
- stylistic or persuasive elements, such as word choice or appeals to emotion, to add power to the ideas expressed.

Adapted from Sarah Duncan, “Poetry Is Alive.” ©2015 by The New York Sun. Originally published February 17, 2015.

- 1 Poetry is thriving in a myriad of communities throughout the country. Why, then, is journalistic discourse dominated by discussions about its supposed death?
- 2 This trend began in 1934, when Edmund Wilson asked the world whether or not verse was a dying technique. In 1988, Joseph Epstein inquired as to who it was that killed poetry. In 1991, Dana Gioia wrote an article on poetry's worrisome irrelevance to anyone who was not themselves a poet or creative writing teacher. In 1995, Morris Freedman concluded poetry was nearly dead from an oversaturation of academic and high-brow critical pretension, but not wholly without a fighting chance for the future.
- 3 These are but a sample. A quick Google search yields over 50 online articles claiming (or combating the claim) that poetry is dead. 2003: Poetry is Dead. Does Anybody Really Care? Newsweek. 2007: The Death of Poetry, Fullspate. 2013: 10 Reasons Poetry's Not Dead, Flavorwire. 2015: Poetry is Going Extinct, The Washington Post. The topic has been exhausted.
- 4 And yet, little has been said around the vocabulary—namely the words “popular” and “alive” — being used to address this apparent phenomenon. Declarations of poetry's untimely death conflate the popularity of an art form with its life without defining this measurement of appeal or vitality. What does it mean for poetry to be unpopular? And if it is so, can it still be alive?
- 5 When compared to other arts, poetry does appear to be more marginal than its creative peers. In a 2012 study conducted by the Survey of Public Participation in the Arts, data revealed that only 6.7% of polled Americans had read any poetry in the past year. In contrast, within the past year, 58% of Americans had seen a movie, 44% of Americans had read a novel, and 21% of Americans had attended a theatrical performance.
- 6 Initially, 6.7% looks like a small number. But the US population is roughly at 320 million; 6.7% of this number works out to be a little less than 22 million people. This number is akin to the populations of a multitude of countries. Australia, for example, has only 23 million people. Chile, The Netherlands, Senegal, Cuba, Israel, Portugal, Jamaica, and more have populations either at or below 22 million. It seems unlikely that the individuals christening poetry Dead would comfortably say the current inhabitants of Ireland are of a dying nationality solely because their population amasses at a lower number than the USA. Ireland is simply a small country. Poetry, so to speak, is a small country too. Perhaps poets and poetry lovers should found their own.
- 7 Indigenous cultures across the world have rich histories of oral arts and storytelling. In the 1940s, the Beat Poets took to the stages with their voices and pens to rail against the duplicity of mainstream culture. Spoken word historians Priya Parmar and Bryonn Bain note that during the Harlem Renaissance and the Black Arts Movement of the 1960s and 70s, spoken word poetry and performance art flourished and expanded. In particular, artists like The Last Poets, Gil Scott Heron, Nikki Giovanni, Sonia Sanchez, and others seamlessly linked black liberation with poetic expression.

The Essay | Action Plan

- 8 Liberation of all marginalized groups is a continued theme on stages in the poetry slam scene, and this is at the very least partly because, as Somers-Willett notes in her book, *The Cultural Politics of Slam Poetry: Race, Identity, and the Performance of Popular Verse in America*, the form invites a democratization of poetry as a whole. As with certain genres of music, individuals who have been denied outlets to process and articulate their experiences find this chance waiting for them in spoken word and the community surrounding it. At a poetry slam, anyone can sign up to directly address their audience through poetic art. As such, everyone can be a poet, regardless of education, race, gender, sexual orientation, income, or ability. The open opportunity for expression creates an atmosphere of poetry as personal as political.
- 9 I propose, ultimately, a different take on the age old question. Instead of, “Is poetry dead?” we must ask instead: “Is poetry accessible to everyone?” If the answer is yes, or close to yes, then poetry will continue to breathe steadily for whoever finds solace and excitement in it. Whether that is three people, 22 million people, or 300 million, the amount of people who choose to partake is irrelevant outside of industry. What is relevant is that the option of poetry – in all forms – is consistently and readily available.

Write an essay in which you explain how Sarah Duncan builds an argument to persuade her audience that poetry continues to be a vibrant artform. In your essay, analyze how Duncan uses one or more of the features listed in the box above (or features of your own choice) to strengthen the logic and persuasiveness of her argument. Be sure that your analysis focuses on the most relevant features of the passage. Your essay should not explain whether you agree with Duncan’s claims, but rather explain how Duncan builds an argument to persuade her audience.

Drill | Appeals Checklist

Instructions: Based on the passage on the previous pages, fill out your appeals checklist. Name the type of support for each category.

Appeals to Reason:

Appeals to Emotion:

Appeals to Credibility:

Drill | Outline

Instructions: Create an outline using the method described in the Action Plan. For the appeals, write down the type of support and the line numbers you would quote in your essay.

Author's Main Point:

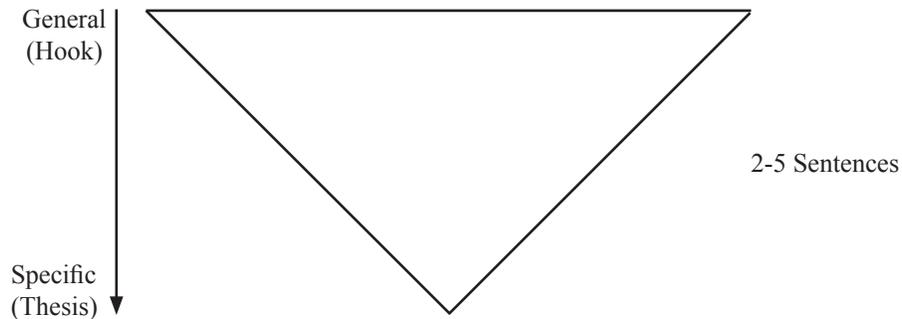
Appeal #1:

Appeal #2:

Appeal #3:

