

Marks Prep's Four Realistic SAT Practice Tests

Answer Explanations for Test 4

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

The first passage on every SAT reading section is a literary passage, which usually requires a somewhat different approach from that used for the more information heavy passages on the rest of the test. This passage describes a series of events taking place over a short period of time. As you read, mark names and places and write a short summary of the action every 15 lines or so. The story starts by showing Jimmy, a child from Rum Alley, in a fight with several other children from Devil's Row until he is rescued by an older boy. Notice that the author does little to take sides in describing the action, and that it is not until near the end of the passage that we learn how the conflict began.

- 1 B RC**  Write in your own answer for this open-ended question: most of the text of the passage is devoted to describing the violent action as it takes place, which is what you would want to write down before going to the answer choices. He describes the action in a mostly neutral way, almost like a reporter, so that we aren't left feeling like one side or the other represents good or evil. This makes (B) clearly the best answer!
-  If you are not sure what to write down, you can use a process of elimination to get to the correct answer, but this is risky, because each answer is at least partly accurate. Choice (A) is incorrect because it suggests that the intent of the author is to pass judgment on the guilty although the passage doesn't "clearly" assign guilt at all. Further, he does not overtly mock (C) the people in the fight, though they may be ignorant and brutal, nor does the author make any call to action in response to the events described, though he may suggest justice is lacking in the actions portrayed (D).
- 2 D COE**  Solve COE questions as a pair: go on to the answer choices in 3 to see which explains why the incident began. Once you have recognized that 76–81 provides the correct answer to this question, you simply have to find the answer choice that best matches what it says. Jimmy's words in 80–81 are in the vernacular of the street boys in the passage, so this may actually be harder than you might think! Jimmie was going to beat up ("lick") a Devil's Row boy ("dat Riley kid"), but then the others ganged up on him ("dey all pitched on me"). With this loose translation of Jimmie's words, choice (D) is clearly correct.
- 3 C COE**  As you read through the choices for the best answer to the reason the incident started according to Jimmie, there are two key "tricks" to get to the correct answer. First, the passage is not completely chronological, as choice (A), the earliest reference (lines 1–4) to the fight, does not necessarily explain why it started. Second, the question asked why the fight started "according to Jimmie"; thus, we can eliminate answers that do not present Jimmie's perspective. If we have paid attention to the fact that the question asks for Jimmie's view, we can streamline the process as only (B) and (D) present Jimmie's view, and, of these, (D) is clearly the only one that gives any reference to why the fight started.
-  If you did not focus on the question's reference to Jimmie's perspective, you can still get to the correct answer, as choices (A) and (B) present actions in the middle of the fight, and choice (D) talks about "causes of retreat" rather than causes of the fight in the first place.

- 4 **C** **RC** Before going to the answer choices, write down your own idea about how Jimmie is described. This paragraph describes Jimmie's appearance. He is bruised and bloodied and his clothes are torn. Notice the contrast between the description of Jimmie's hurt appearance and the description in the last sentence of the paragraph, in which we are told that he looks like "a tiny, insane demon." Thus, you might write something like "beaten but still fighting." Choice (C) fits best with this, as he is pitiable for being beaten and fierce as he still fights on.
-  Alternatively, since the paragraph gives no insight into his motivations, you can eliminate choices (A) (noble), (B) (foolish and ignorant), and (D) (arrogant), all of which require insight into the mind of the character.
- 5 **B** **RC** This is an especially difficult question because it requires us to infer why the author included a specific description that doesn't seem to be important to the plot.
-  To answer inference questions like this one, it is essential to answer the question for yourself before looking at the answer choices. The lines referenced describe people watching what happens, but do not show them caring enough to do anything about it. Thus, writing down "shows apathy in outsiders" will help you get to the correct answer, which is (B).
-  If you were unable to write in an answer or are not sure which fits best, remember to use elimination by taking out answers that involve too specific or too large an inference. Choice (A) suggests that the other people referenced somehow have contributed directly to the conflict, which is much too large an inferential leap. Choices (C) and (D) are inaccurate, as people appear curious enough to watch the fight and no one is described as doing purposeful labor.
- 6 **D** **COE** This is the first of a pair of evidence-based questions, so read this question carefully, and move on to the lines in the next question. As explained in the explanation for question 7, after reviewing the lines, we should choose (D), because the Devil's Row boys ran away from the older, larger boy who joined the scuffle.
- 7 **C** **COE** The boys from Devil's Row don't retreat from the conflict until near the end of the passage, making choices (A) and (B) easy to eliminate. On the other hand, choice (D) is too late in the passage: it describes the boys from Rum Alley leaving, which is after the Devil's Row boys retreat. Choice (C) describes the older boy, Pete, coming to the scene and hitting one of the boys, who then runs away, followed by the rest of the Devil's Row children. This does tell us why the Devil's Row children retreated—they were faced with an older and larger boy to fight.
- 8 **A** **WIC** It is especially important to write-in your own answer for question like this before you read through the answer choices. A good write in for this would be something like "fighter" or "defender." In both sets of lines, "champion" is used to describe Jimmie, who we are told little about in the story except that he is from Rum Alley and fights with children from Devil's Row, despite being outnumbered. Choice (A) is closest to this meaning.
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- 9 **B** WIC This is another great question to do a write-in answer before looking at the answer choices. In context, the word must refer to the people who are, as described, turning slowly towards their home street: the Rum Alley children who came forward in line 82 to exchange stories.



Although contingent often means “depending upon” (A), it does not in this context.



This is a good example of why it is important to view these types of questions in their exact context, rather than focusing on what the word in the question usually means, as the SAT often tests a secondary or tertiary meaning of a word or phrase.

- 10 **A** RC This question is a great example of why it is often important to read the context before or after specific sets of lines being asked about in a question. Lines 88–89 explain exactly what is happening in lines 89–93, that the boys are telling to each other “distorted versions” of the fight. The lines this question is asking about describe some of those distortions (A). The author indicates neither the size nor scale of the fighting in these lines, nor how it turned out (B).



Choices (C) and (D) may be tempting, but both require logical leaps that we should not make. The passage does not indicate that the boys exaggerating the story created actual misunderstandings (C), nor that it is generally true that people distort previous events when retelling them (D).

Passage 2

This passage describes historical events but mostly uses modern language. Its difficulty comes from the presentation of a potentially unfamiliar subject using some scientific terminology that can be challenging to follow. Circling names and potentially unfamiliar terms as you read the passage can provide a loose outline to use when skimming for answers in the text. The passage includes a graph at the end, but don't worry about understanding it in detail initially. You should read the entire text portion of the passage before working through the questions, but you don't need to analyze the graph until it comes up in a question. Remember to write down a short main idea for the passage after reading it: a good main idea for this passage would be something like “Modern relevance of founders' views of climate change theories.”

