

Marks Prep's Four Realistic SAT Practice Tests

Answer Explanations for Test 3

Question Types

Reading Question Types

- WIC Words in Context:** These questions ask about the meaning or use of specific words or phrases as they are used in the passage.
- COE Command of Evidence:** These questions are usually in two parts, with the first being a challenging reading comprehension question and the second question providing line numbers to choose from for the best evidence for the correct answer. When these questions are paired, **both** questions are coded as **COE** in the answer keys.
- IG Informational Graphic:** These questions are based on what the test calls “supplemental materials,” such as graphs, tables or maps.
- RC Reading Comprehension:** These questions make up the remainder of the test questions, asking about such things as tone, main ideas, or inferences.

Writing Question Types

- SEC Standard English Conventions:** These questions are based on rules for grammar and correct usage, covering topics such as punctuations, pronoun reference, sentence structure and more.
- EOI Expression of Ideas:** These questions are based on the context of the passage, so there are no rules to learn to answer them. They often ask students to do certain compositional tasks, including ordering of sentences or paragraphs, transitioning between ideas, adding or deleting text, and much more.

Math Question Types

- HOA Heart of Algebra:** These questions involve the kind of basic algebraic translation, equation solving, and linear expression found in a first-year Algebra class.
- PAM Passport to Advanced Math:** These questions involve the kind of algebraic form changes and higher level functions found both in a first-year and a second-year Algebra class.
- PSD Problem Solving and Data Analysis:** These questions include manipulating data from graphs and tables, as well as data representation topics such as percent, probability, and statistics.
- ATM Additional Topics in Math:** These questions include geometry and trigonometry topics, plus a few lesser-taught topics such as complex numbers.

Answer Explanations Icons



Indicates that a test-taking strategy can be applied



Warns of a common error to avoid



Alerts to the possibility of using an alternative method

Reading Test

Passage 1

You are told in the introduction that this Literary Fiction passage was written in 1854, so prepare for some difficult vocabulary and an old-fashioned writing style. Because this is fiction, there are several things to pay attention to that are not relevant to the other informational and argumentative passages in this section. It is important to understand the feelings and motivations of the main character, what is happening in the story, and the relationship between characters.

This particular passage has two parts: the first part is a character description emphasizing the seriousness of Mr. Thomas Gradgrind, who we later learn is a schoolteacher, and the second part depicts his lesson to his students, showing his literal-minded character in action. As you read, you should develop a sense of Gradgrind's personality and how that is reflected in his interaction with his students in the classroom. As with many older passages as well as fictional passages, rather than writing a summary of the passage as a whole, it may be easier to write in the margins of each paragraph or section what the main point of that part of the text is—doing so will assure your understanding of the passage as you read and also prove useful in answering the questions.

1 B RC This question directs you to the first paragraph and asks what its function is.



Before you look at the answers, look back briefly to remind yourself what the narrator says in lines 1–15. As you've hopefully already noted, this is part of the narrator's description of Gradgrind's character, giving a description of him that reflects the seriousness of his approach to life. The correct answer is thus (B). Gradgrind is introduced as a very serious person guided by strong beliefs.



If your impression of the first paragraph was too general, you may need to use a process of elimination to rule out the wrong answers. You can eliminate (A) because while the paragraph indicates Gradgrind's passionately held beliefs, it doesn't discuss his activities or personal interests. Choice (C) is incorrect because the narrator does not compare Gradgrind to his students. Instead, Gradgrind is compared to some "non-existent persons" with the same last name, but these people are imaginary, not his actual relatives, and this makes choice (D) an incorrect answer.

2 D RC Do NOT fall into the trap of using the answer choices to try to answer this question. For many students, a question like this, which asks about a metaphor used in the passage, seems to be a difficult "interpretive" question, which might make it seem that multiple answers are possible.



Instead of looking at the answers, re-read the sentence referred to in line 21, and you will see that the author explains the metaphor directly, stating that Gradgrind sees his students as little pitchers that he can fill "full of facts." This should make very clear that choice (D) is correct.

- 3 **C** COE Questions 3 and 4 are a set of paired evidence-based questions. After reading question 3, but not its answer choices, look at question 4 and then come back to question 3.



In choosing (B) as the correct choice for Question 4, you've determined that lines 24–30 tell you how Gradgrind views his task as an educator. Apparently, he is like a “cannon loaded to the muzzle with facts” and sees in his students “imagination that were to be stormed away.” This matches nicely with (C), which is the correct answer to this question.



Although the language in lines 24–30 might seem to suggest that Gradgrind helps his students mature (“clean out of the regions of childhood...”), he does this through impersonally conveying information—no indication is given that he personally mentors his students (in fact, everything about his character and approach as outlined in the passage indicates he would NOT do so), which is why choice (D) is incorrect.

- 4 **B** COE You need to find the place in the passage where you learn how Gradgrind views his job as a teacher. Of all the lines you are directed to look back at, only lines 24–30 express how Gradgrind's outlook affects how he interacts with his students. Choice (B) is correct.

- 5 **B** WIC The sentence containing the word in question describes Gradgrind as “a kind of cannon.” “Discharge” completes this cannon metaphor.



Take a look at line 27 and try to determine a good synonym for “discharge” in the context of a cannon. When referring to a gun or cannon, discharge means “sending out a bullet or cannonball.” A synonym to write in might be “firing” or “shot.” This matches the correct answer choice (B).



If you don't know what discharge means in this context, just realizing that this sentence is comparing Gradgrind to a cannon is helpful: the only answer choice that seems to have anything to do with a cannon is choice (B).

- 6 **D** WIC Another word in context! This is a tricky one—it's an archaic word, which means it is no longer in common use, so you'll have to use context clues to understand what it means.



Try to think of a word that works in place of “behoof.” In context, you could replace the phrase “for the general behoof of,” with “for the general benefit of,” so “benefit” would be a good choice, and look!—that matches (D), the correct answer.



If you are unable to put a word in for behoof in the sentence, you can simply read the answer choice into the sentence and see which makes the most sense. Choice (A) and (C) are easy to eliminate: (A) is incorrect and rather silly. Clearly, the students aren't about to put horseshoes on a horse (and certainly aren't going to wear horseshoes themselves!). Choice (C) doesn't work, because he is not mocking all of the students (though he certainly is being unkind to girl number twenty!), so general mockery is inaccurate. Choice (B) is tougher to eliminate, but also doesn't quite make sense. He is not taking away anyone's difficulties in what he is saying here, so this doesn't make sense. However, he does see himself as benefiting the others by humiliating Sissy for her ignorance and allowing the others to show their knowledge, making (D) correct.

- 7 **A** COE  For this COE question pair, take a look at Question 8 first and then come back to Question 7. Lines 67–71 tell us that Bitzer is, like Sissy, being lit by the window. Thus, it is proximity to Sissy that makes Gradgrind choose Bitzer, so choice (A) is correct.
- 8 **B** COE  The implied question in Question 7 is “Why does Gradgrind call on Bitzer?” Thus, you need to find the line numbers that tell you the answer.
-  Choice (A) is the trickiest to eliminate, because it is actually the part in which Gradgrind chooses Bitzer, but it does NOT give any indication WHY he did so. However, in lines 67–71—choice (B)—the narrator suggests that perhaps Gradgrind calls on Bitzer because he is sitting in the same ray of sunlight that is shining on Sissy, so choice (B) is correct. Choice (C) is simply a description of Bitzer, without reference to Gradgrind, and choice (D) is merely Bitzer’s definition of a horse, neither of which tell us anything about why he was chosen.
- 9 **D** RC  Write in your own answer for this question, probably something like “detailed and factual.” Once you have done so, it is clear that choice (D) is correct.
-  Do NOT go directly to the answer choices, many of which may seem tempting in offering a sophisticated “interpretation” of the description! Both choices (B) and (C) might seem like “cleverer” answers than (D), but (D) is perfectly accurate, and the text offers no clear support for the other answers.
- 10 **C** RC  All the answer choices to this question have two parts: an adjective and a reason that would justify the answer. If you can determine that either part of the answer is incorrect, you can eliminate that answer choice entirely.
-  Start by writing down your own word to describe the tone, such as “pleased,” or, if you understand the character a bit better, “pompous.” Once you have written down this word, you can eliminate answer choices based on the initial word. Choice (A) is incorrect because the practical, straightforward Mr. Gradgrind would be unlikely to speak ironically; in his mind, Sissy did not know what a horse is and needed to be told. Choice (B) is incorrect because Gradgrind would be unlikely to express any type of humor. Also, Gradgrind approves of Bitzer’s very detailed definition. Choice (D) is also incorrect: remember, Gradgrind is eager to fill his “little pitchers” with facts, and he enjoys every opportunity to do so. Choice (C) is correct, since “gloating” is a good fit for “pleased” or “pompous.” Gradgrind proudly announces that Sissy now fully understands his definition of a horse, and in his mind, Bitzer’s recitation of a very factual answer proves that he has succeeded in his duty.

Passage 2

This passage is the text of a presidential speech. Remember: a lot of thought goes into both *what* the president should say and also *how* he should say it. As you read a speech, it is important that you determine its purpose. Here, Reagan attempts to convince Congress to support the bipartisan measure for economic reform. It is also essential that you understand the structure of the speech—The first paragraph explains the context of the occasion (the country is facing many economic challenges) and the general topic of the speech (the task of restoring the economy). The second paragraph expresses the urgency of fixing the economic problems by addressing their cause—“government is too big, and it spends too much.” In the next four paragraphs, Reagan attempts to convince the audience that a solution is possible, explains the best solution, and points out problems with an alternative plan. The final paragraph sums up the speech by restating the problem, the possibility of resolving the problem, the solution he supports, and the urgency of the situation. A good summary might read something like, “Reasons congress should support the bipartisan economic plan.”

- 11 **D** RC  If you wrote down the main point for this passage, you have already answered this question! Choice (D) clearly corresponds to the main point of the passage, so that is the correct answer.
- 12 **C** RC  Write in your answer to this question, which should be something like “provide background for the need for the proposed plan.” This clearly corresponds to choice (C), which is the correct answer.
-  At first glance, choice (A) might also seem to be a tempting answer, because it is close to the main point. However, make sure to examine this paragraph in the context of the entire speech. Reagan is certainly describing a troubling state of the economy, but he doesn't view it as irreparable, meaning impossible to fix, or he would not be proposing measures to fix it!
- 13 **A** RC  Here we want the answer choice that corresponds to a statement that Reagan would *not* make. Remember, when answering a question that calls for a negative answer using a word like “not” or “except,” underline and circle that negative word. This helps you focus and remember not to accidentally pick an answer choice that gives a true statement. Look back at lines 13–27. This is the second paragraph, in which Reagan says that Congress must act quickly because “[o]ur government is too big, and it spends too much.” This directly conflicts with the course of action suggested in choice (A). The other choices all provide statements that reflect Reagan's views as expressed in line 13–27.
- 14 **C** WIC  Even if you know what the word “candor” means, you should go back to line 37 and re-read the sentence to understand its meaning in context. If you don't know what “candor” means, notice that it is a part of a list used to describe the spirit of communication Reagan has used, so it should be positive, and it should fit well with the positive tone of “openness, and mutual respect.” Choices (A) and (D) are both too negative, and choice (B) “careful reverence,” doesn't fit with openness and respect nearly as well as choice (C), “impartial honesty,” which matches the dictionary definition of “candor,” which means “frankness, honesty.”
-  Choice (A) may distract you. It contains the word “sincere,” as well as “obfuscation,” which may make it a difficult option to reject if you do not know what that word means. Since obfuscation means that something is hidden or disguised—the opposite of openness—it is a poor choice. Don't choose an answer with difficult vocabulary that you don't know if another choice effectively answers the question with only familiar words!