The Essay | Introduction

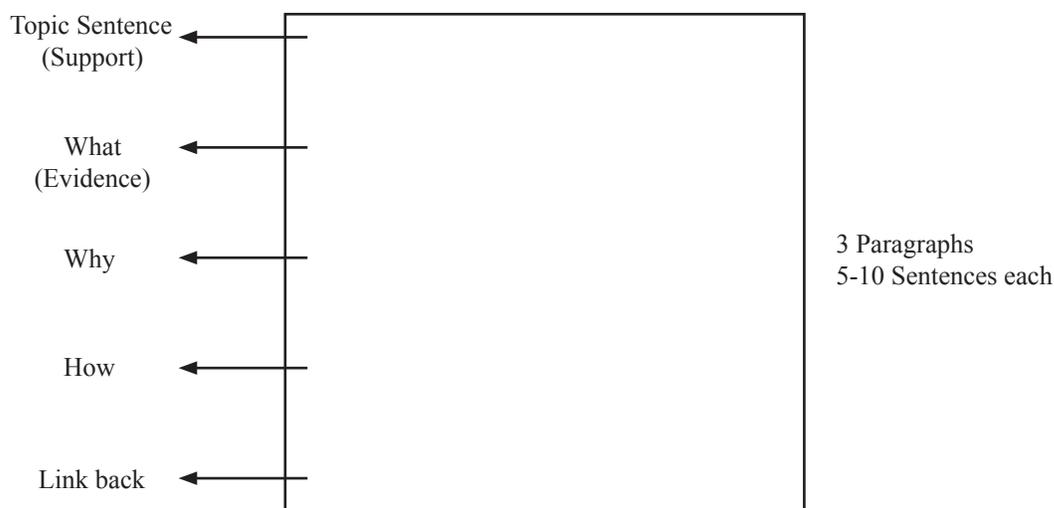
The introduction is your first opportunity to state your case and make an impression on the reader. Therefore, it is very important that your introduction be thoughtful and well-organized. Below we will discuss an effective way to write your introduction. Since you are not given specific instructions on how to write your essay, following a reliable guide is useful for forming your thoughts.



The upside down triangle above is a visual representation of how your introduction should progress. The beginning of the paragraph should start out broadly. You should not state your thesis in the first sentence. Instead, make a general statement about the topic of the passage. This general statement is called the *hook*. Make sure your hook includes the author's name and the title of the work. As your introduction continues, gradually become more specific until the last sentence, which should be your thesis. The *thesis* should be the most specific, and should state which appeals and types of support the author uses. Be as explicit as possible in your thesis so the reader knows exactly where you stand.

The Essay | Body

The body paragraphs make up the bulk of your essay. These are where you define your positions on the passage more exactly and lay out your evidence. It is where the reader will evaluate how you make your case. Therefore, it is centrally important that your body paragraphs are detailed and well developed.



Each of your body paragraphs should address one of the appeals you put in your outline. For your three body paragraphs, start with your second strongest appeal, then your weakest, and finish with your strongest. Begin each paragraph with a *topic sentence*. In this sentence, state the type of support the author uses for that appeal. This should be repeated directly from your thesis statement. Then, for the remainder of the paragraph, develop your ideas on that appeal through answering the three questions: what, why, and how?

What tactic does the author employ? This is where you give examples of the support used, or where you cite your evidence.

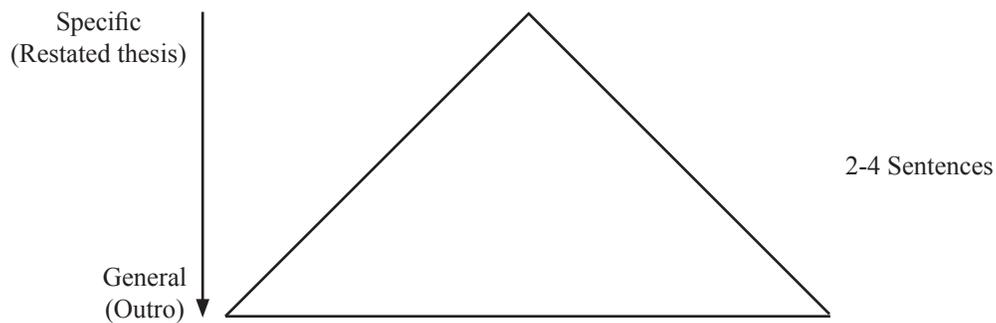
Why does the author use this tactic? This question concerns the author's motivation. It digs a little bit deeper than the what question to ask about the intent of the author and the function of the appeal in the argument.

How does the appeal strengthen the author's argument? The answer for this question will detail the impact the appeal has on the reader of the passage. This impact is how the author is attempting to support their claim.

The last sentence of your body paragraph should be a mini-recap of the paragraph, called the *link back*. In the link back, restate the type of support and how it attempts to persuade the reader of the author's main point.

The Essay | Conclusion

Though the conclusion is the final paragraph of your essay and usually the shortest, do not disregard its importance to your overall essay. The graders look at your essay holistically, meaning they do not go through line by line looking for mistakes, but rather they judge it based on their impressions of the whole text. The conclusion is the last impression they have of your essay before giving it a grade. Therefore, it is important to leave the graders with a favorable opinion by finishing strongly.



The conclusion is the opposite of the introduction in the sense that now we are going from specific to general. Start your conclusion with a *restated thesis*. “Restated” does not mean that you say the exact same thing as you did before, but instead write the same concept of your thesis using different words. Complete your conclusion with an *outro*. An *outro* is a closing statement that ties together the threads of your essay and the passage it’s based on. It should be very basic, general, and address the point of view of the author on a broader scale. Be careful not to introduce any new information.

The Essay | Putting It Together

As you read the passage below, consider how Dwight Eisenhower, uses

- evidence, such as facts or examples, to support claims.
- reasoning to develop ideas and to connect claims and evidence.
- stylistic or persuasive elements, such as word choice or appeals to emotion, to add power to the ideas expressed.

Adapted from former US President Dwight Eisenhower's Farewell Address.

Originally delivered January 17, 1961.