- 11 **B** RC Use the main idea that you wrote down to narrow down the choices for this question. Choice (B) is the best fit as it suggests the possible relevance of older views of climate change today.



Although the passage does state that the founders believed in a type of global warming, choice (A) is incorrect because that belief is not presented as a reason why people today should take action on climate change. Choice (C) is incorrect because the passage does not present climate change views as consistent from the past up to today. The passage describes several past people's interest in climate change, but not their attempts to advocate in favor of changes to prevent climate change. Even more so, the passage suggests that it is a more modern occurrence. Choice (D) is outside of the scope of the passage; the passage does nothing to suggest that man-made climate change is unlikely to be possible today.

- 12 **B** WIC If you know the meaning of “ambivalent,” having a mix of positive and negative feelings or ideas, choosing (B) is relatively easy.
-  However, if the word is unfamiliar, you can use the strategy of putting in your own word based on the context. There are two context clues that help us learn the meaning of this word. First, the sentence before the one containing “ambivalence” tells us that the US has had a lot of climate change skepticism recently. The second clue is later in the sentence in lines 5–9, where the passage tells us that the founders were “far from” the modern American response in that the founders were vocal supporters of climate change theories. Therefore, you might write in “+/-” to indicate that ambivalent must mean both positive and negative, which makes “uncertainty” (B) the correct response.
- 13 **B** COE  For paired-evidence questions like this one, remember to read through the lines in the second question before reading through the answer choices in the first. Once you have found that in choice (C) the passage describes in lines 43–46 that colonists believed man-made climate change could be brought about through colonization, it is easy to choose (B).
- 14 **C** COE After reading through question 13 but before reading through its answer choices, you should read through the lines in the answer choices here. Choice (A) refers to neither founders nor climate change, and choice (B) tell us that disagreeing with the ideas put forth in choice (A) was patriotic, but these views are not about man-made climate change. In lines 43–46 (C), however, the passage explains that the colonists argued in support of man-made climate change in response to negative climate beliefs about North America coming from England. Choice (D) discusses a specific founder, but does not suggest that he believed in man-made climate change.
- 15 **D** RC  This question is an excellent example of one that can be answered much more easily by those who circled character names while reading the passage. Doing so makes it easier to quickly skim the text to find where these two people are mentioned—paragraph 3. These two are described as believing that the climate of the new world was inferior to that of Europe. This belief provided motivation to the founders to take an interest in the study of man-made climate change; it was a way for the founders to show that the efforts of colonials were improving the condition of the new world. Choice (D) is therefore correct.
- 16 **C** WIC  Write down your own word to take the place of “eager” in the sentence. A good phrase to write would be “interested in”: don’t worry if the part of speech doesn’t match! The context clue for this word appears in the sentence right after the one containing the word. We are told that Jefferson worked hard to dispute the idea that American animals were inferior to European animals. This shows that he was especially interested in refuting such claims. Being interested in doing something does not fit with restless (A) or nervous (B) or prepared (D). Choice (C), keen, is correct because it refers to Jefferson’s eagerness or enthusiasm, which is the secondary meaning of “keen.”
- 17 **A** COE Make sure to read through the lines in question 18 to help answer this question rather than answering this one first. Lines 97–100, choice (C) below, explain that people today can use the example of the mistakes made by the founders regarding man-made climate change to help avoid making similar mistakes, which fits perfectly with choice (A) here.

18 C COE Using the lines in the answer choices on this question helps answer question 17, especially because question 17 is fairly open ended. The lines in choice (A) compare the founders' views with the modern American response, but do not suggest how we should apply the founders' beliefs to modern climate concerns. The lines in choice (B) contain little information and do not make mention of modern concerns. The lines in choice (D) reference "degeneracy theorists," who were not directly discussing climate change. The lines in choice (C) describe specifically that modern climate advocates can avoid making the same mistakes as those made by the founders described in the passage, making choice (C) correct.

19 C IG This question asks us about the graph. The best time to read through the graph in detail is right after reading this question but before reading through the answer choices. The graph shows the annual mean temperature and five year average temperature in the US from 1880 to 2015. The annual mean goes up and down over and over as does the five-year average, but both seem to be increasing overall. Choice (C) correctly summarizes this information.



You can also use a process of elimination by checking each choice against the graph. Choice (A) is inaccurate both because the temperature increases and decreases from year to year and because the graph does not cover the time before 1880. Choice (B) is inaccurate because the temperature has fluctuated by more than plus or minus 1 degree. Choice (D) is incorrect because the fluctuations during Jefferson's time (the 1700s and early 1800s) are not shown on the graph.

20 A IG The variation in average temperatures from year to year is shown to be much greater than the variation in the five year average temperature, making choice (A) the correct response. The fact that a difference was measured enough to be shown on the graph indicates that choice (B) is incorrect. Choice (C) is incorrect because the overall trend is an increase rather than a decrease. Choice (D) is incorrect because the change in average temperature from year to year is nearly always greater than 0.1 degrees.

Passage 3

This science passage describes the discovery of a scientifically valuable fossil and subsequent creation of a publication that included stereoscopic images. Some of the terminology and French names in this passage can be difficult to follow, so it is especially important to underline main ideas and circle relevant terms and names in the passage as you read. Some students find that taking short notes on each paragraph, written beside the passage, helps make it easier follow along. Before you move on to the questions, remember to write down the main point of the passage as a comprehension check, perhaps something like “stereoscopic fossil images allowed wider study.”

- 21 **B** RC The La Chapelle fossil is central to the entire passage, so this is a difficult question because of how open-ended it is. However, the best place to start searching the passage for the answer to this question is in the first paragraph, in which the fossil is introduced. The answer is in lines 9–11: “...excavations of the skeleton revealed that it was more complete than anything else in the fossil record,” which indicates that (B) is correct.



If you do not feel confident about where to find the answer to this question, skip it initially, and come back to it at the end and eliminate answers based on what you know is untrue based on the passage and the other questions. None of the other choices are supported by the passage, but it can be very time-consuming to start by trying to look for support for the inferences in each answer choice.

- 22 **C** WIC  Write in your own word for this before looking at the answer choices, especially since this term is derived from Latin and a specialized term for archaeology. Here, the meaning of “in situ” is provided immediately before the term is used: “undisturbed archaeological context.” “Undisturbed context” would be an excellent write-in and leads us to choice (C).

- 23 **C** RC The second paragraph of the passage describes the Bouyssonie brothers sending the remains to Boule, and Boule’s subsequent actions. Boule studied the fossil in detail then produced a publication. The passage does not describe Boule’s work as if it was unexpected or contrary to what the Bouyssonie brothers had planned, so we can reasonably infer that the brothers intended that Boule would look into the fossil in this way, which makes Choice (C) correct.