- 15 **C** COE This is the first question of a COE pair. Check out Question 16 first and then come back.



Once you've identified that lines 66–70 contain the answer to this question, you can answer this question. In those lines, Reagan states that the committee measure projects too much spending, which matches answer choice (C).

- 16 **B** COE Question 15 asks you to identify a specific reason that Reagan says Congress should reject the House Budget Committee's measure. If you've taken note of the structure of his argument, you have noticed that the sixth paragraph is where he lays out the problems with the House's measure. Answer choices (B), (C), and (D) all direct you to lines in this paragraph, but only in the lines in choice (B) does Reagan state a *specific* problem he sees in the measure—that it involves spending \$141 billion more than does the bipartisan bill.

- 17 **B** WIC If you aren't familiar with this expression, can you picture what would happen if you were literally to “cut through the fog?” You would go from being able to see only the fog, to seeing what it has covered or hidden. Reagan is using this idea metaphorically here. He is urging the audience to look through or clear away distractions so they can see the reality of the problem clearly. This is a good match for choice (B).

- 18 **D** IG **NOTE:** This is the first of three questions on the graph that accompanies this passage. In order to answer this question, you will need to understand the information the graph gives you, so you should take a moment to familiarize yourself with the graph as you answer this question. The title of the graph indicates that it displays the inflation rates in America from 1975 to 1985. Note that the given rates are based on data from January 1 of each year. The bottom axis shows the year, and the side axis shows the inflation rate. The inflation rate for each year is indicated on the graphed line.



Since the answer choices make reference to evidence in both the passage and the graph, start with those based on the graph, which will be easier to check quickly. So, does evidence from the passage or the graph support the idea that inflation rates began falling before the proposals in the passage were implemented? If you look back at the blurb before the passage, you will see that Reagan gave his speech in April of 1981. Therefore, you want to look at the year 1981 on the graph—the easiest way to check it is to actually draw a line straight up from 1981. Doing so will make clear that on January 1, 1981, the inflation rate was 11.8, lower than the previous year's rate of 13.9. Therefore the correct answer is choice (D).

- 19 **B** IG Looking back at lines 1–3, you can determine that the election the question refers to occurred in November 1980. The graph shows that in January 1980 the inflation rate was 13.9 percent. This is more than twice the rate it was in 1977 when the inflation rate was 5.2 percent, so choice (B) is correct.



Don't get distracted by choices (C) and (D): the graph simply doesn't provide enough information to draw any conclusions about overall economic growth or mortgage interest rates.

- 20 **D** **IG** This question asks what the trend of the graph is between 1977 and 1983. This is the period in which the inflation rate rises to its highest point on the graph and then falls again. Only answer choice (D) correctly describes a period where the inflation rate both rises and falls dramatically. Stability implies no or little change, which is clearly inaccurate, while expansion and recession both imply economic situations that move in only one direction (though a graph of inflation only is insufficient evidence to show either in any case!).

Passage 3

Questions 21–31 are based on a pair of passages rather than a single passage. Begin by reading the background information printed above Passage 1, which reveals that these passages are from 1844 and 1859, so prepare for some sophisticated rhetoric and antiquated diction.

 Recall that the strategy for paired passages is to read Passage 1, answer the questions on Passage 1, then go back and read Passage 2, and answer the questions on Passage 2. Finally, answer the questions that ask about the relationship between both passages. These two passages describe the authors' thoughts on the similarities and differences between different categories of animals and how these traits can be accounted for. The author of Passage 1 theorizes that the species of animals could be ordered according to variations of their traits, although not necessarily in a neat, linear fashion. He suggests that these variations are designed to suit their needs, but he offers no clear conception of how these variations came to be. The author of Passage 2 agrees with the author of Passage 1 on the key point that it is reasonable to conclude that species descended from similar species. However, he is unsatisfied with this explanation because it does not include an acceptable description of that process.

- 21 **D** **RC**  The line numbers in this question are distracting: although lines 13–15 contain the list, they do not give any indication of the author's intention in their arrangement. Do not simply read the list referenced and determine if the answer choice seems to fit the list in your own opinion, as the question asked about the author's design, not the list itself.
-  Instead, read back to lines 7–10, in which the author states that “there are general appearances of a scale beginning with the simple and advancing to the complicated.” This makes clear that the author is arranging them in this order as choice (D) indicates.
-  Choice (B), although seemingly also true on first glance, is incorrect because it does not follow from the author's stated ideas as choice (D) does.
- 22 **B** **RC** Reread lines 1–6, and summarize for yourself what the author is saying. The author says that the different life forms of the animal kingdom cannot be strung along one line, but they require a more complicated arrangement, sometimes double lines and sometimes a circle or many circles.
-  Thus, you should write down something like “shows complexity” before reading over the answer choices. This idea matches nicely with choice (B).
- 23 **D** **WIC**  For this words in context question, re-read the sentence with the word “impress.” What is a good replacement for “impress” in context? It would make sense to say “tending to *mark* its own features on that which succeeds.” *Imprint* is the only answer choice that fits with “mark,” so that's the correct answer.

- 24 **A** **RC**  Reread lines 21–27, focusing on the indicated key words. The author explains that, although every animal is distinctive, each seems to be modeled on a basic design. Any differences are alterations to suit the animal to its particular conditions. The words “fundamental plan” and “designed” suggest that animal forms are in some way the result of a conscious process, so jot down something like “purpose or design.” This idea is stated in choice (A).
- 25 **C** **WIC** In the first sentence of Passage 2, the author proposes that each species seems to be variously descended other species. What word could you substitute for “mutual affinities” that would make sense in this context and support the authors focus on what makes species resemble each other? “Common attributes” would be a good write in for this question. Although answer choices (A) and (C) use the word “shared” which support the idea that organic beings are alike, the author is discussing shared attributes, not abstract things like values, so choice (C) is correct.
- 26 **C** **COE** This questions introduces a COE pair. Answer questions 27 first and then come back.
-  Be careful to check ahead for these problems. When the first half of a COE pair appears at the end of a page, as this one does, it can be easy to miss the second half until after you have answered the first half. Once you have identified lines 79–88 as answering this question, all you need to do is determine which answer choice summarizes the process described in those lines. Choice (C) does this best.
- 27 **D** **COE** You are looking for the line numbers where the author explains what accounts for the specific variations between living things. He talks about these “means of modification” in lines 79–88, choice (D), where he describes a process of natural selection. Choice (A) merely suggests that existing species may be variations of previous species, and choice (B) and (C) both offer examples of explanations the author rejects.
- 28 **D** **RC**  Write down your own answer for this question before looking at the answer choices. Preposterous means absurd or ridiculous, and repetition is a rhetorical device that is often used for emphasis. Thus, repetition of *preposterous* in these lines emphasizes that the explanation that external conditions alone cause variation is absurd. Just jotting down the words “emphasize” and “absurd” should be enough to make clear choice (D) is the best answer.
- 29 **B** **RC** This is the first question that asks you to consider the relationship between the two passages. Make sure you consider the similarities and differences between the two authors’ perspectives as you answer. This question asks how the second passage responds to the first. Read the passage summaries above. Do the two come to the same conclusion? The author of Passage 2 agrees with the observation of the author of Passage 1 that animals seem to descend from similar animals, but he provides a description of the process by which variations of animal types come to exist, which makes choice (B) the best answer.
-  Choice (D) might seem a tempting choice. It also suggests agreement (“concurring”) and disagreement (“quibbling”), but the specifics of the agreement and disagreement are inaccurate. The author of passage 1’s final conclusion is that species modify themselves to meet external conditions, and that is exactly what the author of passage 2 disagrees with. Further, it is the logic of the claim itself, not its structure, that the author of passages questions.

30 **A** COE This questions introduces a COE pair.



However, before you go to question 31, you need to make sure you understand this question. It refers to lines 27–35, in which the author of Passage 1 describes the sequence of each species as advancing from previous types, showing similarities to the previous form as well as impacting the forms that follow. Now you can go to question 31 and find which line numbers match up with the response of the author of Passage 2 to this observation. Armed with the knowledge provided in lines 72–76, you can see that choice (A) provides a good description of the author of Passage 2's response to this view.

31 **B** COE Remember that the author of Passage 2 (Darwin) is critical of the author of Passage 1 (Chambers) because Chambers does not provide an explanation for the process by which species descend from other species. Darwin expresses this in choice (B), lines 72–76. Choice (A) merely repeats Chambers' own view, while choices (C) and (D) are from the part of the passage when Darwin moves on to present his own ideas.

Passage 4

This passage is a courtroom statement given by civil rights leader Nelson Mandela in South Africa in 1964. From the context, you can expect argumentative writing. Indeed, Mandela addresses the issue of white supremacy in his country, describes the consequences of social, legal, and political inequality, and explains a solution. A good summary of the main point might be something like “South Africans need equal rights to undo the legal and social effects of racism.”

32 **C** RC This question asks you to determine the main point of the author, and if you followed our strategy of writing down the main point before starting the questions, you will be able to tell that the correct answer is clearly choice (C).



If you do not determine the main point for yourself first, many of the wrong answers to this question seem tempting. Choice (A), although related to a portion of the author's argument, is an overstatement of the ideas presented. The ideas stated in choice (B), that whites in South Africa are racist towards Africans, and (D), that policies need to be put in place, are both partially correct, but neither reflects the main point of the passage as a whole. However, all three wrong answers here might seem possible if you haven't already identified the main point before looking at the choices, so be sure to use that strategy!

33 **A** WIC Look back at line 5 and write down a word that might be a good substitute for menial. “Unskilled” or “low-status” would be good choices, and these match up well with the correct answer, “lowly.” Choice (B), “manual,” might be tempting; after all, the next sentence discusses jobs that require carrying or cleaning. However, the main idea of the paragraph as a whole suggests that Mandela is characterizing these tasks not merely as physical labor, but as something whites look at as beneath them, as too “lowly” for them to do.