- 1 We now stand ten years past the midpoint of a century that has witnessed four major wars among great nations. Three of these involved our own country. Despite these holocausts, America is today the strongest, the most influential, and most productive nation in the world. Understandably proud of this pre-eminence, we yet realize that America's leadership and prestige depend, not merely upon our unmatched material progress, riches, and military strength, but on how we use our power in the interests of world peace and human betterment.
- 2 Crises there will continue to be. In meeting them, whether foreign or domestic, great or small, there is a recurring temptation to feel that some spectacular and costly action could become the miraculous solution to all current difficulties. A huge increase in newer elements of our defenses; development of unrealistic programs to cure every ill in agriculture; a dramatic expansion in basic and applied research – these and many other possibilities, each possibly promising in itself, may be suggested as the only way to the road we wish to travel.
- 3 A vital element in keeping the peace is our military establishment. Our arms must be mighty, ready for instant action, so that no potential aggressor may be tempted to risk his own destruction. Our military organization today bears little relation to that known of any of my predecessors in peacetime, or, indeed, by the fighting men of World War II or Korea.
- 4 Until the latest of our world conflicts, the United States had no armaments industry. American makers of plowshares could, with time and as required, make swords as well. But we can no longer risk emergency improvisation of national defense. We have been compelled to create a permanent armaments industry of vast proportions. Added to this, three and a half million men and women are directly engaged in the defense establishment. We annually spend on military security alone more than the net income of all United States cooperations – corporations.
- 5 Now this conjunction of an immense military establishment and a large arms industry is new in the American experience. The total influence – economic, political, even spiritual -- is felt in every city, every Statehouse, every office of the Federal government. We recognize the imperative need for this development. Yet, we must not fail to comprehend its grave implications. Our toil, resources, and livelihood are all involved. So is the very structure of our society.
- 6 In the councils of government, we must guard against the acquisition of unwarranted influence, whether sought or unsought, by the military-industrial complex. The potential for the disastrous rise of misplaced power exists and will persist. We must never let the weight of this combination endanger our liberties or democratic processes. We should take nothing for granted. Only an alert and knowledgeable citizenry can compel the proper meshing of the huge industrial and military machinery of defense with our peaceful methods and goals, so that security and liberty may prosper together.

The Essay | Putting It Together

- 7 During the long lane of the history yet to be written, America knows that this world of ours, ever growing smaller, must avoid becoming a community of dreadful fear and hate, and be, instead, a proud confederation of mutual trust and respect. Such a confederation must be one of equals. The weakest must come to the conference table with the same confidence as do we, protected as we are by our moral, economic, and military strength. That table, though scarred by many fast frustrations – past frustrations, cannot be abandoned for the certain agony of disarmament – of the battlefield.
- 8 Disarmament, with mutual honor and confidence, is a continuing imperative. Together we must learn how to compose differences, not with arms, but with intellect and decent purpose. Because this need is so sharp and apparent, I confess that I lay down my official responsibilities in this field with a definite sense of disappointment. As one who has witnessed the horror and the lingering sadness of war, as one who knows that another war could utterly destroy this civilization which has been so slowly and painfully built over thousands of years, I wish I could say tonight that a lasting peace is in sight.

Write an essay in which you explain how Dwight Eisenhower builds an argument to persuade his audience that the public must guard against the rise of the military-industrial complex. In your essay, analyze how Eisenhower uses one or more of the features listed in the box above (or features of your own choice) to strengthen the logic and persuasiveness of his argument. Be sure that your analysis focuses on the most relevant features of the passage. Your essay should not explain whether you agree with Eisenhower’s claims, but rather explain how Eisenhower builds an argument to persuade his audience.

The Essay | Putting It Together

Instructions: Use the space below for your Appeals Checklist and Outline. Write your actual essay on the next two pages. You will have a planning page like this on the actual SAT that is **not** read by the graders.

The Essay | Putting It Together

As you read the passage below, consider how Carrie Russell, uses

- evidence, such as facts or examples, to support claims.
- reasoning to develop ideas and to connect claims and evidence.
- stylistic or persuasive elements, such as word choice or appeals to emotion, to add power to the ideas expressed.

Adapted from Carrie Russell, “Libraries in Today’s Digital Age: The Copyright Controversy.” ©2001 by ERIC Digest. Originally published October 1, 2001.

- 1 Libraries are public institutions committed to equitable access and the free flow of information to meet the needs of the public. For libraries, copyright law, through its incentive model, a rich and robust public domain, fair use, and library and user exemptions-aids in ensuring that information is both created and made accessible. While digital technologies and an ever-expanding communication network infrastructure have enhanced creation and wide distribution of information to the public, these same technologies can be used to control or restrict public access to information.
- 2 The purpose of the copyright law is to advance the progress of science and the useful arts to benefit the public. It does this by awarding to creators a set of exclusive rights, a limited, statutory monopoly over reproduction, distribution, display, performance, and adaptation of the created work, in order to provide creators an economic incentive to create. The law also sets aside numerous exceptions to creators’ right to ensure that users of copyright materials can read and lawfully use the materials in other ways.
- 3 In recent years, a copyright legislative battle has ensued between copyright holders (primarily represented by the publishing, entertainment, and software business industries) and those who wish to use or have access to copyright materials (primarily represented by library, educational, and public interest communities). Copyright holders argue that they will not make their copyrighted works available to the public in digital formats unless the law is revised to prevent piracy and protect the marketplace for intellectual property by controlling access and use. Libraries argue that users rights to information should be upheld regardless of technological innovation and digital formats. The big question: Can copyright law continue to balance the interests of both copyright holders and users in the digital environment?
- 4 In an attempt to update the law to encompass new digital environments and to allay copyright holders’ fears of widespread piracy, Congress passed the Digital Millennium Copyright Act of 1998 (DMCA), an amendment to the copyright law that has been the source of much controversy. The DMCA has furthered a trend to erode the “balance” of copyright law by awarding more rights to copyright holders while restricting the rights of public who wish to enjoy the same user rights to digital information resources as were enjoyed in the print environment. Thus, copyright law and its adaptability in the digital environment continues to be fraught with uncertainty.
- 5 For libraries, lending material to library users is a core public service. First sale [the right to distribute the copy after purchase without the permission of the copyright holder] allows libraries to share their lawfully acquired copies with users. Moreover, interlibrary loan is vital to libraries with limited collection development funds. Poorer libraries can borrow copies from bigger libraries to meet user requests. As more materials become available in only digital formats that cannot be loaned, libraries fear that they will be unable to meet the information needs of users. Libraries cannot afford all materials and rely on sharing.
- 6 Copyright aggregators, those industries that hold the rights to scores of Copyrighted works, like the motion picture and recording industries and the publishing community, parlayed a major victory in the Digital Millennium Copyright Act with the inclusion of a new chapter to copyright law, called Copyright Protection and Management Systems. Many library associations, legal scholars, and public interest groups believe this chapter expands the rights of copyright holders to the detriment of the public.