- 24 **A** WIC Eminent is being used to describe Marcellin Boule, who we are told is a director at a prestigious museum. From the context, we can tell that eminent is a positive adjective that describes someone who does important scientific research. “Top in field” could be a good write-in for this question, but if you have trouble coming up with a specific word or phrase, a couple of up arrows to indicate the word being very positive would be a great start. Of the choices, “distinguished” is the closest in meaning and is correct.



Don’t choose an answer just because it may be unfamiliar: choice (C), “grandiose,” is a tempting choice if you aren’t completely sure what it means because it sounds like “grand,” which is very positive. “Grandiose” means impressive in size, appearance, or style, and usually refers to something unnecessarily or pretentiously grand.

- 25 **D** COE As with all COE questions, go ahead to the next question's answer choices before choosing the best answer here.



However, be sure that you understand the question before reading over the answer choices for the next question—this question asks about the way that the focus shifts in the passage as a whole, which is a movement from the artifact to a discussion of the stereoscopic plates used to present it in a book. Once you have identified that lines 36–42 show this transition, it is easy to choose (D) for this question!

- 26 **D** COE The question above asks about the movement of the passage from before the second paragraph to what comes after the second paragraph. Thus, you need to think about the movement of the passage as a whole as you read over the options. The first paragraph discusses the discovery of the fossil, and the third paragraph and the rest of the passage describe the book's use of stereoscopic images. Choice (A) introduces the topic of the second paragraph, Boule, but does not relate to the larger movement of the passage as a whole. Choice (B) discusses the book itself and its significance, but does not discuss the key aspect of the stereoscope that the rest of the passage focuses on. Choice (C) discusses what Boule wrote in the book, but does not quite get to the use of stereoscopic imagery. Only choice (D) gets us from Boule's book about the fossil to its use of stereoscopic plates, which then are the focus of the remainder of the passage.

- 27 **A** RC Kaleidoscopes are briefly mentioned in the third paragraph (top of the second column). In the sentence immediately following the sentence in the passage that mentions kaleidoscopes, the passage describes stereoscopes as having a “particular trick”: “to give a two-dimensional image an illusion of depth.” This trick being “particular” suggests that it is a way in which stereoscopes are different from other optical toys listed in the previous sentence, like kaleidoscopes. Choice (A) is therefore correct.



Don't be fooled by answer choices that present material verbatim from the passage—the whole answer must be correct to be the best answer. Choice (C) mentions the kaleidoscope being an “optical toy,” which is language lifted directly from the passage, but the passage suggests that stereoscopes are another “optical toy,” so this is not a difference.

- 28 **B** RC Go back to the passage so that you can answer this for yourself. The author creates an analogy between stereoscopic prints and modern data sharing to help the reader understand the importance and effect of those prints being provided in the book, as indicated in choice (B). Choice (A) is incorrect because this connection does not help one visualize the stereoscopic prints, only understand their importance and connection to modern science. Choice (C) is incorrect because this sentence does not explain *how* the stereoscopic prints were produced. Choice (D) is incorrect because the emphasis here is on the similarities between providing stereoscopic images and modern data sharing, not the differences.

- 29 **B** COE Remember to complete paired evidence questions by using the line numbers in the second question to figure out which choice is correct for the first question. We can eliminate Choices (A) and (C) based on the information contained in the line numbers in the following question. Choice (B) is correct because the stereo cards, we are told, are valuable for getting a better understanding of the fossils they depict. Choice (D) is incorrect because, although the stereo cards are described as valuable, the passage does not state that this was the first instance of stereoscopic images used in a scientific publication.

- 30 C COE Use these line numbers after reading through the previous question to help answer that one. Choice (A) discusses the stereoscopic device in general, not the specific plates used in the book. Choice (B) talks about need for “proxies,” but doesn’t mention stereoscopic images at all. Choice (C), however, provides the most specifically detailed information about the scientific value of the specific stereo cards included in the *L’Homme* publication, and is therefore correct.



Choice (D) may seem difficult to eliminate if you are not careful to identify exactly what the question asks, since it mentions Boule’s use of stereograms in the book, but it references the long-term effect, not the immediate response of Boule’s contemporaries.

Passage 4

Expect the SAT Reading Test to contain at least one passage that is over one hundred years old. Most students find that older passages are usually more difficult and take longer to get through. To manage your time best, plan to skip older passages initially and save them for last. This particular passage is a persuasive speech given to support women’s right to vote. Focus on the individual arguments made in each paragraph—take short notes beside each paragraph to see how the argument fits together.

- 31 D COE For paired evidence questions, make sure to read through the line numbers in the second question before reading through the answer choices in the first question. The author constructs her argument through several means, so this question could be answered in several varying correct ways. However, only one answer choice given actually answers the question correctly. If you were able to see that lines 29–33 were correct for question 32, you can quickly see that choice (D) matches them, as the author provides an argument for why preventing women from voting constitutes a violation of the constitution.



If you were unable to rule out all the wrong answers on question 32, you can still get this pair correct by recognizing that none of the answer choices match either choice (B) or (D) for question 32, as both essentially suggest the same thing—that women are actually people!

- 32 C COE Use the information contained in the line numbers from this question to answer the previous question, rather than answering them separately one after another. Re-read the indicated lines and ask yourself whether these lines indicate how her argument is constructed. Choice (A) does not do so, because it is entirely a quote, and thus does not show her argument. Choice (B) is harder to rule out, because in these lines she makes an argument that “we” means all the people, women and men. However, it doesn’t directly reference the issue of a woman’s right to vote—it only presents a piece of evidence that leads to her primary argument. Choice (C) shows the specific way in which the author constructed her argument for women’s right to vote, and it matches with the specific correct answer to the previous question. Choice (D) asks a rhetorical question, but does not tie directly to the question of women’s right to vote.