- 34 B COE** This is the first question of a COE pair. Once you have underlined the key words in the question—probably “reflects” and “whites view Africans”—move on to 35, and then come back when you have answered that question.
- You have found that lines 5–9 contain the answer to this question. What do they say? As stated in choice (B), these lines demonstrate that whites see Africans as servants who will perform menial tasks for them.
- 35 B COE** Question 34 asks how the author suggests whites view Africans. Answer choice (B) directs you to the lines where he describes how whites expect Africans to perform menial tasks.
-  Choice (A) may be tempting, but note that lines 1–5 only states that “White supremacy implies black inferiority,” not that this is how whites actually view Africans. That whites do view Africans as inferior is stated in other portions of the passage, but not within these specific lines.
-  Further, if you did initially select choice (A), you could determine when evaluating number 34 that no choice matches up with these lines. Choice (D) in number 34 is much too large an inference to make based on lines 1–5, even if inferiority were an accurate expression of the author’s claims about the way white South Africans view native Africans.
- 36 A RC** This question asks you to consider the function of the third paragraph, so be sure to look back and remind yourself what the author says in lines 31–48. This is the paragraph where the author explains several negative social consequences of poverty and the breakdown of family life. In the previous paragraph, he has claimed that poverty and the breakdown of family life are themselves the consequence of discriminatory pass laws. Choice (A) expresses the relationship between these paragraphs.
-  Don’t be distracted by choice (B). Although the third paragraph examines the societal costs of a law, the author did not previously explain a list of its benefits and only expresses a critical view of the policy.
- 37 B WIC** This word-in-context question asks for a substitute for a very common word—“meet.”
-  Be careful! This does not mean the question is easier—often common words can have unusual contextual meanings, and the test-makers are probably testing one here. Although “meet” most often means “encounter” or “join” those words won’t work here.
-  Instead of thinking about what “meet” usually means, re-read the sentence and write down your own replacement word—maybe “fulfill,” “satisfy,” or “answer”? This should lead you away from the more common definitions presented in choices (A), (C), and (D) toward the correct answer (B).
- 38 C RC** This question asks about why the author is using repetitive sentence structure in the fourth paragraph, so go back to lines 49–73 and look for repeated elements. In the fourth paragraph, the author lists the grievances of Africans by first stating what they want to be allowed to do in the future and then what they don’t want, which is to be limited to what they are allowed to do now. For example: “Africans want to perform work which they are capable of doing, and not work which the Government declares them to be capable of.” The repetition of “want to” and “not” throughout the paragraph highlights the difference between desire and current reality, as stated in answer choice (C).

- 39 **D** COE Notice that this is the first question of another COE pair, so you want to read the question carefully and underline the key words, such as “white South Africans resist granting equal rights to Africans.” Underlining the key words helps you be certain that you are looking for exactly the right thing in the lines referenced in the next question. After finding that lines 75–78 provide the answer to this question, you can choose (D) as the best expression of the author’s ideas about why equal rights are resisted by white South Africans. In lines 75–78, the author expresses that whites are concerned about the potential political majority that Africans would represent if they were granted the right to vote. This is best summarized in answer choice (D).
- 40 **C** COE You are looking for the answer to question 39: what is the main reason whites resist granting equal rights to Africans? You can find the answer near the end of the passage. In lines 75–78, the author expresses his view that whites fear democracy—giving Africans equal voting rights—because the majority of voters would be African. Choice (C) is therefore correct.
-  Choice (D) may be tempting because lines 81–85 mention that “enfranchisement of all will result in racial domination,” but explains that this is “not true,” and instead provides the author’s own view of what the effects of enfranchisement would be, whereas the text in 75–78 discusses this fear itself and does so more specifically than in lines 81–85.
- 41 **C** RC Recall that repetition is a rhetorical device often used for emphasis. In repeating the word *ideal*, the author is stressing his belief that a different system—a democratic system—is possible. In lines 86–91, the author says this system would bring freedom, harmony and opportunity—a better reality than the present system he criticizes throughout this passage. The author’s purpose in repeating the word is best expressed by choice (C). Although choice (A) also says the purpose of the repetition is to highlight an aspect of the author’s ideal, the author isn’t saying his dream is impractical. Rather, he hopes “to live for and to achieve” his ideal.
- 42 **D** RC  Before looking over the answer choices, write down your own answer. Based on the passage as a whole, the author believes that pass laws are very harmful, and he has nothing good to say about them. Choices (A) and (B) can be quickly eliminated because they are both too positive though answer choice (A) contains some difficult vocabulary. “Salutary” means beneficial, and “deleterious” means harmful. Choice (A) is thus incorrect because the author’s view of pass laws are that they are harmful both to individuals and to families. Choice (B) is incorrect because the author doesn’t say anything positive about the purpose or “design” of the law, only its harmful consequences. Choices (C) and (D) are both negative, so you will have to read them closely to choose the best answer. Choice (C) is incorrect because the author doesn’t characterize the arrests he discusses as “illegal”—the pass laws in place actually make them specifically legal—although he does blame the law for the breakdown of family life. Choice (D) correctly identifies the author’s attitude toward pass laws. In addition to expressing the author’s view that these laws are responsible for the breakdown of family life, this answer choice also identifies the issue of harassing police encounters that the author discusses in lines 21–27.

Passage 5

This contemporary science passage outlines some of the historical developments in our understanding of the brain and brain injuries, particularly stroke, and advancements in the treatment of stroke injuries. The passage concludes with a projection for future developments for treatment. A graph accompanies the passage. Read the passage and answer the first 9 questions. When you come to question 52, which asks about the graph, go back to analyze what information the graph presents.

43 D RC  This question asks about the primary intention of the passage—use the summary you should have already written of the main point of the passage, and you will have an easy time answering this question. Your summary of the main point should indicate that the author summarizes the history of developments in understanding strokes, which is reflected in choice (D).

44 D RC  For a tone question, always quickly jot down your own word to describe the tone of the passage before looking at the answer choices. You might write down a word like “informational,” which makes it easy to choose (D).



Some students have a hard time coming up with words to describe the tone an author uses. If that's you, just try to rate the tone from very positive (5) to very negative (1), with 3 for a neutral tone. You might rate this passage a 3 or 4, meaning it is fairly neutral or slightly positive. You can eliminate choices (A) and (B) for being too strong, (A) in a negative way and (B) in that the passage is not strongly persuasive, and thus is not rhetorical. Choice (C) may be harder to eliminate, especially if you are uncertain what “measured” means as a tone (which would actually be too negative in this case), but “inquisitive” doesn't fit the passage at all. Remember that for an answer to be correct, the entire answer must be correct, so don't get distracted by words like “pedantic” or “measured,” which you may not be sure about as words for an author's tone, but use the parts you know to eliminate answer choices.

45 C RC  Re-read the relevant part of the passage and find the answer for yourself. Hippocrates and Willis are discussed in paragraph 2. Hippocrates described seizures and observed that paralysis on one half of the body was related to injury on the other half of the brain. Immediately after these facts are presented, Willis's work is explained. Willis studied arteries in the brain and discovered the dye injected into a carotid artery on one side of the brain would be expelled on the other side. In this way, Willis expanded on Hippocrates earlier discovery, as in choice (C).

46 B COE This is a paired COE question. Answer question 47 first and then come back to this one.

Now that you have correctly identified the correct line numbers where the answers to this question can be found, what do those lines say? Lines 39–44 explain that disease in the carotid artery causes symptoms that can be warning signs for future strokes, which corresponds best with choice (B).

47 D COE You are looking for where the author discusses the importance of the carotid artery to an understanding of strokes. In lines 39–44, the author explains the discovery that carotid artery disease could cause attacks which could warn of future strokes, so choice (D) is correct.



Although the line numbers in answer choices (A) and (B) also direct you to points in the passage where carotid arteries are mentioned, these lines lack a discussion of a connection between the carotid arteries and strokes.

- 48 **B** WIC This WIC question asks for the definition of “minute.” Make sure you go back to line 78 and write in your own word for “minute” as it used in the sentence.



If you don't do this, you might think they are asking for a substitution for the word that means “the equivalent of 60 seconds” and choose (C). If you look back however, you will see that you need to find an adjective that describes a pellet small enough to deliver treatment to a tissue in someone's body, and so choice (B) is correct.

- 49 **C** WIC Take a look back at line 90 and see if you can think of a good substitute for “dramatic” here. Perhaps “substantial” or “sizable” or choice (C), “impressive”?



Although choice (D), “drastic,” might be a good replacement in some contexts, here we want a word with a positive connotation, and the connotation of “drastic” is negative.

- 50 **D** COE This is the first of a COE pair.



Before you move on to the next question, be sure to take the time to carefully mark the key words in the question to be sure you understand exactly what the questions asks.



At first glance, you might think that the question merely asks what someone can do that helps prevent stroke, but the question specifically asks what might “minimize the damage from a stroke,” not what might prevent one from happening in the first place.

Once you have found that only choice (D) provides an answer to question 51, it is easy to choose (D) for this question, as it clearly reflects what lines 64–68 indicate about the importance of early diagnosis and treatment.

- 51 **D** COE Once you have carefully marked the preceding question so you know just what you are looking for on this question, you can read through each set of lines to see whether it provides any evidence about what might minimize the damage an individual suffers from a stroke. Choice (A) discusses how to identify diseased carotid arteries, which might be a sign of future strokes, but does not directly discuss strokes at all. Choices (B) and (C) both discuss different actions that might lead to or prevent strokes, but neither one talks about minimizing damage caused by a stroke. Thus, choice (D), which discusses the new-found importance of rapid diagnosis and immediate treatment, is the correct answer, as it leads into the passage's discussion of how stroke may become a temporary and treatable illness.

- 52 **C** IG This question is based on the accompanying graph. Before tackling this question, take a look at the graph to see what it says. The horizontal axis of this graph marks every tenth year from 1950 to 2010. The vertical axis indicates the number of deaths per 100,000 people. The bold black line on the graph indicates the number of actual deaths. The solid, straight black line indicates the number of deaths if the rate hadn't declined. The dashed black line indicates the expected death rate if the rising rate had continued.

The question asks how many deaths per 100,000 people would have been expected in 2010 had the death rate continued to climb. To find this answer, go to the graph. Make sure you are looking at the correct line—you want to be reading the dashed line. In 2010, it appears that a little under 600 deaths per 100,000 people were expected. This corresponds best with answer choice (C), 590.

Writing and Language Test

- 1 C SEC This question is testing the correct use of commas with subordinate clauses or phrases. The main clause of this sentence is “Immunization has been a tremendous boon for world health.” The phrase “the process of inoculation and vaccination through the artificial introduction of infectious material” is a non-essential element of the sentence (specifically an appositive phrase). Non-essential elements of a sentence should be separated from the rest of the sentence with commas or dashes, one before the phrase and one after the phrase. This rule is followed in answer choice (C). Choices (A) and (B) are incorrect because they introduce one of the needed commas but not the other. Choice (D) is incorrect because a colon should only be used after a clause that could be a full and complete sentence by itself.



If you can remove a phrase from a sentence and the sentence still makes sense, then put a comma on either side of the phrase. It is considered “non-essential.”

- 2 D SEC This question is testing the correct use of pronouns. Anytime you use a pronoun, make sure it has a clear antecedent—the noun that the pronoun is replacing. In this sentence, the pronoun “it” is ambiguous. Even though we can tell “it” probably refers to immunization, grammatically it could also refer to world health. Choice (A) is therefore incorrect because the pronoun is ambiguous. By contrast, choice (D) has no ambiguity and is therefore the right answer—the reader is clear that it is immunization that is under attack. Choice (C) is incorrect because of the ambiguity of “its” and because “its” lacks an apostrophe which would be needed to form the contraction “it’s (meaning “it has”). Choice (B) uses a plural pronoun when there is no plural noun in the previous sentence for the word “that” to refer to.

- 3 D EOI This is a redundancy question. The SAT has a strong preference for concise language, so avoid repeating information, especially in the same sentence. Choice (D) is the most concise choice. The other choices each include redundant information. We don’t need to say “it is important” and “we must” in the same sentence.



Always notice when one answer is shorter than the others: it is often the correct answer and is a clue to look for redundancy and wordiness in the other options.