The Essay | Putting It Together

- 7 It is now an infringement of copyright (punishable by a fine and jail time) to access a password protected or encrypted work without the prior authorization of the copyright holder. In other words, publishers and other copyright holders can use technological measures to deny access to the public of published works. This allows copyright holders the option of charging a fee for access. Most importantly, copyright holders can use technology to enforce license terms on the public.
- 8 Libraries remain committed to a balanced copyright law because without it, copyright cannot meet its primary objective, “to advance the progress of Science and the useful arts” for the benefit of the public. Knowledge and discovery are dependent on access to information, and equitable access can only be achieved when independent of the ability to pay. Libraries pay for information to share with their communities. As more information becomes available in only digital formats, it is important that the public can enjoy the same information rights they exercised with print formats.

Write an essay in which you explain how Carrie Russell builds an argument to persuade her audience that current copyright law restricts the public’s access to information. In your essay, analyze how Russell uses one or more of the features listed in the box above (or features of your own choice) to strengthen the logic and persuasiveness of her argument. Be sure that your analysis focuses on the most relevant features of the passage. Your essay should not explain whether you agree with Russell’s claims, but rather explain how Russell builds an argument to persuade her audience.

The Essay | Putting It Together

Instructions: Use the space below for your Appeals Checklist and Outline. Write your actual essay on the next two pages. You will have a planning page like this on the actual SAT that is **not** read by the graders.

ANSWER KEY



Answer Key

Page 23: 1. What 2. Why 3. Why 4. Why 5. What 6. How 7. What 8. What 9. How 10. How

Page 26: 1. B 2. C 3. D

Page 32: 1. B 2. C 3. B 4. A 5. B 6. D 7. C 8. C

Page 35: 1. C 2. D 3. B 4. D 5. B 6. C 7. A 8. B 9. B 10. D

Page 36-37: 1. C 2. A 3. A 4. C 5. B 6. A 7. C 8. A 9. A 10. A

Page 38-39: 1. B 2. C 3. D 4. B 5. A 6. D 7. B 8. C 9. C 10. D

Page 42-43: 1. B 2. B 3. C 4. D 5. B 6. B 7. A 8. A 9. D 10. C 11. D

Page 44-45: 1. A 2. B 3. D 4. C 5. B 6. A 7. B 8. A 9. D 10. D

Page 46-47: 1. B 2. C 3. B 4. A 5. D 6. D 7. B 8. D 9. B 10. C 11. D

Page 49-50: 1. C 2. D 3. A 4. A 5. B 6. C 7. D 8. B 9. A 10. B

Page 51-52: 1. C 2. D 3. B 4. B 5. D 6. D 7. C 8. D 9. C 10. A 11. A

Page 55-56: 1. D 2. C 3. A 4. A 5. C 6. C 7. D 8. D 9. D 10. D

Page 57-58: 1. C 2. A 3. D 4. B 5. D 6. C 7. C 8. C 9. B 10. B

Page 60-62: 1. D 2. B 3. D 4. C 5. B 6. D 7. D 8. A 9. B 10. B 11. B

Page 64-65: 1. D 2. B 3. B 4. A 5. D 6. B 7. D 8. B 9. C 10. C 11. D

Page 66-67: 1. C 2. B 3. B 4. D 5. C 6. C 7. C 8. A 9. D 10. D

Page 68-69: 11. B 12. A 13. B 14. C 15. B 16. C 17. D 18. A 19. B 20. A 21. D

Page 70-71: 22. C 23. A 24. C 25. D 26. B 27. A 28. B 29. B 30. D 31. A

Page 72-74: 33. C 33. A 34. B 35. B 36. C 37. D 38. C 39. A 40. B 41. D 42. D

Page 76-77: 43. C 44. B 45. B 46. D 47. B 48. D 49. D 50. C 51. C 52. A 53. B

Page 80-81: 1. B 2. A 3. D 4. B 5. B 6. C 7. C 8. A 9. C 10. D

Page 82-83: 11. A 12. C 13. D 14. C 15. B 16. B 17. D 18. A 19. A 20. D

Page 84-85: 21. C 22. C 23. C 24. C 25. A 26. D 27. A 28. A 29. B 30. D 31. B

Page 86-87: 32. C 33. B 34. B 35. B 36. C 37. D 38. D 39. C 40. A 41. D

Page 88-89: 42. C 43. A 44. B 45. B 46. A 47. B 48. C 49. B 50. B 51. A

Page 90-91: 52. C 53. B 54. D 55. C 56. D 57. A 58. D 59. C 60. D 61. D 62. B

Page 92-93: 63. A 64. C 65. A 66. D 67. D 68. B 69. C 70. C 71. A 72. D

Page 95-96: 73. B 74. D 75. C 76. A 77. A 78. C 79. B 80. D 81. A 82. B 83. A 84. C

Page 97-98: 85. D 86. B 87. C 88. D 89. B 90. A 91. D 92. B 93. C 94. D 95. D

Page 107: 1. Subject: Joan Verb: began 2. Subject: Animals Verb: have 3. Subject: Chemistry Verb: comes 4. Subject: Manhattan Verb: is
5. Subject: Walking Verb: may

Page 108: 1. Robert Nester Marley, a music legend born in Jamaica, broke music barriers with his activist lyrics. 2. We discovered the largest deposit of diamonds in the country, and it was amazing to see. 3. Andrew arrived at the party late; he was delayed by the weather. 4. After an extremely long day at work, Samuel wanted to go home.

Page 110: 1. its 2. it's it's 3. it's 4. its

Page 111: 1. which lasted three hours 2. after giving the family cat a bath 3. the third most populous city in the United States 4. Mr. Rogers' Neighborhood

Page 112-114: 1. Did you know that chocolate, a favorite delicacy around the world, is created from the cacao bean? 2. Cacao beans are primarily grown in South and Central America, especially in Mexico and Brazil. 3. The beans grow on little shrubs in tropical areas; these shrubs are actually relatives of North American evergreen trees. 4. Once harvested, the beans are cleaned, dried, and stored for future shipment. 5. In many cases, the cacao beans' potency is enhanced through slow roasting. 6. The cacao bean has a distinctive smell and taste, and is therefore used in both food and non-food products. 7. Although many people associate chocolate with dessert, chocolate is also found in unique dishes such as Mexican mole. 8. Nevertheless, I prefer my chocolate in desserts; my favorites are chocolate ice cream, chocolate tortes, and chocolate chip cookies. 9. My mother's recipe for chocolate chip cookies has been handed down in my family for generations. 10. It's incredible that some people don't like chocolate. 11. In the United States, the two biggest chocolate companies are Mars, which makes M&M's, and Hershey, which makes Kisses. 12. Many people believe that the best chocolate in the world is found in European countries such as Belgium, Germany, France, and England. 13. In England, Cadbury is the biggest candy company; it produces a number of excellent chocolate bars, such as the Aero, the Double Decker, and the Toffee Crisp. 14. If you had to choose, what's your favorite use for chocolate?