- 33 **A** **RC**  Make sure to write in a short answer to this question before you look at the answer choices. The author is giving a persuasive speech in which she uses strong rhetoric to convince her audience. Choice (A), “forceful,” is correct, because it focuses on assertiveness and powerful use of language. Choice (B), “pedantic,” means overly precise and finicky. Choice (C), “irate,” means angry and can be a difficult answer choice to cross out, especially if you did not write in your own answer before looking at the choices. Although we may be able to infer that the speaker is upset at the situation she describes, her use of language focuses on reasoned arguments, not unreasoning anger, as suggested by “irate.” Choice (D), “despondent,” means down, discouraged, or despairing, and does not fit the energetic and dynamic language and arguments provided in the passage.
- 34 **B** **RC**  As with many questions that contain specific line numbers, the answer to this question is contained not within the lines given, but rather in the following paragraph, so be sure to read the broader context to answer the question correctly. In paragraph 3, the author makes reference to specific language used in the preamble to the Constitution to advance her argument, which makes choice (B) correct.
- 35 **C** **WIC**  Go back to the sentence and write in your own replacement word. In the paragraph containing line 33, the speaker makes the argument that prohibiting women from voting is unconstitutional. When the speaker states that disenfranchisement is “a violation of the supreme law of the land,” this is what she is referring to—the Constitution. She speaks to the top most elevated source of law. A good write-in for this question would be something like “top” or “most important.” Choice (C), “highest,” is therefore correct. Although choices (A) and (B) can work in meaning for “supreme” in some instances, neither works in this context, as the speaker is arguing that disenfranchisement violates the chief source of law, not that the Constitution is flawless or above questioning.
- 36 **A** **RC** Lines 33–38 make two specific arguments about disenfranchisement—that it is unconstitutional and that it is undemocratic. Either or both would make a good write-in for this question before reading through the answer choices. Continue reading the sentence immediately following lines 33–38 to see a continuation of the discussion of why the lack of women’s right to vote is undemocratic. Choice (A) is correct. Choice (B) is overly strong through its use of the word “forever.” Choice (C), although a probable consequence of a lack of women’s suffrage, is not discussed at all in lines 33–38.
-  Choice (D) is tempting, but it is overly specific, in that although lacking the vote does deprive women of “the blessing of liberty,” it does not necessarily deprive non-white males from that blessing.
- 37 **B** **RC** This paragraph can be difficult to read because of its sentence structure. Nearly the entire paragraph is one long complex sentence with lots of clauses. The sentence essentially states that denying women the vote is “the most hateful aristocracy ever” and that other common types of inequality are relatively less objectionable because this inequality enters “every home of the nation.” Choice (B) is correct because this paragraph indicates that the “oligarchy of sex” is the most widespread of the oligarchies described.

- 38 **C** WIC The most relevant portion of the sentence containing the word in question reads “no State has a right to make any law, or to enforce any old law, that shall abridge [meaning decrease or restrict] their privileges [things that people are allowed to restrict] or immunities.” Immunities therefore must refer to something other than privileges that the State lacks a right to do. In context, this suggests that restricting or decreasing someone’s immunities would be negative. Think also about the word itself: “immunities.” To be “immune” is to be resistant to or protected from something. Vaccines like the flu shot are also called immunizations. Here, “resistances” or “protections,” would both be excellent write-in words, and “protections” is the correct answer, choice (C).
-  Choice (D), “inoculations” does mean the same thing as immunizations in the context of vaccines, but generally not in other contexts.
- 39 **D** COE Using the line numbers in the following question, we can see the author explain that discrimination against women is unconstitutional “precisely as is every one against Negroes.” Choice (D) is therefore correct.
- 40 **D** COE Make sure to read through the given lines after reading through the previous question, but work on both questions together as a pair. Choice (D), lines 60–63, is correct because in these lines the author directly makes the argument that discrimination against women and blacks is prohibited by the constitution in the same way.
- 41 **C** IG Be careful not to get confused by this graph’s x -axis (at the bottom of the graph). You should read the notes listed next to a graph when answering a question about that graph to make sure you understand how the data is being represented. The graph shows that the percent of the over-21-year-old population that voted increased from 25% to about 37% at the start of women’s suffrage, then, over the next 10 years, fluctuated between around that level and 48% at the most. The primary inference we can draw is that voter turnout increased noticeably following women’s suffrage and maintained that increase for at least the following 10 years. Choice (C) is therefore correct. Choice (A) may or may not be a true statement, but the graph does not suggest whether it is or isn’t true—the graph doesn’t include information on the outcomes of specific elections or the participation of specific individuals. Choices (B) and (D) under and overestimate respectively the impact of women’s suffrage on voter participation.

Passage 5

This set of paired passages is the second science question set on the reading section. Remember to focus on circling proper nouns and underlining words and phrases that seem important or especially confusing. Read through Passage 1, then answer questions 42–45 before reading Passage 2, as these questions only deal with Passage 1. Then read Passage 2 and answer the remaining questions. Splitting up the passages in this way makes managing the timing a little easier and decreases how much material you have to keep in mind when answering some of the questions. The first passage describes a portion of the life cycle of some insects and explains the natural interrelations of insects in human terms. The second passage critiques the personification of natural phenomena, especially in the description of insects. Note that Passage 1 uses this type of language numerous times.

- 42 **B** **RC**  Re-read these lines and their context and write your own answer down before going to the answer choices. In this image, the author intends to suggest that prey and predator perfectly fulfill their roles. If you wrote something like this down first, it is very easy to pick Choice (B).
-  If you found the passage difficult to understand, you can also use a process of elimination to rule out incorrect answers. Always be on the lookout for specific words that make an answer choice incorrect. Choice (A) is incorrect because, although well suited for their individual roles, the passage does not tell us that insects are “comfortable” in their particular roles. Indeed, it seems a stretch to believe that prey insects are “comfortable” with being eaten. Choice (C) is incorrect because the relationship, although well established and simple, does not benefit the prey, at least as far as we know from the information in the passage, meaning that the relationship is not mutually beneficial. Choice (D) is incorrect because we are not given information about the predator and prey making sounds to each other.
- 43 **A** **WIC** This paragraph describes the relationship between a larva being eaten by a parasite and the parasite itself. In lines 2–7, for example, the passage states “the Anthrax [fly]...must...be made incapable of opening his victim’s body...harmonious relation between the eater and the eaten.” Choice (A) correctly describes this relationship – the “victuals,” “foster mother,” and “vessel” all refer to the thing being eaten by the Anthrax fly.
- 44 **D** **RC**  Re-read these lines and identify the purpose of these references for yourself. The author uses “founder” and “melting pot” when describing insect behavior to make the behavior seem more human in order to make it easier to understand. Choice (D) correctly captures this intention.
- 45 **B** **WIC** “This restriction” as it is used in lines 14–15 refers to the restriction described in the previous two sentences—that “the Anthrax [fly]...must, for his own protection, be made incapable of opening his victim’s body.” This restriction is described therefore as a necessary limitation on the fly’s behavior, making choice (B) correct.
-  If you are unable to come up with your own word for this question, you can carefully eliminate the wrong answers instead. Choice (A) is incorrect because this limitation is inherent to the fly’s being and not a result of a conscious choice of will. Choice (D) is similarly incorrect because there is no choice being made. Choice (C) is incorrect because the restriction is described in such a way as to help us understand why it would need to be that way, rather than something surprising or unexpected.