- 4 D EOI In this question, you need to decide whether to include one of the phrases provided after the word polio. Choices (A), (B), and (C) each provide correct additional information in a grammatically correct way. However, the extra information given in each of these choices is unnecessary and does not advance the discussion in the passage. Additionally, the information is more or less the same in each of choices (A), (B), and (C), so if any of them were the right answer, all of them would have to be the correct answer.



Once again, notice that one answer is much shorter than the others. This is a clue that you should be looking for redundancy or to see if the additional information is necessary.

- 5 C EOI This question is testing transitions. Choice (C) provides the clearest transition phrase, illustrating that the information that follows happens as a reaction to the events in the preceding sentence. Choice (B) is incorrect because it provides redundant information. The sentence already ends with “in 1952,” so we don’t need to say the year at the beginning of the sentence. Choice (D) is incorrect because “however” is used to show a contrast, but the events discussed in this and the previous sentence are closely connected. Choice (A) is not as good an answer as choice (C) because it is less specific and overemphasizes the causal nature of the connection. “Therefore” is used to show a specific “A” leads to “B” type connection where the second statement is true as a result of the first one. For example, I like all flavors of ice cream; therefore, I like vanilla ice cream.



Always read a sentence before and a few sentences past the underlined portion of a “transition” sentence so that you are clear on what kind of transition needs to be made. For example, are you looking for a contrast, an example, further clarification, causality, etc.

- 6 C SEC By looking at the answer choices, it is clear that this question is testing a vocabulary word and the use of commas. We use a comma when we are connecting two independent clauses with a coordinating conjunction (for, and, nor, but, or, yet, so). We also use a comma when separating three or more items in a list (e.g. A, B, and C). The underlined portion in this sentence contains a list but the list only consists of two things, so it does not require a comma. This eliminates choices (B) and (D). Choice (A) is incorrect because it incorrectly uses “affective” instead of “effective.” “Effective” means successful. “Affective” means relating to feelings and attitudes. Therefore, choice (C) is correct.

- 7 A EOI This question is asking for the best choice of word. Choice (A) best matches the tone of the passage. Choices (B) and (C) and (D) are less formal and somewhat awkward when used here.

- 8 B EOI  This is a Writer’s Intention, or goal question. Remember that you should underline the goal anytime a question gives you a specific goal to try to meet. Here, the goal is to show “a link between low rates of vaccination and higher rates of infection.” You are not just looking for the sentence that sounds best or fits best in the context of the overall paragraph. You must meet the goal you underlined. Choice (B) is the only one that links low vaccination rates with higher infection rates. The other choices do not specifically show the relationship between the two—they tell us that nations with low vaccination rates are experiencing polio, but do not go as far as choice (B) in connecting the low vaccination rates with the high rates of polio infection.

- 9 D SEC This question is testing your knowledge of “it’s” and “its.” Make sure you know the difference!! “It’s” is the contraction of “it” + “is.” “Its” (with no apostrophe) is the possessive of “it” and means belonging to it. “Its’ ” is not a word and will never be in the correct answer choice. This sentence is referring to the use of it, which is possessive, rather than “it is use,” and so the correct answer must be either choice (C) or (D). Choice (C), however, uses the incorrect form of the verb ‘to be’ (has/having) and makes the sentence into one big dependent clause, which makes the sentence incomplete. Choice (D) uses the correct form of “its” and avoids introducing any errors in the verb.

- 10 **B** SEC This question is testing the correct use of a restrictive clause—a clause that isn't necessary to form a grammatically complete sentence but is necessary for the reader to understand the relevant context of the sentence. The first portion of the sentence (before the underlined portion) is an independent clause—it could be a full and complete sentence ending after the word “article.” The remaining portion of the sentence is part of a restrictive clause. Restrictive clauses often begin with the word “that,” which makes choice (B) correct. Both choices (A) and (C) are clearly incorrect when you read them to yourself, as they are missing a “that” or “which” and choice (D) is incorrect because it uses the wrong verb tense.
- 11 **A** EOI This question asks you to use information from the graph and the passage, but you only need a little information from the passage here. The passage tells us that the polio vaccine was introduced in 1955. The graph tells us that since 1955 the number of cases of polio infection primarily decreased (with some fluctuations at first) until they reached 0 around 1964. The number then stays at 0 for the rest of the time shown on the graph. Thus, choice (A) fits the information in both the passage and the graph. Choice (B) is wrong because it incorrectly states that the number of reported polio infections only decreased after 1955, and yet there was an uptick in the late 1950s. Choice (C) incorrectly states that polio infections in the US sometimes rose to levels close to 1955 after the introduction of the vaccine. Choice (D) incorrectly attributes only a small portion of the decrease to vaccination, which we know to be incorrect based on the information in the passage about the success of the polio vaccine.
- 12 **C** EOI  This is a goal question. Always remember to underline the goal in the question to help you choose the correct answer. In this case, you must pick the answer choice that “specifies some of the artistic techniques that were banned.” Choices (A), (B), and (D) all specify that techniques were banned, but only choice (C) actually provides specific examples of what some of those techniques were.
- 13 **B** EOI This is a sentence combining question. You must choose the best way to combine the two sentences provided. Choice (B) is the shortest of the choices, and it does not introduce an error, any redundancy or a vague pronoun.
-  Have a strong preference towards the shorter choices in sentence combining problems. As a general rule for this kind of question, the shortest answer choice is usually correct unless there is something specifically wrong with it.
- 14 **A** EOI Choice (A), (B), and (C) all have the same meaning but choice (A) presents the most concise option. The context is sufficient that choice (A) is not vague—we know “there” refers to the library because there is only one location mentioned in the sentence before the underlined portion. Choices (B) and (C) provide redundant information by mentioning the library again. By now you should have realized that the SAT hates redundancy! Choice (D) would only make sense if we were coming back to a discussion after going on a tangent to discuss something else in between, which didn't happen here.

- 15 **A SEC** By looking at the answer choices, you can see that this question is testing punctuation—specifically placement of commas or semi-colons. Remember that a comma is generally used with “and” only when separating two independent clauses (sentence units that could be full standalone sentences) and when separating items in a list of three or more. In this sentence, there is only one independent clause so no comma is needed before the “and.” Thus, choice (A) is the correct one. Choice (B) incorrectly places a comma before the “and.” Choice (C) incorrectly uses a semi-colon before the “and,” which is incorrect because semi-colons are only used to separate two independent clauses. Choice (D) incorrectly separates a verb and the object of that verb with a comma.



It can be tempting to place a comma before an “and” in a sentence with multiple verbs. However, we only put a comma before an “and” if the “and” is joining two independent clauses, so make sure that there is a subject and a verb on either side of the “and” before placing a comma there.

- 16 **C EOI** The author should not make the addition here because this sentence distracts from the main point of the paragraph. The focus of this paragraph, as with the previous and the following paragraphs, is on the narrator’s artistic development. The author’s experience in the United States is a relatively minor portion of the overall passage and additional details about movies and food are unrelated to the main topic of artistic growth.



Remember that for additions, you are not deciding whether a sentence is grammatically correct. You are deciding if the new sentence adds a *necessary* detail to the paragraph. If it seems to go off topic, then choose No.

- 17 **C SEC** By looking at the answer choices, you can see that this question is testing punctuation. This question is perhaps best answered using a process of elimination. Choice (A) is incorrect because a colon may only be used immediately following a portion of a sentence that could be a complete stand-alone sentence. The portion here before the colon could not be a full sentence because of the word “titled” immediately prior to the colon. Choices (B) and (D) are incorrect because a comma should not be placed between the verb “titled” and the object of that verb “Words and Scenes...” Placing a comma between the verb and its object is grammatically similar to writing “I like, ice-cream,” or “I watch, movies,” both of which would be similarly incorrect due to the unnecessary commas.

- 18 **A SEC**  This is a subject-verb agreement question. To choose the correct verb form for a subject, read the sentence with the subject and the verb next to each other. Here, that would mean reading the sentence without the extra detail phrase surrounded by two commas (“including...prohibited”). At that point, it becomes much easier to “hear” that choice (A) is correct. The subject of the sentence is artwork. “The artwork” is singular, as it refers to the art as one combined group. Choice (B) is therefore incorrect, as “were” is used for plural nouns, or singular nouns in hypothetical cases, which also doesn’t apply here. Choices (C) and (D) both lack a “to be” verb (like “was”), and therefore incorrectly attribute the artwork as actively doing the verb, as if the artwork is displaying, rather than being displayed.



Subject-verb agreement questions are tricky when the subject and verb are separated by a subordinate clause or phrase. Always cross these phrases out so that you see the subject next to the verb.

- 19 **B** EOI Here, the underlined portion should mean “a group.” Choice (B), “an enclave,” refers to a group or place different from the character of the surrounding people or locations, which best fits the meaning here.
- 20 **A** SEC This question tests the use of parallelism in a sentence. The sentence contains a list of three things, each beginning with an article (a, an, the). The sentence reads: “[M]y distance...created within me” and then a list of three things—first “**a** nostalgia for my childhood home,” and second “**an** urge to see the rolling hills of the Chinese countryside.” The third item in the list must therefore also start with an article to parallel the first two, which choice (A) does.
- 21 **A** SEC This sentence contains a list of people whom the narrator met. Each group in the list should be separated with a comma. Choice (A) does this correctly. Choice (B) uses a dash, which cannot be correctly used to replace a comma in a list. Choices (C) and (D) both incorrectly introduce apostrophes to words that should not be made possessive, and they introduce other errors in structuring the list.
- 22 **D** EOI This passage is presented in chronological order. Paragraph 4 discusses the narrator’s return to China, which is further described in paragraph 6, and referenced at the end of paragraph 5 as something the author would like to do. Paragraph four should therefore be placed between paragraphs 5 and 6, as in choice (D).
- 23 **D** SEC This is a parallel structure question. That means you need to make sure the different parts of the sentence (in this case items in a list) are all in the same format. The format here should be “verb” followed by “noun.” You can see the format in most of the list: “Craft [verb] a theme [noun], develop [verb] rules [noun], supervise [verb] artists [noun]...” Only choice (D) follows the format for the whole list by using the verb “manage” followed by the noun “supply chain.” Choices (A), (B), and (C) each incorrectly omit a verb or noun from one of the items in the list.
- 24 **C** EOI This is a Writer’s Intent question in which we are tasked with picking the choice that best meets a specific goal. Remember to underline the goal. Here, the goal is to match the writer’s tone and uphold the main idea of the paragraph. The main idea of this paragraph is that the design challenges described by the author are difficult, although not insurmountable. The tone of the passage is fairly serious—the author does not rely on colloquial or slangy terms. Choice (B) is overly informal. Choices (A) and (D) both overemphasize the difficulty of the task by suggesting that it is nearly or completely impossible, rather than only challenging.

25 **A** **EOI** This is a vocabulary question. “Ensure” means to make certain. “Insure” means to protect against loss, especially through arranging repayment for such a loss (like with car insurance). “Unsure” means hesitant or undecided. Here, “make certain” is closest in meaning, and thus choice (A) is the correct response. Choice (D) is incorrect because it changes the meaning of the sentence in an undesirable way. With choice (A), the sentence means that playtesting is a means through which the author can **make sure** the ideas will make sense to others. Without the underlined portion, the sentence would mean that playtesting helps with making the ideas make sense to others. This changes the emphasis from one of guaranteeing the ideas make sense to one of helping make it more likely that the ideas make sense. Based on the emphasis in precision in the passage, the meaning provided through choice (A) best fits the overall context.