Page 116-120: 1. C 2. A 3. A 4. C 5. C 6. A 7. C 8. D 9. B 10. A 11. C 12. B 13. A 14. D 15. B 16. A 17. D 18. A 19. D
20. B 21. C 22. D 23. B 24. B 25. C 26. A 27. B

Page 122: 1. The Netherlands was part of the band of countries that signed the Treaty of Rome. 2. The newly elected president, to the dismay of her opponents, has argued to phase out the electoral college. 3. likes 4. explain 5. was the trademark 6. has led 7. is

Page 123 - 1. had 2. are 3. will be 4. ate 5. stated was 6. is 7. will be

Page 124 - 1. Believed 2. wondering 3. understand working 4. has been working

Page 127-130: 1. B 2. C 3. A 4. B 5. B 6. C 7. C 8. D 9. A 10. A 11. A 12. D 13. B 14. B 15. D 16. C 17. A 18. C 19. D
20. B 21. A 22. D 23. C

Page 132: 1. Before boarding the boat, passengers must purchase their tickets at the counter so they are allowed to board. 2. Because the chemical composition of wheatgrass juice is so similar to that of hemoglobin, people consume it to maintain good health. 3. you
4. one one's 5. their

Page 134: 1. Miss Fletcher gave the car keys to Mary and me. 2. Kyle and I waited for Matt to finish class so that we could all go to lunch.
3. your 4. I 5. Tony and him

Page 136-137: 1. A 2. C 3. D 4. A 5. C 6. C 7. B 8. C 9. D 10. A 11. B

- Page 138: 1. Dressed in an unappealing t-shirt and baggy jeans, the boy displayed a disrespectful and egotistical attitude when he arrived to escort his date to the prom and refused to pose for photos. 2. Walking into the café, Maggie immediately received a cup of coffee at her favorite table. 3. Between the two women, Linda was the more prepared to present at the meeting.
- Page 140: 1. B 2. D 3. D 4. B 5. D
- Page 142: 1. Although many groups were vehemently opposed. . . 2. Even though Dadius completed a merger with Rival Boobox, the new company. . . 3. Because Molasses McFadden has never donated. . .
- Page 143: 1. B 2. C 3. B 4. D 5. A
- Page 144: a. Studies showing that students who are good at psych do better on quant & verbal exceries b. The previous statement can be proven by studying SAT scores c. The seond part provides evidence for the first d. A
- Page 145: 1. A 2. B 3. D 4. A
- Page 146: 1. The Daily Show with Trevor Noah first aired in 1996 under the name The Daily Show; each episode consisted of an opening monologue, satirical sketches, and a celebrity interview. 2. It is clear that Alex doubts the proposal's fairness, Barney disputes its effectiveness, and I question its legality. 3. Everyone contributed to the charity breakfast: Larry cooked eggs, Ervin fried bacon, and Michael made the pancakes.
- Page 147: 1. B 2. D 3. B 4. D
- Page 148: 1. Telecommunications satellites orbit the earth at distances in excess of 30,000 meters. 2. During the 2008 Summer Olympics, sprinter Usain Bolt ran the 100 meter dash, a distance of approximately 110 yards, in 9/69 seconds . . . 3. The prices of fashionable clothes . . .
- Page 151: 1. B
- Page 152: 1. I'm going to try to find a new pair. . . 2. If the convention had not been scheduled for the same week, there would have been enough . . . 3. The epidemics of influenza . . . 4. From Letta's perspective . . . 5. In order to participate in the tournament, Greendale High School has to field the full complement . . . 6. The judge found no clear way to assess whose . . .
- Pages 153-154: 1. B 2. D 3. D 4. D 5. C 6. B 7. A 8. A
- Pages 155-156: 1. D 2. A 3. B 4. D 5. C 6. B 7. A 8. B 9. D 10. D 11. C
- Pages 157-158: 1. C 2. D 3. B 4. C 5. D 6. C 7. A 8. B 9. A 10. C 11. D
- Pages 159-160: 1. B 2. A 3. D 4. A 5. B 6. C 7. D 8. B 9. A 10. C 11. D
- Pages 162: 1. A 2. A
- Page 164: 1. B
- Pages 166-168: 1. A 2. A 3. D 4. A 5. A 6. C 7. C 8. B 9. C 10. C 11. C
- Pages 169-171: 1. C 2. D 3. C 4. B 5. A 6. B 7. D 8. A 9. B 10. B 11. A
- Pages 172-174: 1. A 2. C 3. C 4. C 5. B 6. C 7. B 8. C 9. A 10. B 11. B
- Pages 175-176: 1. A 2. D 3. C 4. B 5. A 6. D 7. B 8. B 9. C 10. D 11. D
- Pages 178-181: 1. D 2. D 3. C 4. C 5. C 6. B 7. C 8. A 9. B 10. B 11. B 12. C 13. B 14. D 15. B 16. C 17. C 18. D 19. A 20. D 21. B 22. B
- Page 182-198: 1. B 2. C 3. A 4. B 5. D 6. C 7. D 8. C 9/ D 10. B 11. C 12. B 13. C 14. C 15. C 16. D 17. B 18. C 19. C 20. D 21. B 22. A 23. B 24. A 25. A 26. D 27. D 28. D 29. D 30. B 31. A 32. B 33. C 34. B 35. A 36. A 37. C 38. A 39. C 40. C 41. B 42. A 43. A 44. C 45. B 46. D 47. B 48. C 49. A 50. C 51. D 52. C 53. A 54. A 55. C 56. A 57. A 58. D 59. C 60. D 61. D 62. D 63. C 64. B 65. B 66. D 67. C 68. C 69. A 70. D 71. C 72. D 73. A 74. C 75. A 76. D 77. B 78. A 79. C 80. D 81. B 82. D 83. D 84. A 85. B 86. D 87. B 88. A
- Pages 208-209: Integer: A number with no fraction or decimal; True; True Digit: Integers 0-9 inclusive Consecutive: In order Distinct: Different Even: An integer divisible by 2; True; True; False Odd: An integer not divisible by 2 Remainder: The integer left over after division; 5 Multiple: Multiples of a number x are found by multiplying x by any positive integer; 7, 14, 21, etc; itself LCM: The smallest positive value that is a multiple of 2 or more numbers; 18; $28x^2y$ Absolute Value: The distance a value is from zero on the number line; 7; 7; 2 Factor: Factors of a number x are integers that will divide into x with no remainder; 1, 2, 3, 4, 6, 8, 12, 24; 1 GCF: The lasrgest factor of 2 or more numbers; 8; $8x$ Prime: A number with exactly 2 distinct positive factors, 1 and itself, False; False Factorial: The product of all integers from 1 to any integer n, inclusive; 720 Reciprocal: The multiplicative inverse of a number; $1/4$ Order of Operations: PEMDAS; -3 Scientific Notation: A shorthand way of writing very large or very small numbers; 1.03×10^5
- Page 210: 1. 1 2. 4 3. Yes 4. 2 5. No 6. 12 7. 1 8. 0.00075 9. $6 < p < 8$ 10. 40,326 11. $60xy^2$ 12. I and III
- Page 211: D
- Page 212: D
- Page 213: B
- Page 214: B
- Pages 215-216: 1. A 2. C 3. B 4. A 5. B 6. B 7. B 8. C 9. C 10. B
- Pages 217-218: 1. A 2. C 3. D 4. C 5. B 6. A 7. C 8. B 9. C 10. B 11. C
- Page 219: 40 0.125; 0.6; 0.725
- Page 220: 10/21 4/15
- Page 221: 1. 1/11 2. $-22/45$ 3. $(ab + 2)/2b$ 4. $3/64$ 5. $1/4$ 6. $8/25$ 7. $-7/8, -3/7, -1/5, 5/6, 7/8$ 8.. $3/11$
- Pages 222-223: 1. $5/8$ 2. A 3. B 4. D 5. C 6. C 7. B 8. B
- Pages 224-225: 1. $1/7$ 2. C 3. B 4. A 5. B 6. C 7. 9 8. A
- Page 227: 528
- Page 228: 32
- Page 229: 10 gallons
- Page 230: 1. 112 2. 8.5 3. 4.5 4. 3 5. 104 6. 52
- Pages 231-232: 1. C 2. 3080-4200 3. D 4. 215 5. C 6. C 7. D 8. C 9. D 10. A