- 46 **D** COE  Before you can answer this question, you must understand the claim referred to in the question. Re-read these lines and you will see that the claim described in this question is that there is a tension between knowing that insects should be described using scientific terms, rather than human terms that fall into traditional human stories of good and bad, “pain and destruction,” etc. The best example of this in the answer choices is choice (D), lines 29–33, as these lines describe an old human story as an analogy to a fly parasitically digesting a larva. The other sets of lines describe natural phenomena using more scientific terms.
- 47 **A** RC  Write in your own answer for this question after re-reading the first paragraph. The first paragraph of Passage 2 discusses a complaint that natural history is so often described in human terms and that this is an inappropriate mode of discussion within the field of science. This is the problem described that many scientists have in their writing, making choice (A) correct.
-  If you are not sure what the point of the first paragraph was, you can attempt to match up the language of the answer choices with the paragraph and eliminate answers that don't match. There is no common misconception mentioned, so (B) doesn't work; there is no contrast established between data and explanation, so (C) won't do; he isn't arguing against objectivity, so (D) is no good.
- 48 **C** COE Lines 33–35 include a description of insect behavior using human story in the way Passage 2 criticizes. Using the line number ranges in the following question, we can see that the author of Passage 2 states in lines 50–51, “wasps should not be described in human terms,” and then goes on to mention some specific human themes that are often inappropriately used to describe insect behavior. Choice (C) is correct because the author of Passage 2, as illustrated by these lines, likely would deny that human themes and stories should be drawn from and used to describe insects.
- 49 **A** COE Choice (A) is correct because these lines most specifically provide the author's complaint about the type of language and comparisons made in lines 33–35 in Passage 1.
- 50 **C** WIC The author of Passage 2 describes insect behavior as being instinct based—a sort of programmed mode of acting unrelated to the kind of conscious thought and decision making undertaken by humans. The author also describes, as we have seen questions about already, the issue of scientific phenomena, especially insect behaviors, being described using human terms and stories. Choice (C) correctly summarizes this contrast as between “scientific fact” (the instinct based behavior) and “human interpretation” (the stories).
- 51 **B** RC The two passages relate to each other in that the first passage discusses a specific type of insect behavior using language that personifies the insects and applies their behaviors to human stories, and the second passage criticizes discussing insects in that way. Choice (B) best summarizes this connection.
-  Choice (A) might seem tempting because Passage 2 criticizes Passage 1. Choice (A) is incorrect because the way Passage 1 describes its findings is separate from its research methodology. Research methodology is how one collects data, not how one describes it.

52

D RC

Re-read these lines and write in your own answer for what the author intends in these descriptions. Lines 69–82 contain a mix of insect behaviors described in scientific terms and in human terms. These are used to contrast the inappropriate ways in which insect behaviors have been described, as in choice (D). Choice (A) is incorrect because the type of language being criticized is used in the lines as examples. Choice (B) is incorrect and unrelated to the discussion—the implication that relations in the natural world are efficient is made in Passage 1, but Passage 2 does not disagree. Choice (C) is incorrect, although it be difficult choice to eliminate. Choice (C) is incorrect because the methods described are being thoughtfully critiqued, rather than mocked. The difference is in the tone and use of language.

Writing and Language Test

- 1 **A SEC** The object of the verb “was” in this sentence must be who “the best known figure” is referring to, Bob Dylan. It is not correct to make his name possessive here because his name is an object and does not possess anything. Were we to make “Dylan” possessive, the sentence would mean that “the best known figure” was Dylan’s songs, rather than Dylan himself. Choice (D) is incorrect because it introduces a comma splice error. Because we could read the portion of the sentence before and after the comma in choice (D) each as separate full complete sentences, the punctuation used would have to be a period, semi-colon, etc., rather than only a comma. Choice (A) correctly relates “Dylan” with “the best known figure” and avoids introducing any errors.
-  Choice (C) is incorrect because “who’s” is an abbreviation of “who is,” just as “they’re” is an abbreviation of “they are” and “he’s” is an abbreviation of “he is”. Remember that when pronouns take apostrophes, they don’t signify possession: rather, they signify contraction of the pronoun and the verb “to be.”
- 2 **C SEC** When evaluating whether to surround a portion of a sentence with two commas or two dashes, determine whether the information contained in the clause or phrase to be surrounded is essential to make the sentence full and complete. In this sentence “Masters of War” and “Blowin’ in the Wind” are essential to understanding the sentence because those are the specific songs that railed against war profiteers, etc. Because the names of the songs are essential to the sentence, they should not be surrounded with commas or dashes, which makes choice (C) correct.
-  Choice (D) is incorrect because the commas surrounding the names of the songs suggest that all of Dylan’s songs railed against war profiteers. As the rest of the sentence makes clear, other songs had different messages.
- 3 **B EOI**  This question is asking us to revise the underlined portion to provide additional description to better connect with the main idea of the paragraph. Therefore, you should read through the rest of the paragraph, answering questions 4–6 along the way, before answering this question. The main idea of the paragraph is that Dylan surprised the audience at the Newport Folk Festival by playing rock music, rather than his traditional folk music. Choice (B) is the only choice that mentions that this festival is a traditional folk music festival. This is the correct response because it helps clarify why it was surprising that Dylan did not play the music that was expected, because the festival was intended for the type of music he had previously played.
- 4 **C SEC** As indicated by the use of “did,” the past tense of “do,” this sentence is in the past tense. Choice (C) is correct because “led” is the past tense of “to lead.” Choice (A) is incorrect because it uses the plural form of the verb, “lead,” which would be appropriate to use for a plural subject acting in the present, neither of which is the case here. Choice (B) is in the present tense, which conflicts with the past tense “did” earlier in the sentence. Choice (D) is incorrect because it is in the present perfect, which also conflicts with the past tense “did” earlier in the sentence. The past perfect is denoted with “had” instead of “has.”

- 5 **A** **EOI**  Use process of elimination. Choice (A) is correct because it uses appropriate vocabulary to match that of the rest of the passage and it's the simplest choice. Choices (B) and (C) both use overly formal language, which also does not quite capture the correct meaning in this case. Choice (D) is overly informal due to its use of the colloquial "folks."
- 6 **B** **SEC**  Use process of elimination. Choice (A) is incorrect because a comma is ordinarily only used along with "and" when separating items in a list of three or more things and when separating independent clauses in the same place that you could use a period or semi-colon. Choice (C) is incorrect because it lacks a comma that would be needed to connect the participle phrase "playing new songs without political themes" with the rest of the sentence. Choice (D) is incorrect because, by introducing a new subject into the clause following the comma, it creates a comma splice error. A comma alone (without a coordinating conjunction – FANBOYS) cannot be used in place of a period to separate two things that could each be separate standalone sentences.
- 7 **A** **EOI**  On all "yes/yes/no/no" questions, always try to figure out your own answer before looking at the answer choices. Think: Is the information provided in the underlined part relevant to the main idea of the preceding paragraph? The main idea of this sentence and the paragraph as a whole is that, when performing at the Newport Folks Festival, Dylan unexpectedly played new music of a different type than what he usually played. The underlined portion should be deleted because the information it presents is off topic and distracts from this main idea.
- 8 **D** **EOI**  For transition word questions, always read the sentence or two before the underlined part and understand what's happening there.
- Here, the sentence beginning with the underlined portion is describing a conclusion of the previous sentence. "Thus" means the same thing as "hence," "therefore," and "as a result," and is thus appropriate here. "Universally," as in choice (A), is overly strong; the second sentence of the paragraph clearly states that the response "was mixed, with both boos and cheers audible" "Furthermore," as in choice (B), means the same as "in addition," and would be appropriate if the last sentence of the paragraph was presenting additional information on the same topic rather than summing it up. "Conversely," as in choice (C), is used when showing a contrast—something different from what was previously described.
- 9 **C** **SEC** There is little context by which we can determine that the sentence must read "reaction was" or "reactions were"; however, the negative view the Newport audience had towards the performance is described using the singular "response" in paragraph 3, suggesting that the singular "reaction" is more appropriate than the plural "reactions" here. Both are correct in terms of subject-verb agreement. Choices (A) and (B) are incorrect because both include a comma splice error in which a comma is used in place of a period or semi-colon to connect two independent clauses together. To use a comma in this way, it must be accompanied by a coordinating conjunction (FANBOYS) like "but," as in choice (C).