26 **D** **SEC** The sentence containing the underlined portion consists of two independent clauses: “[M]ost of this work goes into the game” and “some of it gets saved for publicity materials.” One way of joining two independent clauses together is to use a comma and a coordinating conjunction (for, and, nor, but, or, yet, so). Choice (D) does this and is the correct answer. Choices (A) and (C) incorrectly combine a semi colon with a coordinating conjunction (“but”). Choices (B) and (C) incorrectly use the plural “themselves” instead of the singular “itself” to refer to “the game,” a singular noun.



Remember—a semi-colon is never used before a coordinating conjunction.

27 **A** **EOI**  This is a Writer’s Intent question, which means you should underline and focus on the specific goal the question is asking you to achieve. In this case, the goal is pick the choice that “most logically follows” the last sentence. The previous sentence described the option of publishing through a professional publisher as being the least financially rewarding, meaning that it doesn’t pay much money. The correct response, choice (A), correctly relates information on this topic by providing the explanation for why this is true. Choices (B), (C), and (D) all discuss topics relevant to the passage, but none that logically explain the concept discussed in the previous sentence.

28 **C** **SEC** This is a subject-verb agreement question. The subject of the sentence, “possibility,” is a singular noun acting in the present tense and so should be matched with “is,” as in choice (C).



When determining subject-verb agreement, ignore clauses beginning with “which” separated by two commas. This sort of phrase or clause contains grammatically unnecessary information that could be deleted without making the sentence incomplete. Generally, when answering this kind of question, locate the specific subject that is doing the verb and place it immediately next to the verb so that you can hear if they agree.

29 **A** **EOI**  For yes/yes/no/no questions, start by answering the question yourself. Is this a good addition here? Yes, because the sentence helps explain the meaning of “crowd funding websites,” a term with which the reader might not be familiar. Choices (B), (C), and (D) are all incorrect because they each provide an incorrect rationale for stating yes or no.

30 **D SEC** “Not only” must usually be accompanied with “but also,” as in “not only one thing but also another.” Because “not only” appears in the non-underlined portion of the text, “but also” should follow. Choice (B) is incorrect because it introduces an unneeded comma. Choices (A) and (C) are incorrect because they each fail to complete the “not only ... but also” idiom.

31 **B EOI** The sentence we are adding contains the term “this difficulty” without any explanation of which difficulty it is referring to. Therefore, it should be placed immediately after the sentence that mentions the difficulty in question, which is sentence 1. The author claims it is difficult to make large profits by selling board games, and the additional sentence gives the reason for the difficulty.

32 **D EOI** This is a transition question. You must decide if one of the transitions provided best introduces the paragraph or if no transition is needed. In this case, were a transition word or phrase to be used, it would need to introduce the idea that the concept being immediately described is new and somewhat different from the previous discussion, like “Additionally.” Instead, choices (A), (B), and (C) all use concluding words, so choice (D) must be correct.



Note also that because choices (A), (B), and (C) all have the same meaning, if one of them were correct, the other two would have to be correct as well. The SAT won't give you multiple correct answers to a question.



When given the choice between three options that start a sentence or paragraph with a transition word or phrase and one that starts the sentence or paragraph with no transition, the last option (no transition) is nearly always the correct answer on the SAT.

33 **C EOI** This is a tone question. The passage maintains a fairly serious and straightforward tone and avoids much use of colloquial or slangy terms. Choice (C) is the best option here because it maintains this tone. Choices (A), (B), and (D) all use metaphoric or symbolic language in a way that fails to match the style of the rest of the passage.

34 **D SEC** This question tests two grammar concepts: the use of commas and colons.



Nonessential elements contained in the middle of a sentence should be separated from the rest of that sentence using either two commas or two dashes. In this sentence, the nonessential element is “perhaps surprisingly.” (We could remove this phrase from the sentence and it would still make sense.) A comma is used at the start of this element, so a second comma must be used to complete it. Although a dash and a comma can be used together in the same sentence, they cannot be paired together to surround a nonessential element. Choice (D) is the only choice to correctly complete this comma pair. The colon used in choice (D) is correct because it is used to connect something that can be a full and complete standalone sentence with a list or quote, in this case a list of one thing, the British Medical Journal. A list of one item still counts as a list for using a colon.

- 35 **A** **EOI**  The heart of this question is “what is the main idea of this passage?” This type of question can be difficult to answer without first reading the rest of the passage, so it is fine to initially skip it, then come back after working through the rest of this passage. This passage details the contributions to medicine by the author Charles Dickens. Despite all providing arguably correct statements of fact, only choice (A) presents this main idea.
- 36 **D** **SEC** This question is testing the use of apostrophes. When a singular noun ends in an “s,” make it possessive by adding either an apostrophe after the “s” or an apostrophe and an additional “s” at the end of the word. For example, to make the name “Chris” possessive, we could use Chris’ or Chris’s. In this sentence, the singular “Dickens,” should be possessive because it owns or controls a “keen eye.” It is the keen eye of Dickens. Choice (D) is the only choice that correctly uses an apostrophe to make the name “Dickens” possessive.
- 37 **C** **SEC** This question is testing the rules for using commas between adjectives in a list.
-  Adjectives should be separated with commas only when they are non-cumulative. You can test this by trying to rearrange the order of the adjectives and seeing if the new order makes sense, or by seeing if you could put the word “and” between the adjectives. If either of these works, it means the adjectives are noncumulative and therefore should be separated with commas. In this case, it wouldn’t make sense to insert an “and,” as in “modern and medical” or to rearrange the order, as in “medical modern approach,” so these adjectives are cumulative and should not be separated with commas.
- 38 **A** **EOI** This question is asking you to choose the best word based on the context of the sentence. The sentence is describing an influence behind Sydney Burwell’s research and the word “inspired” expresses that meaning. Choices (B) and (C) provide words that do not fit the meaning of the sentence. Choice (D) does not fit the tone of the passage, nor does it make sense in the context of research happening many decades after the inspiring event.
- 39 **D** **SEC** Use “who” and “whom” to refer to people and “that” and “which” to refer to things. Here, “an obese boy” is being referred to. Choices (A) and (C) are therefore incorrect.
-  To decide between “who” and “whom,” determine if the word itself is the subject or object of the sentence. The subject will be doing a verb in the sentence. If the word is a subject, use “who” because only subjects do verbs. If not, use “whom,” the object form of the pronoun because objects receive verbs. Here, the underlined portion is doing the to be verb, “is,” and so we should use “who.”
-  Another way to decide between who and whom is to make the sentence starting with the word “who” or “whom” into a question and then to see what type of pronoun you would use to answer the question. Pick “who” if you used a subject like “I,” “she,” “they,” or “us,” or “whom” if you used an object like “me,” “her,” “them,” or “us.” In this sentence, the question you would ask would be “Who/whom is consistently either sleeping or extremely drowsy?” The answer would be “**He** is sleeping or drowsy.” “He” is a subject like “who,” so we should use “who.”

- 40 **D** **EOI** Sentence 3 uses the possessive pronoun “their” twice. This sentence, therefore, should be placed in the paragraph in a location that will clarify the antecedent of these pronouns – who “they” are. Sentence 1 contains only a singular noun, Dickens, and so cannot be correct. Sentence 4 does contain two nouns, Joe and Dickens, but it’s clear that they are not the people being referred to in sentence 3. Sentences 2 and 6 both contain the antecedents of “their,” the researchers, but only sentence 6 references these researchers coming to conclusions, which is what Sentence 3 refers to.
- 41 **C** **SEC** This is both a subject verb agreement and a verb tense question. Tackle it one piece at a time. The subject of the verb “to lead” in this sentence is “this portrayal,” a singular noun. The verb should therefore be in singular form, which eliminates choices (A) and (B). Choice (D) (and choice (B) too) is in the past tense which is incorrect as the rest of the sentence up to this point has been in present tense. Choice (C) is singular and in the present tense.
- 42 **C** **EOI** This is a sentence combination question.
-  Remember that you want to choose the answer that most concisely and clearly shows the relationship between the ideas. Choice (C) does this. Although choices (A), (B) and (D) show the correct relationship, they all contain some level of redundancy and wordiness, repeating the word “London” for example.
- 43 **B** **EOI** Remember for a yes/yes/no/no question, answer the question for yourself. Should the sentence be deleted? Yes. The focus of this paragraph is on how Dickens’ writing led to increased interest in certain fields of medical study. While the underlined sentence is arguably true, it does little to support the focus of this paragraph and is out of place among the other sentences in the paragraph.
- 44 **B** **EOI** The goal in this question is to choose an example that demonstrates the main idea of the passage as a whole using a “vivid example.” The main idea of this passage is that Charles Dickens’ writing is celebrated as providing meaningful assistance to the field of medicine. Only choice (B) describes Dickens’ contribution to medicine and uses Barley the gout sufferer as a vivid example.

Math Test – No Calculator

Multiple-Choice Questions

- 1 **B** HOA To find x , subtract 12 from both sides to get $3x = 9$. Dividing by 3 gives you $x = 3$. You are not done yet because the question asks for $2x + 8$. Plugging in results in $2(3) + 8 = 6 + 8 = 14$.



Since choice (D) is 3, the value you determined x was equal to, this problem is a little dangerous. You've got to be careful to re-read the *ask* (i.e. the thing you are ultimately asked for) before you move on to the next question. In so doing, you will realize that this question is looking for an expression of x and not for x itself.

- 2 **D** HOA Since the absolute value of a number is never negative, you can eliminate choice (C). You can also eliminate choices (A) and (B) because the absolute value of a number plus a positive integer will always be positive. To confirm choice (D), you can set the expression equal to -1 and confirm that it is true for some value a .

$$\begin{aligned} |a - 2| - 2 &= -1 \\ |a - 2| &= 1 \\ a &= 3 \text{ or } a = 1 \end{aligned}$$

- 3 **D** PAM Since $f(6) = -6$, you can write $-6 = \frac{c}{3}(6) + 2$. Solving for c :

$$\begin{aligned} -6 &= 2c + 2 \\ -8 &= 2c \\ c &= -4 \end{aligned}$$

Therefore, $f(x) = -\frac{4}{3}x + 2$. Plug in $x = -9$. $f(-9) = -\frac{4}{3}(-9) + 2 = 12 + 2 = 14$



Notice that -4 is a choice, but you are not asked for the value of c . Just like in question 1, make sure that you always answer the *ask*.

- 4 **B** HOA This is a direct translation problem where you simply convert the words into an algebraic equation. 9,600 workers joined between 1960 and 1985, and this is three times the number n that joined between 1986 and 2010. So $9,600 = 3n$. Do not be intimidated by all the numbers in the question. Four of them are dates whose only purpose is to indicate the two different time periods, so they have no bearing on the equation.

- 5 C PAM FOILing (using double distribution) is the most direct way to arrive at the answer. You can either FOIL right away or first distribute the 2 into the first binomial as follows:

$$2(3x-1)(-x+4) = (6x-2)(-x+4) = -6x^2 + 24x + 2x - 8 = -6x^2 + 26x - 8$$



You can check choice (C) by picking a number for x and substituting it into the original equation and into answer choice (C). You should get the same result for both. Though you can do the entire question by plugging a number for x into the original expression and all four choices, without a calculator that can be unpleasant and invite errors. In this case, plugging in a number is better as simply your checking method.