Page 233: 50
Page 234: D B
Page 235: 1. 91 2. 12.5% 3. 20% 4. 0.5 5. 2700 6. 48,640 7. 48,025 8. 20%
Pages 236-237: 1. B 2. D 3. A 4. C 5. C 6. A 7. D 8. B 9. D 10. B 11. B
Page 238: A
Page 239: D
Page 240: 1. 216 2. 182 3. 1880 4. 97.9 5. 30 6. 216 7. 2.5 8. 48
Pages 241-243: 1. 228 2. D 3. C 4. B 5. C 6. B 7. C 8. 1950 9. C 10. 51
Page 244: Mode - The number that appears most often; 4 Median - The middle number in a set of numbers; put in ascending order; 4; 5
Range - Difference between the largest and smallest values in a set Outlier - A value that is significantly larger or smaller than any other value in a set; Range First Quartile - The median of the first half of data points Third Quartile - The median of the second half of data points Interquartile Range - Third quartile minus first quartile
Page 245: Nicole
Page 246: 22.2
Page 248: 10 35 57 71 80
Page 249: 1. Median - 9.5 Mean - 8.666 First Quartile - 6 Third Quartile - 11 2. 7 3. $x \geq 9$ 4. 9 5. \$21,000 6. III and V
Pages 250-251: 1. C 2. B 3. D 4. B 5. D 6. B 7. D 8. B
Pages 253-254: 1. B 2. A 3. B 4. B 5. C 6. C 7. C 8. D 9. D
Pages 257-259: 1. B 2. A 3. C 4. C 5. A 6. D 7. B 8. A
Page 261: D
Page 262-264: 1. B 2. C 3. B 4. B 5. C 6. A 7. C 8. A 9. A
Page 266: Equation - An expression that has an equal sign Inequality - An equation expressing that one part is either greater or less than the other part Square - The product of a number times itself; 25 Square Root - Two identical factors of a number; 6 Absolute Value - The distance from zero on a number line Exponent - A number or expression placed to the upper right of a number denoting the power to which that number is raised 3. B
Page 267: 1. 5 2. 7 3. -20 4. $15/7$ 5. 9 6. $2/3$ 7. $20/9$ 8. $16/23$
Page 268: 1. C 2. A 3. C 4. A 5. D 6. C 7. B
Page 270: 1. $n - 13$ 2. $j = 5p$ 3. $2(x + y)$ 4. $5h + 6b = 12$ 5. $12/(10 - 4)$ 6. $5 - n = 4(2 + 3)$
Pages 271-272: 1. D 2. B 3. 59 4. C 5. D 6. D 7. A 8. C 9. C 10. D 11. C 12. C
Pages 273-274: 1. D 2. D 3. D 4. A 5. D 6. D 7. A 8. B 9. A 10. C
Page 275: Option 1 - B Option 2 - B
Page 276: D
Page 277: D
Page 278: 1. -10 2. $5/2$ 3. 14 4. 39 5. 30 6. 10 7. $16.4 = 2h + 3r$; $29.2 = 4h + 2r$
Page 279: 6
Page 280: $12/5$
Pages 281-282: 1. A 2. C 3. C 4. B 5. B 6. A 7. C 8. D 9. A 10. A 11. C
Pages 283-284: 1. D 2. B 3. D 4. 12 5. 230 6. 6 7. A 8. $3/7$ 9. C
Page 285: x is less than 4 x is greater than 9 x is less than or equal to 12 x is greater than or equal to 50 D C
Page 286: B
Page 287: 1. $X > 5$ 2. $r \leq 3$ 3. $-2 \leq b \leq 8$ 4. $h \leq 40$ 5. $x > -2.4$ 6. $3 < j < 4$ 7. $13 < f < 18$ 8. 2
9. -1 10. greater than or equal to; less than or equal to
Pages 288-289: 1. B 2. B 3. C 4. C 5. A 6. D 7. B 8. B 9. D 10. B
Page 291: \$360 $c(t) = 4.75 + 0.4(t - 3)$
Page 292: 12
Page 293: 1. 24 2. 2 3. 16 4. 34 5. Hours the employee works 6. 3165 7. $c(m) = 1.5 + (0.7)(m - 3)$
Pages 294-295: 1. D 2. C 3. A 4. A 5. B 6. D 7. 24 8. 6 9. B 10. 1877
Page 296: 1. C 2. C 3. C 4. B 5. A 6. A
Pages 298-299: Add and Subtract: $4y^2$; $2y^2$; $8y^2$ Multiply: y^5 Divide: y^2 ; 3^2 ; $2x^2$ Raising an Expression: x^{15} ; $2^{12}x^{15}$; $9x^8y^{10}$ Change of Base: $-2/3$;
2 Fractional Exponents: square root of x^3 ; seventh root of x^5 ; 2 square root of 2 Negative Exponents: $1/9$; 16 Properties of 1 and 0: 1; 0; 1 Raising Negative Numbers: 9; -64; $-1/8$ Fractions: $1/4$; $1/8$; $1/16$
Page 300: Square Root Definition: 4; x ; $2y^2$ Addition and Subtraction Under the Root: 3 square root of 2; x square root of 2 Adding and Subtracting: 7 square root of 2; -5 square root of 7 Multiplying and Dividing: 24; 5 square root of 2; 8 square root of 6 Factoring Our Perfect Squares: 5 square root of 3; 4 square root of 3; a square root of b Rationalizing: 2 square root of 5; $(x \text{ square root of } y)/y$ Nth Root: 3; 5; 4 Eliminating Root Signs: 27; 32
Page 301: -4
Page 302: 1. 9 square root of 5 2. 6 3. square root of 3 4. $2x^5$ 5. x^9 6. y^9 7. $81x^{12}$ 8. 9h 9. a^{12} 10. $6x^5$ 11. $(z^5x^3)/y^6$ 12. 256 13. 9^3
14. $4x^2$
Pages 303-304: 1. C 2. 20 or 40 3. C 4. C 5. D 6. D 7. B 8. D 9. B 10. C 11. C 12. A 13. 729
Pages 305-306: Adding/Subtracting: $9x$ $4x + 5y$ $4x - 5x^2$ $-6x^3 + 5x^2$ Final Answer: $8x^2 - 18x^3$ Multiplying: $30x^4$
FOIL: $20xy - 10x + 24y - 12$ Fractional Polynomial Addition/Subtraction: $(3x^2 + 6x + 55)/33x$ Fractional Polynomial Multiplication: $(5x + 10)/33x$ Fractional Polynomial Division: $(3x(x + 2))/55$
Page 307: 1. D 2. A 3. B 4. A 5. C 6. D 7. 27
Page 308-312: GCF: $4x$; $4x(2x^2 + y^3 - 6z)$ Difference of Perfect Squares: $(4x - 10)(4x + 10)$ Quadratic Factoring: $(x - 4)(x + 6)$; $x = 5$ and -6
 $4(x + 4)(x + 1)$; $x = -4$ or -1 Quadratic Formula: $a = 4$; $b = -2$; $c = -5$; $(2 \pm \text{square root of } 84)/8$ Factoring by Grouping: $x = 6$;
Rainbow Technique: $(2x + 7)(2x + 3)$