- 10 **B** **EOI**  On all main idea questions, write down a quick main idea before you look at the answer choices. The main idea of this passage is that Bob Dylan did not only play one type of music (folk) even though many of his fans would have preferred that he did, and choice (D) is the only one that is consistent with the main idea.
-  This is a very difficult type of question, and you can also use process of elimination here. Choices (C) and (D) all provide entirely new information. Choice (A) is overly general and does not relate to the main idea of this essay.
- 11 **B** **EOI** Because this sentence begins with “Dylan claims he didn’t necessarily mean to offend...,” it should be placed immediately after a discussion of Dylan’s offensive conduct. The conduct Dylan undertook that bothered so many of his fans was playing rock music instead of folk music in the Newport Folk Festival, as described in paragraph 2. The best location for this new sentence therefore is at the end of the discussion of Dylan’s playing the music, at the end of paragraph, 2 as in choice (B).
- 12 **D** **EOI**  Use process of elimination. “Unexpected,” “unforeseen,” and “inexplicable” all have similar meanings, which make all of them unlikely to be the correct answer. Further, none of them make sense when used to describe the known effects of a practice as shown through studies. Choice (D) is therefore correct.
-  Whenever “Delete the underlined portion is an option,” always consider it carefully. If the underlined portion can be deleted to create a simpler sentence and it conforms to the meaning intended by the author, it is probably the right answer.
- 13 **A** **EOI**  Always pick the simplest answer! The SAT has a strong preference in the Writing section for concise, efficient language. For questions that, without providing a more specific goal, ask how best to combine two sentences, prefer the shortest answer choice that makes sense and avoids introducing an error, especially a vague pronoun. Choice (A) is correct because it is short and simple, and it combines the sentences without introducing redundancy, which each of the other choices contain.
- 14 **D** **SEC** The “colleagues” in this sentence conducted the testing but are not possessing it and so should not be made possessive through use of an apostrophe, as in choices (A) and (B). Choice (C) is incorrect because it uses the present tense “tests” when the sentence should be in the past tense as indicated by the word “conducted” earlier in the sentence. Choice (D) correctly avoids an apostrophe error and uses the correct tense, “tested.”
- 15 **B** **SEC**  This question tests pronoun agreement as well as subject-verb agreement. The results mentioned in this sentence refer to those of “Jacobs and his team,” as in the previous sentence, and should therefore be the plural “their results” rather than the singular “its results.” Choices (A) and (C) are incorrect for that reason. Choice (D) is incorrect because it combines the plural “results” with the singular “has” and creates a subject-verb agreement error. “Have” would be the correct word to use in choice (D), as in “results have served.”

- 16 **A** SEC  Use process of elimination. In choice (B), the semi-colon is incorrect because you don't have a full independent clause after the semi-colon. In choice (C), you need the adverb "particularly," not the adjective "particular," and in choice (D), there are two errors: the colon is incorrectly used and "in particular" is the correct idiom, not "in particularly."
- 17 **C** EOI  As always, for "yes/yes/no/no" questions, always answer the question before you look at the answer choices. Do you think the passage needs the underlined portion? The answer should be yes, because the underlined portion offers helpful specific guidance about the amount and type of exercise.
-  You could also use process of elimination here. Choices (A) and (B) are incorrect because the reasons they provide for deleting the underlined portion are not true. The underlined portion does not contradict an emphasis on exercise; it merely suggests that even small amounts of exercise provide benefits. This information is not implied earlier in the sentence, as stated in choice (B). Choice (D) is incorrect because the underlined portion does not define "aerobic exercise."
- 18 **C** EOI  Always pick the simplest answer! Choices (A), (B), and (D) all redundantly reuse the word "symptoms." Reusing that term has the effect of making the sentence read "...[A]erobic exercise...can reduce **symptoms** for those who suffer from...**symptoms**." Choice (C) is correct because it avoids this redundancy.
- 19 **D** SEC "A part" refers to a piece of a larger whole, like how a tire is a part of a car and a button is a part of a shirt. "Apart" refers to separation, like how you might miss your friends when you and they are apart. This sentence is describing a portion of a program and so should use "a part." Choices (A) and (B) are incorrect for that reason. Choice (D) is correct because it uses the correct preposition "of" to go with "a part."
- 20 **B** SEC Choice (A) is incorrect because the introductory noun phrase ("Even those without a diagnosed anxiety or depression disorder") lacks a verb. Choices (C) and (D) are incorrect because you need a demonstrative plural third person pronoun here, not a nominative (or subject) or objective pronoun. "They" and "them" are nominative (subject) and objective pronouns respectively.
-  If the explanation above is confusing, just try listening to the entire sentence out loud. If you have read enough English, "they" and "them" should sound incorrect in this context.
- 21 **B** EOI Choice (B) is correct because it correctly presents specific information from the table in a way that is also relevant to the main point of the paragraph, that although many people are not aware, exercise does provide more than only physical benefits. Choice (A) fails to use any specific data from the table. Choice (C) fails to utilize information relevant to the main idea of the paragraph and claims that it is surprising that many respondents to a survey claimed physical fitness was a benefit of exercise, which is false because that fact is obvious to most people. Choice (D) is incorrect because it falsely equates the majority of respondents on the table stating that increased fitness is *a benefit* of exercise with that being the *main benefit* of exercise. Further, choice (D) fails to refer to the specific data in the table.

22 C EOI Paragraph 3 describes the physical benefits of exercise and begins with the transition word “First,” which suggests that the paragraph should be placed early in the passage. Paragraph 1 provides an introduction to the passage, and paragraph 3 provides information on the psychological benefits of exercising. Paragraph 3 should be placed between paragraphs 1 and 2.

23 D EOI This question asks you to both use specific data in the graph and show how common the problem of not getting enough sleep is. Choice (D) accomplishes both goals and is correct. Choice (A) incorrectly summarizes the information in the graph by stating that almost 30% of American adults reported sleeping 6 hours or less per night, whereas the graph shows that this amount is actually 37.1% (23.0% 6 hours + 9.1% 5 hours + 5% less than 5 hours). Choice (B) includes a correct statement but does not cite any specific data in the graph. Choice (C) incorrectly rounds information from the graph and does not emphasize how common insufficient sleep is.