- 6 A HOA A system of linear equations with no solutions means the lines expressed by the graphs of those equations are parallel and the coefficients of x and y in one equation are multiples of the respective coefficients in the other equation. Taking the coefficients of y , -3 can be multiplied by $\frac{5}{3}$ to get -5 . So a must be $\frac{5}{3}$ times 2, which yields $\frac{10}{3}$. This is, perhaps, more easily seen when using a proportion:

$$\begin{aligned} \frac{2}{a} &= \frac{-3}{-5} \\ -10 &= -3a \\ \frac{10}{3} &= a \end{aligned}$$

A more time-consuming approach would be to manipulate each equation into slope-intercept form ($y = mx + b$). Since parallel lines have the same slope, you would set the slopes equal and solve for a .

- 7 B PAM The average rate of change in the number of visitors over a period of time is equal to the change in the number of visitors divided by the change in time.

$$\frac{320 - 20}{18 - 6} = \frac{300}{12} = 25$$

- 8 C HOA Although this is a system of equations problem, you cannot back solve because the question asks for $x + y$ rather than just x or just y . One way to find $x + y$ is to use the elimination method to solve the system of equations for x and y separately, and then add those values.



Always explore possible ways to simplify equations or expressions. You can solve this problem more quickly if you recognize that the equation $6x - 4y = 14$ is divisible by 2, so that $3x - 2y = 7$. Now subtract $2x - 3y = 3$ from this new equation, and you will be left with $x + y = 4$.

$$\begin{aligned} 3x - 2y &= 7 \\ -(2x - 3y) &= 3 \\ \hline x + y &= 4 \end{aligned}$$

- 9 **B PAM** The graph of $y = (x + 7)^2$ is a parabola with a vertex at $(0, -7)$. The line $y = 16$ is horizontal. The parabola and line intersect at two points with y -values of 16, so set y equal to 16 and solve. Since you have the equation $(x + 7)^2 = 16$, you can take the positive and negative square root to solve for x .

$$\begin{array}{ll} x + 7 = 4 & x + 7 = -4 \\ x = -3 & x = -11 \end{array}$$

Point M is $(-3, 16)$ and point N is $(-11, 16)$. The distance between them is the difference in x -values, $|-3 - (-11)| = 8$.

- 10 **A HOA** If $A = 80^\circ$, $80n = 360$, so $n = 4.5$. Since the exterior angle is greater than 80° , $n < 4.5$. Therefore, the greatest number of sides, which must be a whole number, is 4.



This is an easy enough problem to back solve. Choice (C), for example, yields $A = 60^\circ$ and choice (B) yields $A = 72^\circ$, whereas choice (A) yields $A = 90^\circ$, so that is the only choice where $A > 80^\circ$.

- 11 **C HOA** The total paid before tax can be represented by $d + d + d - 6 = 3d - 6$. To find the price after tax, you can find 110% of $3d - 6$ (100% is the original cost and you add the 10% tax to that). The easiest way to find percent of a number is to convert the percent to a decimal and multiply: $1.10(3d - 6) = 3.3d - 6.6$. Dividing by 3 gives you $1.1d - 2.2$.



Since there is a variable, d , in both the question and the answer choices, this is an opportunity to plug in numbers if you are more comfortable with them. Pick a number for d and write it down. If you pick $d = 10$, then two gifts each cost \$10 and the third gift costs \$4. The total is \$24 before tax. To find the price after tax, you can find 110% of \$24. Convert the percent to a decimal and multiply: $1.10(24) = 26.40$. This is the total cost, but the question asks for the amount paid by each gift giver. There are three people, so divide 26.40 by 3. Each person paid \$8.80. Notice that all of the answer choices include the variable d , so you must plug $d = 10$ into each answer choice to see which one gives you 8.80. Choice (C) would show $1.1(10) - 2.2 = 11 - 2.20 = 8.80$.

- 12 **B ATM** The wording of this question may be intimidating, but all it requires you to do is to simplify the complex fraction $\frac{6 - 5i}{2 + i}$ into the form $a + bi$. First, multiply both numerator and denominator by the complex conjugate of the denominator, $2 - i$. You will need to FOIL and remember that since $i = \sqrt{-1}$, $i^2 = -1$.

$$\frac{6 - 5i}{2 + i} \cdot \frac{2 - i}{2 - i} = \frac{12 - 6i - 10i + 5i^2}{4 - 2i + 2i - i^2} = \frac{12 - 16i - 5}{4 - (-1)} = \frac{7 - 16i}{5}$$

This is equivalent to $\frac{7}{5} - \frac{16}{5}i$, so $b = -\frac{16}{5}$.

- 13 **D** PAM The equation of the quadratic function is written in factored form, so you can easily see that the x -intercepts of the parabola are at $x = -3$ and $x = 5$. Since a parabola is symmetric about a line through its vertex, the x -value of the vertex must be halfway between -3 and 5 . Therefore, $m = 1$. To find n , plug in 1 for x in the equation.

$$y = a(1 + 3)(1 - 5)$$

$$y = a(4)(-4)$$

$$y = -16a$$

Since n is the y -coordinate of the vertex, $n = -16a$.

- 14 **B** PAM This is a case of exponential growth where the population is increasing annually by a percentage of its current amount. The formula $A = P(1 + r)^t$ represents exponential growth where P represents the principal (initial) amount, r the annual rate of change (as a decimal), and t the number of years that have passed. In this problem, A is written as $P(t)$, the principal is 43,560 and the rate is 0.155. The equation for population is $P(t) = 43,560(1 + 0.155)^t$, which is equivalent to $P(t) = 43,560(1.155)^t$.



Choice (D) is easily mistaken for the right answer since it only lacks the 1 that must be added to the rate. A quick examination of choice (D), however, reveals that, over time, the population will decrease not increase.

- 15 **A PAM** To simplify the rational expression $\frac{8x+2}{3x-1}$, you can use polynomial long division. It looks intimidating, but the process is identical to long division of whole numbers. First, determine how many times the divisor, $3x - 1$, goes into the dividend, $8x + 2$ by asking yourself how many times does $3x$ go into $8x$. It goes in twice, so multiply the divisor $3x - 1$ by 2 and subtract it from $8x + 2$.

$$\begin{array}{r} 3x-1 \overline{)8x+2} \\ \underline{-(6x-2)} \\ 2x+4 \end{array}$$

The result, $2x + 4$, is the remainder. Since remainders can be written as fractions (remainder over divisor), the answer is $2 + \frac{2x+4}{3x-1}$.



Another approach is to plug in a number for x in $\frac{8x+2}{3x-1}$. If you let $x = 1$, for example, then

$\frac{8(1)+2}{3(1)-1} = \frac{10}{2} = 5$. Plug $x = 1$ into each answer choice to see which one equals 5. Choice (A) works because $2 + \frac{2(1)+4}{3(1)-1} = 2 + \frac{6}{2} = 2 + 3 = 5$.



This can also be a back solving problem. It requires getting common denominators in order to add or subtract in the choices, but that can still be less tedious or easier to execute than the previously discussed methods.

Student-Produced Response Questions

- 16 **HOA 0**

There are multiple ways to solve a system of equations, but the elimination method is the quickest here.

$$\begin{array}{rcl} 2a + 4b = 12 & \rightarrow & 2a + 4b = 12 & 2a + 4b = 12 \\ 2(5a - 2b = 30) & \rightarrow & \underline{10a - 4b = 60} & 2(6) + 4b = 12 \\ & & 12a = 72 & 12 + 4b = 12 \\ & & a = 6 & 4b = 0 \\ & & & b = 0 \end{array}$$

17 ATM 105

In an isosceles triangle, the two angles opposite the two congruent sides are also congruent.

The triangle on the left has a right angle, so the other two angles, which can both be called a , each measure 45° . Since $b = \frac{2}{3}a$, $b = \frac{2}{3}(45) = 30$. The other two angles in the triangle on the right must measure 75° since they are congruent and $\frac{180-30}{2} = 75$. Angle c is supplementary to the 75° angle, so $m\angle c = 105^\circ$.

18 ATM 2.5 or 5/2

Since D is the midpoint of \overline{AB} and $AB = 8$, $AD = DB = 4$. E is the midpoint of \overline{AD} , so $AE = ED = 2$. It is also useful to note that $\triangle ABC$ is a 3-4-5 right triangle. Since the legs measure 6 and 8, the hypotenuse \overline{AC} measures 10 (you could also find this using the Pythagorean Theorem). DE is $\frac{1}{4}$ of AB , so FG is $\frac{1}{4}$ of AC . $\frac{1}{4}$ of $10 = \frac{5}{2}$.

19 PAM 9

Substitute $w = 12\sqrt{2}$ into $\frac{1}{4}w = \sqrt{2x}$ and solve for x :

$$\begin{aligned}\frac{1}{4}(12\sqrt{2}) &= \sqrt{2x} \\ 3\sqrt{2} &= \sqrt{2x} \\ 3\sqrt{2} &= \sqrt{2} \cdot \sqrt{x} \\ 3 &= \sqrt{x} \\ 9 &= x\end{aligned}$$

20

PAM 7

To find a real number solution for x , you can factor the polynomial since it is both factorable (by grouping) and set equal to zero. Rewrite the equation by factoring out the GCF (greatest common factor) of the first two terms and the GCF of the last two terms. Notice that you'll have $x - 7$ in both products. Factor out $x - 7$ and solve:

$$x^3 - 7x^2 + 3x - 21 = 0$$

$$x^2(x - 7) + 3(x - 7) = 0$$

$$(x - 7)(x^2 + 3) = 0$$

$$x - 7 = 0 \quad x^2 + 3 = 0$$

$$x = 7$$

Since $x^2 + 3$ can never equal zero if x is a real number, 7 is the only solution.



Any solution to an equation is checkable by plugging your answer back in. Since there is no safety net of choices in this problem, take the time, if you have it, to plug 7 in. At first that will seem daunting because it looks like you need to work out 7^3 without a calculator. Notice, though, that the first two terms, 7^3 and $7(7^2)$, really mean the same thing, so they subtract to zero:

$$7^3 - 7(7^2) + 3(7) - 21 = 0 + 21 - 21 = 0.$$

Math Test – Calculator

Multiple-Choice Questions

- 1 **A HOA** To write an equation representing this situation, think about how much money Flannery starts with and how much she needs at the end of the day. She begins with \$300 and then makes \$45 an hour, represented by $45n$. However, she must pay a fee of \$150 before leaving work. This can be expressed by $300 + 45n - 150$. This must equal her goal of \$420. By subtracting 300 from each side, you get choice (A).

$$300 + 45n - 150 = 420$$

$$45n - 150 = 120$$



Be careful: if you start with $300 + 45n - 150 = 420$ and combine like terms, you get $45n + 150 = 420$, which is not one of the choices. When your answer doesn’t obviously match one of the choices, first check to see if one of them is just a different form of your expression or equation.

- 2 **A PAM** To determine the function f , you only need to find the slope of f since the four answer choices all have different slopes. In the table, each time a increases by three, $f(a)$ increases by one. Slope is $\frac{\text{rise}}{\text{run}}$ or $\frac{\text{change in } y}{\text{change in } x}$ and since a is the x -value and $f(a)$ is the y -value, the slope is $\frac{f(a_2) - f(a_1)}{a_2 - a_1} = \frac{1}{3}$. This will be true no matter what pair of coordinate pairs you choose. The only linear equation with a slope of $\frac{1}{3}$ is $f(a) = \frac{1}{3}a - 3$, choice (A).