Page 313: 1. -2 2. -3 or 2 3. $(r - 6)(r + 6)$ 4. -2 5. -4 6. $z - 2y^2 + 3x^3 = 10$ 7. $2k^{2i} + (1/2)kj$ 8. $(-5 \pm \sqrt{113})/4$ 9. -1 10. 8

Pages 314-315: 1. 2 2. 12 or 4 3. B 4. D 5. D 6. B 7. 4 8. D 9. 189 10. B 11. C 12. D

Pages 317-318: 1. C 2. 1.06 3. 322 4. A 5. A 6. C 7. D 8. B 9. 140

Page 319: B

Page 320: 1. B 2. C 3. B 4. D

Pages 325-326: 1. C 2. B 3. B 4. B 5. B 6. D 7. C 8. C 9. D

Page 327: 1. C 2. B 3. A 4. D 5. B

Pages 331-332: 1. A 2. B 3. A 4. 1 5. D 6. 11 7. B

Page 333: 1. D 2. B 3. C 4. B 5. C

Page 334: 2. square root of -1; -1; - square root of -1; 1 3. $(3i + 21)/-50$

Page 335: 1. $11i$ 2. $26 - 18i$ 3. $-33 + 56i$ 4. $(37i - 1)/10$ 5. 13 6. $12 + 7i$

Page 336: 1. D 2. B 3. D 4. D 5. A 6. C

Page 340: Equation of a Line: $y = mx + b$; slope; y-intercept y-intercept: $(0, y)$ x-intercept: $(x, 0)$ Slope: $(y_1 - y_2)/(x_1 - x_2)$ or rise/run; undefined; 0; negative reciprocals; equal Distance Formula: square root of $((x_1 - x_2)^2 + (y_1 - y_2)^2)$ Equation of a Circle: $(x - h)^2 + (y - k)^2 = r^2$; x and y coordinates of the center of the circle; radius

Page 341: Center: $(2, -3)$ Radius: square root of 17

Page 342: 1. $1/5$ 2. 13 3. $-6/5$ 4. $(x - 8)^2 + (y - 5)^2 = 16$ 5. $y = (4/3)x - 16$ 6. $5/4$ 7. $x = -6$

Pages 343-344: 1. C 2. B 3. B 4. D 5. B 6. A 7. A 8. D 9. C 10. D

Page 345: 1. C 2. D 3. C 4. C 5. D 6. B

Page 346: Parallel: Lines that never intersect Perpendicular: Lines that intersect to form a right angle Bisect: Cut in half Midpoint: The point exactly in the middle of a line segment Vertical Angles: opposite angles formed by intersecting lines; equal in length Supplementary Angles: angles that add up to 180 degrees Complementary Angles: angles that add up to 90 degrees