24 C EOI  Underline the specific details that the question is asking: “...indicate that the majority of Americans are unaware of the health risks associated with a lack of sleep.” Choice (C) is the only answer choice that suggests that many Americans are unaware of the health risks of sleep deprivation. The fact that the CDC has partnered “with other organizations in a widespread campaign to alert the public” indicates a widespread lack of awareness of the risks. None of the other choices indicate lack of public awareness.

25 D SEC This question tests comma use. One way that commas are used is to separate a non-essential element at the end of a sentence. Choice (D) is correct because it uses a comma to separate a nonessential element “such as heart disease, etc.” from the rest of the sentence.

Choice (A) is incorrect because it adds an unneeded additional comma between “as” and the list, which is the object of the verb “as.” Choice (B) is incorrect because it uses a colon in such a way that it cuts a nonessential element in half rather than at the end of an independent clause before a list, quote, or another independent clause that explains or clarifies the previous one. To correctly use a colon to separate the independent clause from the list in this sentence, one would need to delete the words “such as” and place the colon after the word “problems,” which is not an answer choice. Choice (C) is incorrect because it uses a semi-colon after an independent clause before a nonessential element. A semi-colon is used almost exclusively on the SAT in only the same places as where a period would also be correct.



Commas are generally used before the words “such as” and “including” when these words are introducing a list of items.

26 D EOI  For all “yes/yes/no/no” questions, start by answering the question yourself. Is this a good addition here? In this case the answer is no because the additional information represents an unnecessary deviation from the main point of the paragraph and the passage—that adults aren’t getting enough sleep, which has various negative consequences. Choice (D) correctly answers the question while providing an appropriate reason. The rationale given in choice (A) is incorrect as the central topic of the following paragraph is unrelated to students. Choice (B) gives a rationale that is a true statement but does not provide a sufficient reason to justify making the addition. Choice (C) is incorrect because the reason it provides is incorrect—this statement would not actually contradict evidence provided earlier in the paragraph.

- 27 **C SEC** This question tests comma use. The sentence contains a nonessential element, “many researchers have found,” which should be set off with two commas or two dashes. Commas or dashes being used in this way should be paired, and so since there is already a comma after “found,” there must be a comma added between “workforce” and “many,” as in choice (C).
-  If you can remove a phrase or clause from a sentence without changing the meaning of the sentence (i.e. the sentence still makes sense), the phrase is considered nonessential and should be set off with commas.
- 28 **C SEC** This is a misplaced modifier question. A modifier is a word or phrase that describes or modifies another word or phrase.
-  Modifiers must be placed immediately before or after the words they describe. Here, “Reviewing the results” at the start of the sentence is a modifier. That statement must be followed by the thing it is modifying. The researchers were the people who reviewed the results, so the term, “researchers,” must immediately follow the modifying statement at the start of the sentence. Only choice (C) puts the right noun in the right place in this way.
- 29 **B EOI** This is a vocabulary in context question. The reason the nap stations described in the passage have been installed is to allow a location for workers to gain additional mental and physical energy through rest. “Recharge,” as in choice (B), is the best word choice here because in this context recharge means reenergize.
- 30 **A EOI** This is a transition word question, and the transition word is beginning a new paragraph.
-  Read the full paragraph before deciding on the transition word and decide how/if it relates to the previous paragraph. The statement that follows the underlined portion refers to what would be the best way to go about integrating napping policies into a workplace culture. Choice (A) is correct because “ideally” means under the best possible (ideal) conditions. Choices (B) and (D) are incorrect because “Nevertheless” and “Consequently” are used to show a contrast and the ideas in this paragraph are not serving as a contrast to those in the previous paragraph. Choice (C) is incorrect because “Consequently” is used to show a direct causal relationship (i.e. because one thing is true, another thing is also true).
- 31 **B SEC** This is a pronoun question. The antecedent of the pronoun that should be used here is “overtired workers,” which is plural. Choice (B), “their,” is therefore correct, as “their” is the plural third person pronoun. “There” is used to refer to location (e.g. “I want to go there.”), making choice (A) incorrect. Choices (C) and (D) are incorrect because they are both singular.
- 32 **D SEC** There is no need to insert a word here—the sentence is already complete and makes sense without an addition. Choice (D) is therefore correct.
- 33 **A EOI** This is a goal question. Remember to underline the goal in the question. In this case, it is “indicating that accommodating workplace napping is a trend among employers that will continue to increase in popularity.” Only choice (A) meets this goal. Choice (B) is about students, not employers. Choice (C) focuses on employees rather than employers. Choice (D) describes reasons why workplace napping is beneficial but does not indicate that it will continue to increase in popularity.

- 34 **B** SEC This question tests verb tense. The underlined verb should be in the perfect tense, specifically the present perfect tense. Verbs in the perfect tense often focus on how a past action affects the present. For example, you can see in this sentence that a past action—the popularization of the automobile—has made the United States a nation of cars in the present. The perfect tense always takes the verb “to have” plus a past participle. Because we need the present perfect tense (as the United States continues to be a nation of cars), choice (B) is correct.
- 35 **A** SEC This question tests how to punctuate subordinate clauses. Choice (A) is correct because it separates a nonessential element at the end of the sentence using a comma. Choice (B) is incorrect because it pairs a semi-colon with “and.” Remember you can only use a comma before a coordinating conjunction to separate two independent clauses, not a semi-colon. Choice (C) is incorrect because a colon can only be used before a list, quote, or something that could be a full sentence, none of which apply here. Choice (D) is incorrect because it changes the tense in a way that doesn’t make sense in context.
- 36 **C** EOI  This is a writer’s intention or goal question. Make sure to underline the goal: “indicating that the car became symbolic of American values.” Choice (C) is correct because it indicates that the car became symbolic of the American values of independence and individuality. The other choices all contain arguably true statements, but they do not meet the specific goal called for in the question.
- 37 **B** EOI  This is a transition word question so you need to carefully read the sentence before and after the transition and determine the relationship between them. The sentence with the underlined portion is providing additional information about public transit, continuing on from the previous sentence. “Moreover” is correct because it means the same as “in addition.” All of the other answer choices—however, even so, and regardless—are used to show contrasts.
-  You might notice that the three wrong answers all have the same general meaning, so it’s unlikely that one of them could be correct. If one were correct, they would all be correct.
- 38 **A** EOI Choice (A) is correct because it most directly provides support for the claim that vehicle crashes are a significant cause of death in the US. The other choices all provide information that is either irrelevant or provides less direct support for the claim.
- 39 **C** SEC (C) is correct because we use a comma before “including” and “such as” when the phrases are followed by a non-essential phrase or clause. (A) and (B) are incorrect because you never put a colon or dash before the word including. (D) is incorrect because semi-colons are only used to separate two independent clauses, which are not present in this sentence.
- 40 **D** EOI This is a word choice question in which you must choose the best word for the context. We are looking for a word that means that the emissions are *responsible for* poor air quality, ozone depletion, etc. Of the answer choices provided, “implicated” is the closest in meaning to *responsible for*, so (D) is correct.