- 3 **D PSD** Answer this question by the process of elimination. Choices (A) and (B) are incorrect because the tweets both increased and decreased after December 17th. Choice (C) is incorrect because the maximum number of tweets occurred around December 25th, not December 31st. That leaves choice (D). Be mindful of the word “generally.” It is true that tweets generally increased until December 25th and then generally decreased, even though you could find brief periods where this doesn’t hold.

- 4 **A PSD** One way to get an answer is by backsolving. Since the answer choices are in ascending order, start with one of the middle choices. If you pick Choice (B), divide 550 by 600 to determine if it is equal to 87.5%. Since $\frac{550}{600} = 0.91\bar{6}$ or 91.6%, 550 is too large. Therefore, the correct answer is (A).

You can double check that $\frac{525}{600} = 0.875 = 87.5\%$.



You can also easily take 87.5% of 600 by multiplying $(0.875)(600)$ on your calculator. It will give you 525. The only danger here is that the 24 mentioned in the question is extraneous, so make sure to avoid the temptation to use it in your busywork.

- 5 **C HOA** This is a two-part question. First, find z by translating the statement “when 4 times some integer z is subtracted from 12, the result is 32” to the algebraic equation $12 - 4z = 32$ and solving it.

$$\begin{aligned} 12 - 4z &= 32 \\ -4z &= 20 \\ z &= -5 \end{aligned}$$

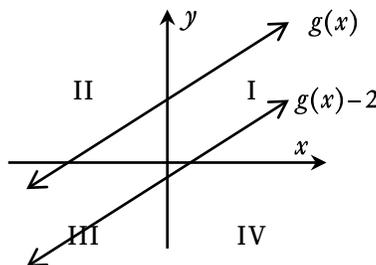
Now, multiply z by 3 and add 7 to get $3(-5) + 7 = -15 + 7 = -8$.



Notice that -5 is a choice, even though the question does not ask for z . Before moving on to the next problem, always re-check the *ask* from the problem you’ve just completed to be sure you’ve answered it.

- 6 **B PSD** Since the total population is 1.25 million people and the populations for each country range from 1.5 to 3.4, the units for the vertical axis cannot be millions, Choice (C), or hundreds of millions, Choice (D). Choice (A) is incorrect because thousands is too small. In thousands, 2.2 would represent 2,200. The sum of 2200, 3100, 1500, 3400, and 2300 is 12,500, which is not 1.25 million (1,250,000). Therefore, the correct answer is (B), hundreds of thousands.

- 7 **A PAM** The best approach is to draw the graph of the function $g(x)$ as a line that passes through quadrants I, II, and III. The function $g(x) - 2$ is a line parallel to $g(x)$ but shifted down 2 units. Draw $g(x) - 2$ so it passes through quadrants I, III, and IV. Using your sketch, you can see that $g(x)$ must have a positive slope and a y -intercept between $(0, 2)$ and the origin. If the y -intercept of $g(x)$ were any higher on the y -axis, $g(x) - 2$ would not pass through quadrant IV. If it were any lower than the origin, $g(x)$ would miss quadrant II.



- 8 C PSD Since 75 seconds is equivalent to 1.25 minutes ($75 \div 60 = 1.25$), Laura reads 2 pages in 1.25 minutes. To find how many pages she reads in an hour (60 minutes), you can set up a proportion with the ratio $\frac{\text{pages}}{\text{minutes}}$, and solve it by cross-multiplying:

$$\begin{aligned}\frac{2}{1.25} &= \frac{x}{60} \\ 1.25x &= 120 \\ x &= 96\end{aligned}$$



You can also use conversion ratios to change units all in one step:

$$1 \text{ hour} \times \frac{60 \text{ minutes}}{1 \text{ hour}} \times \frac{60 \text{ seconds}}{1 \text{ minute}} \times \frac{2 \text{ pages}}{75 \text{ seconds}} = 96 \text{ pages.}$$

- 9 C PSD Participants who smoked between 6 and 25 cigarettes per day fall under the smoking status of “Moderate (6–15)” and “Heavy (16–25).” The probability that one of these participants was “Underweight” can be determined by:

$$\frac{\text{Number of Underweight, Moderate and Heavy smokers}}{\text{Number of total Moderate and Heavy Smokers}} = \frac{35 + 47}{575 + 1046} = \frac{82}{1621} = 0.051.$$

- 10 C PSD The key is to determine the scale on both the x and y -axes of the graph. Each vertical line represents an increase of 2 cm on the x -axis (Height) and each horizontal line represents an increase of 2 cm on the y -axis (Reach). There are four boxers with a reach of at least 184 cm, and the shortest has a height that is half-a-box to the left of 180cm, so 179 cm.

- 11 D PSD Calculate the ratio of height to reach for boxers A, B, C, and D. Boxer D has the smallest ratio: $\frac{191}{198} = 0.965$.

- 12 A HOA You can backsolve by plugging each answer choice into the inequality. Remember, you want the one that is NOT a solution, meaning the choice that does not make the inequality true. If you start with choice (A) and plug in 3 for x , the inequality becomes $4(3) - 3 \geq 2(3) + 7$ or $9 \geq 13$. Since this is a false statement, (A) is the correct answer.



Though you could solve this inequality algebraically, you’d still want to check your answer, so why not, as we did above, just cut right to the chase and start with the checking?

- 13 **D PAM** Every time the age of the sample increases by 5730 years, the number of Carbon-14 atoms decreases by half. Since the number of C-14 atoms decreases by a different amount each time (e.g. the difference between 3.2×10^{12} and 1.6×10^{12} is 1.6×10^{12} , but the difference between 1.6×10^{12} and 8.0×10^{11} is 8.0×10^{11}), the relationship is not linear. That eliminates choices (A) and (B). It cannot be choice (C), exponential growth, because the number of C-14 atoms is decreasing, not increasing. That leaves choice (D), exponential decay.



Be careful when determining the relative size of numbers written in scientific notation. 8×10^{11} is *smaller* than 1.6×10^{12} because the exponent is smaller.

- 14 **B HOA** The *C*-intercept is the total monthly cost of using the gym zero times. This represents the base cost of a gym membership each month since you would pay that amount for a month even if you never use the gym.

- 15 **C HOA** All four equations are in slope-intercept form where *m* is the slope and *b* is the *y*-intercept (or in this case the *C*-intercept). Since the *y*-intercept is approximately 35, you can eliminate choices (A) and (D) as those equations have *y*-intercepts of 0. To determine the slope of the line, take two points on the line and calculate $\frac{\text{rise}}{\text{run}}$ or $\frac{y_2 - y_1}{x_2 - x_1}$. It appears that the line passes close to (0, 35) and (2, 40). The slope of a line that goes through those points is $\frac{40 - 35}{2 - 0} = \frac{5}{2} = 2.5$. This is much closer to 2, the slope of choice (C), than to $\frac{1}{2}$, the slope of choice (B), so Choice (C) is the best equation.

- 16 **C PSD** The range, the spread between the largest and smallest values, will change the most once the outlier 25 is removed from the set. With 25 included, the range is $25 - 5 = 20$, and without 25 included, the range is $15 - 5 = 10$. The median is unaffected by the removal of 25, remaining at 7. The mean is only slightly changed, decreasing from 9.17 to 8.23.



Generally, the mean and median should not change drastically with the addition or removal of one number in a large enough set. An exception to this would be the addition or removal of an extreme outlier. For example, if the number 5,000 were added to the set in this problem, the mean would be greatly altered. Of course, if there were a 5,000-story apartment building on Elm Street, the change in the mean number of stories would be the least interesting fact about that street.

- 17 **A PSD** Since the team practices 6 days a week and the players drink 200 gallons of water per practice, they consume 1200 gallons per week. The filter pours water at a rate of 9 gallons per minute, which is equivalent to 540 gallons per hour. To find the number of hours spent filling water containers, divide 1200 gallons by 540 gallons per hour: $\frac{1200}{540} = \frac{20}{9}$ hours.



You can also use conversion ratios:

$$\frac{200 \text{ gallons}}{1 \text{ day}} \times \frac{6 \text{ days}}{1 \text{ week}} \times \frac{1 \text{ min}}{9 \text{ gallons}} \times \frac{1 \text{ hour}}{60 \text{ minutes}} = \frac{20 \text{ hours}}{9 \text{ week}}$$

- 18 **D HOA** Solving for p yields $14p \geq 12$ or $p \geq \frac{6}{7}$. Plugging $\frac{6}{7}$ for p into $11 - 7p$ will give you the maximum possible value since plugging in anything larger will create a smaller final difference: $11 - 7\left(\frac{6}{7}\right) = 11 - 6 = 5$.



A trick here is to recognize that $11 - 7p$ is equivalent to $14p - 22$ divided by -2 . Thus, divide both sides of the inequality by -2 . Remember to flip the inequality sign whenever you multiply or divide by a negative number!

$$\frac{14p - 22}{-2} \geq \frac{10}{-2}$$

$$11 - 7p \leq 5$$

Since $11 - 7p$ is less than or equal to 5, the maximum possible value is 5.

- 19 **C PSD** The probability that someone who had dinner at the food court did not eat Chinese food can be represented by $\frac{\text{Pizza for Dinner} + \text{Burgers for Dinner}}{\text{Total Dinners}} = \frac{52 + 53}{150} = \frac{105}{150}$.



Notice that you only need the information from the “Dinner” row. Don’t be confused by the extra information in the table.

- 20 **A PSD** Use the equation $c(x) = (T + G)x + I + R$ and the table to write equations for the total cost of renting a truck from company A and from company C.

$$\text{Company A: } c(x) = (0.60 + 0.10)x + 35 + 20 = 0.70x + 55$$

$$\text{Company C: } c(x) = (0.75 + 0.15)x + 0 + 50 = 0.90x + 50$$

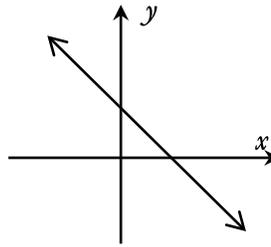
To find the range of miles when the cost for company A will be greater than or equal to the cost for company C, set up an inequality and solve for x .

$$0.70x + 55 \geq 0.90x + 50$$

$$5 \geq 0.20x$$

$$25 \geq x \quad \text{a.k.a. } x \leq 25$$

- 21 **D HOA** The slope of the line in any linear function of x is the coefficient of x , which, in this case, is $T + G$. Both the truck rental T and the gas expenses G are in dollars per mile. Choice (D) is the only answer that makes sense because it is the cost of per mile expenses.
- 22 **C PAM** The key phrase in this question is “exponential rate.” To grow at an exponential rate means to increase by a certain percentage of oneself. You can eliminate Choice (A) because the annual rate of change was constant, \$10. Similarly, you can eliminate Choices (B) and (D) because they have constant growth rates, \$110.10 and \$100, respectively. You are left with Choice (C). Here the balance grew by a greater amount each year (10.50, 11.03, 11.57), which is a sign of exponential growth. You could do calculations to show a consistent exponential growth in choice (C), but they are unnecessary once you eliminate the other choices.
- 23 **C HOA** If $h - k = 0$, then $h = k$. You can sketch a line where the x -intercept (h) and the y -intercept (k) are equal. The slope of the line must be negative.