Page 347: 1. A 2. B 3. B 4. C

Page 348: Similar: they have 2 angles in common Degrees: 180 degrees Equilateral triangle: 60 degrees Pythagorean Theorem: $a^2 + b^2 = c^2$

Page 349: $x = 5$

Page 350: 1. 20 2. 10 3. 5, 12, 13 4. 6, 7, 7 or 6, 6, 8 5. 22 6. $2 < x < 16$ 7. $c < b < a$ 8. 8 9. 14 square root of 3

Pages 351-352: 1. 20 2. 68 3. B 4. 110 5. A 6. 12 7. C

Page 353: 1. 18 2. D 3. C 4. D

Page 354: Area: $\pi(r)^2$ Circumference: $2\pi(r)$ or $\pi(d)$ Degrees in a Circle: 360; 180 Arc, Sector, Central Angle Proportions: central angle/360 degrees = arc length/circumference = area sector/area circle Tangent Line: right angle Triangle inscribed in semi-circle: right triangle

Page 355: D B

Page 356: 1. $25(\pi)$ 2. $24(\pi)$ 3. 13 4. $50(\pi)$ 5. $169(\pi)$ 6. square root of 42 7. $10 + 10(\pi)/9$ 8. 40 degrees

Pages 357-358: 1. 60 2. 91 - 120 3. D 4. 36 5. B 6. B 7. A 8. 13

Page 359: 1. B 2. B 3. 140 4. $1/50$

Page 361: 1. 20 2. 44 3. 13 4. 34 5. 124

Page 362: 1. D 2. C 3. B 4. B 5. D 6. B

Page 364: 1. 216 2. 11 3. $360(\pi)$ 4. 60 5. 96 6. 486

Page 365: 1. A 2. 6.75 3. C 4. D

Page 366: Sine: opposite; hypotenuse; Sine = opposite/hypotenuse Cosine adjacent; hypotenuse; Cosine = adjacent/hypotenuse Tangent: opposite; adjacent; Tangent = opposite/adjacent Cosecant: hypotenuse/opposite Secant hypotenuse/adjacent Cotangent: adjacent/hypotenuse Radians: 180

Page 367: Sine: $8/10$ Cosine: $8/10$ Relationship: They are equal 90 degrees; angle C; cosine of angle C

Page 368: 1. 0.2 2. 6 3. $7/15$ 4. $5/13$

Page 369: 1. $3/5$ 2. 2 3. 0 4. D

Pages 372-373: 1. A 2. B 3. C 4. D 5. A 6. B 7. D 8. C 9. C 10. D 11. B 12. A

Pages 374-375: 1. B 2. D 3. C 4. A 5. C 6. D 7. B 8. D 9. C 10. B 11. C 12. D 13. C

Pages 376-377: 1. C 2. B 3. 60 4. D 5. 15 6. B 7. $35/3$ 8. B 9. 528

Pages 378-379: 1. C 2. C 3. D 4. $3/5$ 5. $5/4$ 6. 2 7. 1 8. D 9. C

Pages 380-382: 1. D 2. C 3. B 4. B 5. 180 6. B 7. D 8. C 9. 23 10. D 11. C 12. D 13. C 14. B 15. 63

Pages 383-385: 1. 6.9 2. 576 3. D 4. A 5. 25 6. D 7. B 8. B 9. 4 10. D 11. D 12. D 13. C 14. 2.17 15. A

Pages 386-388: 1. 96 2. D 3. B 4. 61.2 5. B 6. B 7. B 8. D 9. 6 10. 13.8 11. B 12. B 13. 73.3 14. 350

Pages 389-391: 1. D 2. 36 3. D 4. B 5. C 6. D 7. D 8. C 9. 12 10. B 11. A 12. D 13. A

Pages 392-394: 1. D 2. B 3. D 4. D 5. C 6. C 7. B 8. A 9. D 10. D 11. D 12. D 13. B

Pages 395-399: 1. B 2. D 3. B 4. B 5. C 6. B 7. C 8. A 9. B 10. A 11. D 12. C 13. A 14. D 15. A

Pages 400-403: 1. B 2. D 3. B 4. B 5. C 6. C 7. B 8. C 9. D 10. C 11. B 12. D 13. C

Pages 404-405: 1. B 2. 5 3. B 4. A 5. 4 6. A 7. D 8. B 9. C 10. A 11. C 12. B 13. D

Pages 406-407: 1. A 2. 14.8 3. 9 4. A 5. C 6. B 7. C 8. 900 9. C

Pages 408-409: 1. B 2. D 3. C 4. C 5. D 6. D 7. D 8. D 9. B 10. B 11. C 12. B

Pages 410-411: 1. C 2. D 3. D 4. C 5. 94 6. B 7. 3.2 8. C 9. D

Pages 412-413: 1. A 2. C 3. B 4. B 5. 6 6. A 7. $5/24$ 8. $9/14$ 9. 120

Page 414: 1. C 2. D 3. B 4. C 5. D 6. C 7. A 8. B

Page 415: 1. C 2. A 3. C 4. A

Pages 416-418: 1. D 2. A 3. A 4. B 5. D 6. D 7. A 8. A 9. D 10. C 11. A 12. A 13. B 14. B 15. D 16. C

Page 419: 1. B 2. C 3. A 4. D 5. D 6. A 7. C

Pages 420-421: 1. C 2. B 3. C 4. C 5. B 6. B 7. B 8. A 9. C 10. A 11. D 12. B 13. $1/6$ 14. A

Pages 422-423: 1. B 2. D 3. A 4. D 5. C 6. C 7. A 8. B 9. A 10. A 11. C 12. B 13. B 14. A
Pages 424-426: 1. C 2. D 3. A 4. A 5. 10 6. 12, 23, or 36 7. C 8. D 9. A 10. B 11. D 12. A 13. D 14. A 15. A 16. C 17. D 18. 2
19. A 20. C
Pages 427-428: 1. C 2. D 3. C 4. D 5. 880 6. B 7. D 8. C 9. C 10. C
Page 429: 1. A 2. B 3. B 4. A
Pages 430-432: 1. D 2. 6 3. 45.5 4. A 5. D 6. B 7. A 8. C 9. B 10. B 11. D 12. C
Page 433: 1. B 2. C 3. A 4. B 5. B
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