Calculate the slope of the line to be $\frac{k - 0}{0 - h} = \frac{k}{-h}$. Since $h = k$, substitute to get a slope of

$$\frac{h}{-h} = -1.$$

- 24 **B** PAM First simplify $f(b) - g(b)$, distributing the negative sign to every term of $g(b)$.

$$\begin{aligned} f(b) - g(b) &= (4b^2 - 3b + 5) - (20b^3 - 15b^2 + 25b) \\ &= 4b^2 - 3b + 5 - 20b^3 + 15b^2 - 25b \\ &= -20b^3 + 19b^2 - 28b + 5 \end{aligned}$$

Unfortunately, $\frac{-20b^3 + 19b^2 - 28b + 5}{5b - 1}$ doesn't look pretty. In this form, it doesn't appear to be equivalent to any of the answer choices. The next step is to divide using polynomial long division.

$$\begin{array}{r} \overline{) -20b^3 + 19b^2 - 28b + 5} \\ \underline{-(-20b^3 + 4b^2)} \\ 15b^2 - 28b \\ \underline{-(15b^2 - 3b)} \\ - 25b + 5 \\ \underline{-(-25b + 5)} \\ 0 \end{array}$$

Now, just notice that $-4b^2 + 3b - 5$ is simply $-f(b)$.



When a problem looks terribly difficult, like this one, always consider what a change of form might do. Here, $g(b)$ can be factored to $5b(4b^2 - 3b + 5)$, which means $g(b) = 5b \cdot f(b)$. So

$$\frac{f(b) - g(b)}{5b - 1} = \frac{f(b) - 5b \cdot f(b)}{5b - 1} = \frac{f(b)(1 - 5b)}{5b - 1} = -1 \cdot f(b).$$



Plugging in a number for b can also make the question easier. If you use, for example, $b = 2$, then $\frac{f(2) - g(2)}{5(2) - 1} = \frac{15 - 150}{9} = -15$. Choice (B) also yields -15 when $b = 2$.

- 25 **C** PSD A good strategy is to plug in numbers for the initial radius and height of the tank. If you let $r = 1$ and $h = 1$, then the initial volume is $V = \pi r^2 h = \pi(1)^2(1) = \pi$. If the aquarium increases the volume by 50%, the new volume will be 1.50π . An 18% increase of the radius will make the new radius 1.18. To determine the new height, solve the following equation:

$$\begin{aligned} 1.50\pi &= \pi(1.18)^2 h \\ h &= \frac{1.50\pi}{(1.18)^2 \pi} = \frac{1.50}{1.3924} = 1.077 \end{aligned}$$

Since the new height is 1.077, it is a 7.7% increase from the initial height of 1.



When the choices have variables in them, it is wise to avoid using special numbers, like 0 or 1, when plugging in. However, since this problem has four numeric choices, there is a clear benefit to using a simple number like 1 for both the original radius and the original height.

26 D PSD An important distinction to make is that the data points represent the *actual* dependency ratio for Japan for each year since 1995. The line of best fit represents an estimate of the dependency ratio for each year. Choice (A) is incorrect because there is no actual data for the dependency ratio in 1995. The line of best fit indicates that the dependency ratio was likely 0.416, but you have no way of knowing if that is the actual ratio. Choice (B) is incorrect because it has the numerator and denominator of the dependency ratio reversed. The corrected statement would say, “In 2005, the number of people whose ages were below 15 or above 65 was 51 percent of the number of people of working age in Japan.” Choice (C) is incorrect because the actual dependency ratio for Japan does not increase by 0.103 each year; the estimated dependency ratio (as predicted by the line of best fit) increases by 0.103 each year. Since the data points don’t form a true line, there is no standard increase. Choice (D) is correct because the data point at 7 years (2002) has a dependency ratio of 0.48. Therefore, in 2002, Japan had 48 people that were not of working age for every set of 100 working-age people.

27 D ATM First, find the slope of using the slope formula $\frac{y_2 - y_1}{x_2 - x_1}$.

$$\text{Slope of } \overline{AB} = \frac{1-3}{5-1} = \frac{-2}{4} = -\frac{1}{2}$$

The slope of a line perpendicular to \overline{AB} is the negative reciprocal of $-\frac{1}{2}$ which is 2. You can eliminate choices (A) and (B) since they both have a slope of $\frac{1}{2}$. Since the perpendicular line intersects \overline{AB} at its midpoint, find the midpoint by taking the average of the x -values and y -values of the endpoints A and B .

$$\text{Midpoint of } \overline{AB} = \left(\frac{1+5}{2}, \frac{3+1}{2} \right) = (3, 2)$$

The midpoint must be on the line you are looking for, so you can plug (3, 2) into the equations $y = 2x - 1$ and $y = 2x - 4$ to see if it is on either the line from choice (C) or the line from choice (D). Since $2 = 2(3) - 4$, choice (D) has the correct equation of the perpendicular line.

28 B PAM This is an example of exponential growth where the population of mosquitos increases by a percentage of itself. The formula $A(t) = P(1+r)^t$ exhibits exponential growth where P represents the principal (initial) amount, r the rate of change (as a decimal), and t the number of times the rate is compounded. In this problem, the principal is 200 and the rate is 0.50. Since the population increases by 50% every two weeks, it is compounded once every fourteen days. This is represented by $\frac{d}{14}$. For example, if $d = 14$, the rate is compounded once because $\frac{14}{14} = 1$; if $d = 21$, the rate is compounded 1.5 times because $\frac{21}{14} = 1.5$. The equation is therefore $A(t) = 200(1 + 0.5)^{\frac{d}{14}}$ or $200(1.5)^{\frac{d}{14}}$.

- 29 **A** **PAM** If $f(x) + 5 = 0$ has exactly one real solution, then the graph of $f(x) + 5$ has only one x -intercept. Add 5 to each answer choice (because you want $f(x) + 5$) and graph each new function on your calculator. The graph of $y = x^2 + 10x + 25$ has one x -intercept, so choice (A) is correct. When taking section 4 of the SAT with a graphing calculator, never forget that sometimes the best way to analyze a function is to just let the calculator show you what it looks like.

- 30 **B** **PAM** A good strategy is to plug in numbers for A and B . Since B is two less than A , let's pick $A = 4$ and $B = 2$. Then substitute those values for A and B into the two equations.



$$R = 16(2)^4 = 16(16) = 256$$

$$P = 4(2)^2 - 5 = 4(4) - 5 = 16 - 5 = 11$$

Now, plug $R = 256$ and $P = 11$ into the answer choices to see which equation is true. Only (B) is correct.

Choice (A): $11 \neq \frac{256}{16} + 5$

Choice (B): $11 = \frac{256}{16} - 5$

Choice (C): $11 \neq \frac{256}{4}$

Choice (D): $11 \neq 4(256) - 5$



Since $B = A - 2$, you can rewrite the second equation as $P = 4(2)^{A-2} - 5$ or

$4\left(\frac{2^A}{2^2}\right) - 5 = 2^A - 5$. Since the first equation yields $\frac{R}{16} = 2^A$, you can rewrite $P = 2^A - 5$ as

$$P = \frac{R}{16} - 5.$$

Student-Produced Response Questions31 HOA $2 \leq x \leq 3$

If Allie types 30 words per minutes, she could type 5400 words in 180 minutes $\left(\frac{5400}{30} = 180\right)$.

If Allie types 45 words per minutes, she could type 5400 words in 120 minutes $\left(\frac{5400}{45} = 120\right)$.

Since there are 60 minutes in an hour, 120 minutes is equivalent to 2 hours and 180 minutes is

3 hours. Therefore, it will take Allie anywhere between 2 and 3 hours, inclusive. You can

therefore give any number in this range, such as 2, 2.5, 2.99, or 3.

32 HOA 183

This is a classic systems of equations problem. Let G be the number of sunglasses Genie sold and S be the number of sunglasses Sarah sold. Since they sold a total of 299 sunglasses, $G + S = 299$. Genie sold 67 fewer sunglasses than Sarah, so $G = S - 67$. You could solve this system of equations several ways, but it is already set up for the substitution method since the second equation has G isolated.

$$G + S = 299$$

$$G = S - 67$$

Substitute the second equation into the first and solve for S .

$$G + S = 299$$

$$S - 67 + S = 299$$

$$2S - 67 = 299$$

$$2S = 366$$

$$S = 183$$

33 PSD 2

Since 1 acre = 1 chain \times 1 furlong, 1 acre = 66 ft \times 660 ft = 43,560 square feet. The plot of land has an area of 87,120 square feet, so to find the number of acres, divide 87,120 by 43,560 and the result is 2 acres.

34 ATM 120

An arc is a portion of the circumference of a circle, and the ratio of arc length to circumference is equal to the ratio of its central angle to 360° .

$$\frac{\text{arc length}}{\text{circumference}} = \frac{\text{central angle}}{360}$$

Since the circumference of a circle is equal to $2\pi r$, the circumference of this circle is $2\pi(12)$ or 24π . You can set up the following proportion and solve for x , the central angle

$$\begin{aligned}\frac{8\pi}{24\pi} &= \frac{x}{360} \\ \frac{1}{3} &= \frac{x}{360} \\ x &= 120\end{aligned}$$

35 PSD 60

If 60% of the total acceptances are male and there are 240 male acceptances, then $240 = 0.60x$ where x is the number of total acceptances.

$$x = \frac{240}{0.60} = 400$$

Thus, there must be 400 total acceptances. Since there are currently 340 (240 boys and 100 girls), the college should accept 60 more girls.

36 ATM 110, 111, 112, 113, 114, or 115

A sector is a portion of the area of a circle, and the ratio of sector area to circle area is equal to the ratio of central angle to 360° .

$$\frac{\text{sector area}}{\text{area of circle}} = \frac{\text{central angle}}{360^\circ}$$

The diameter of the circle is 10, so the radius is 5. Since the area of a circle is πr^2 , the area of this circle is $\pi(5)^2 = 25\pi \approx 78.54$. The area of the sector is between 24 and 25, so you can pick any value between 24 and 25, inclusive, to set up the proportion. For example, pick 24.5:

$$\begin{aligned}\frac{24.5}{78.54} &= \frac{x}{360} \\ 78.54x &= 8820 \\ x &= 112.3\end{aligned}$$

Rounding to the nearest degree, this would be 112. Picking a different value for the sector area (between 24 and 25) would yield a different central angle. The possibilities are 110, 111, 112, 113, 114, or 115.

37 PAM .999

Since the rate at which a man loses height is a percentage of his current height, this is an example of exponential decay. The formula $A(t) = P(1 - r)^t$ models exponential decay where P represents the principal (initial) amount, r the rate of change (as a decimal), and t the number of times the rate is compounded. In this problem, you are given the equation $H = 76v^t$. Notice the similarity to the decay model: v can be represented by $1 - r$. The rate 0.1% can be written as a decimal so $r = .001$. Thus, $v = 1 - r = 1 - .001 = .999$.

38 PAM 73.8

Use the given equation $H = 76v^t$ and $v = .999$ from question 37 to solve for Mr. Celio's height when he is 70.



Be careful because t is the number of years in the future after age 40. Therefore, t should be 30, not 70.

$$H = 76(0.999)^{30} = 73.8$$