- 41 **B** **EOI** The main idea of this paragraph is that public transportation is good for the environment, so we are looking for an ending to this sentence that sticks with that main idea. Choice (B) is the only option that provides an additional reason why public transportation helps the environment—because it is more energy efficient than private vehicles. Choices (A) and (C) suggest that public transportation is the same or worse in terms of energy consumption, and choice (D) suggests that there is no way to know one way or the other, none of which fit in with the main idea of the paragraph.
- 42 **A** **SEC**  This is a parallel structure question. When a sentence has two or more parts, such as items in a list or two or more things in a comparison, the different parts generally need to be in the same grammatical format. Here “use” and “investment” both need to be in the same form—either both need to be gerunds (words formed from verbs that end in “ing” and are used as nouns) or neither should be gerunds. Choice (A) is the only one that doesn’t make one of the words a gerund but not the other.
- 43 **C** **EOI** The underlined sentence provides an introduction to the rest of the paragraph and serves as a topic sentence.
-  This question is a great example that when evaluating a yes or no question on the SAT, it is important to consider not just the yes or no part, but also whether the reason given is the reason that justifies saying yes or no. The reasoning in choice (A) is mistaken—this sentence does not contradict a claim made by the paragraph. Choice (B) offers a true rationale, but that rationale is not a good reason to delete the underlined sentence. Choice (D) offers a correct rationale, but we would not keep a sentence in this location only because it provides a true example of the impact of public transit. Choice (C) provides the best reasoning for why this is a helpful sentence in this spot.
- 44 **D** **SEC** This question tests the correct use of pronouns. The pronoun is replacing “millions of Americans.” (D) is correct because the underlined word is the object of the verb “allowing,” and so must be an object pronoun—“them.” Answer (C), “these,” and answer (D), “those,” are the subject forms of the pronoun and are incorrect.

Math Test – No Calculator

Multiple-Choice Questions

- 1 **D** HOA The quickest way to find $8a + 5$ is to recognize that $8a$ is twice $4a$. Since $4a = 24$, $8a = 48$. Thus, $8a + 5 = 48 + 5 = 53$.

- 2 **B** PAM This question requires an understanding of function notation. $f(2x)$ means the function f evaluated at $2x$. To find $f(2x)$, substitute $2x$ for x everywhere x occurs in $f(x) = 3x^2 - 4x$:

$$\begin{aligned} f(2x) &= 3(2x)^2 - 4(2x) \\ &= 3(4x^2) - 8x \\ &= 12x^2 - 8x \end{aligned}$$



A common error students make is forgetting to square 2 in $(2x)^2$. Recall that $(2x)^2$ is the same as $(2x)(2x)$ or $4x^2$.

- 3 **B** HOA One way to solve a proportion is by cross-multiplying. This will result in a linear equation in one variable, which can then be solved easily:

$$\begin{aligned} \frac{3}{x} &= \frac{21}{x+12} \\ 3(x+12) &= 21x \\ 3x+36 &= 21x \\ 36 &= 18x \\ x &= 2 \end{aligned}$$



Be careful because 2 is an answer choice, but the question asks for the value of $5x$. Multiply 2 by 5 to get 10.



An alternate way to approach this proportion is to look for a relationship between the numerators. Notice that 3 times 7 is 21. Therefore, x times 7 is $x + 12$. You can then set up and solve the linear equation:

$$\begin{aligned} 7x &= x + 12 \\ 6x &= 12 \\ x &= 2 \end{aligned}$$

Again, $5x = 10$.

- 4 **B HOA** You can solve this system of equations by solving the first equation for m .

$$\frac{m}{n} = 3$$

$$m = 3n$$

Then insert it into the second equation. This gives you one equation in one variable (n) to solve.

$$3n = 6(n - 4)$$

$$3n = 6n - 24$$

$$-3n = -24$$

$$n = 8$$

- 5 **B HOA** This question is asking about a change of form. You are given a proportion and asked which proportion in the answer choices is correct if the given one is true. The best way to examine a proportion is to cross-multiply to get rid of the fractions.

$$\frac{y + 2x}{x} = \frac{10}{3}$$

$$10x = 3(y + 2x)$$

$$10x = 3y + 6x$$

At this point, look at the answer choices to see where you want to head. Notice that choices (A) and (B) include the ratio $\frac{x}{y}$. Try manipulating the equation so one side is $\frac{x}{y}$. To do so, move the x terms to one side of the equation and the y terms to the other. Then divide by $4y$.

$$10x = 3y + 6x$$

$$4x = 3y$$

$$\frac{4x}{4y} = \frac{3y}{4y}$$

$$\frac{x}{y} = \frac{3}{4}$$



Another form change that can assist you in this problem is splitting up the initial fraction on

the left side: $\frac{y + 2x}{x} = \frac{y}{x} + \frac{2x}{x} = \frac{y}{x} + 2$. Since this equals $\frac{10}{3}$, you can say $\frac{y}{x} = \frac{10}{3} - 2 = \frac{4}{3}$. Now

just flip the fraction to get $\frac{x}{y} = \frac{3}{4}$.



If you are looking for opportunities to plug in numbers, this problem presents a cool one. Since the original proportion has x on the bottom of one side and 3 on the bottom of the other, see what happens when you make x equal 3. y would be forced to equal 4, leading you right to choice (B).

- 6 **A HOA** Since (p, q) is on the line $y = mx + 3$, it follows that $q = mp + 3$. Next, solve for the slope. The slope of a linear function, like $y = mx + 3$, is the coefficient of the x term, or m . Simply solve $q = mp + 3$ for m :

$$q - 3 = mp$$

$$\frac{q - 3}{p} = m$$

- 7 **A PAM** This is a radical equation because it has a square root. To avoid the possibility of extraneous solutions (answers that do not work when you plug them into the original equation), use the answer choices and back solve. Start by plugging in $x = 3$ since 3 is in two of the choices.

$$3 - 3 = \sqrt{2(3 - 3)}$$

$$0 = \sqrt{2(0)}$$

$$0 = \sqrt{0}$$

The statement $0 = \sqrt{0}$ is true, so 3 is a solution, and the answer can only be (A) or (B). Now try $x = 5$.

$$5 - 3 = \sqrt{2(5 - 3)}$$

$$2 = \sqrt{2(2)}$$

$$2 = \sqrt{4}$$

Again, you get a true statement, $2 = \sqrt{4}$, so 5 is a solution. Since 3 and 5 are solutions, the answer must be choice (A), and you do not even have to check $x = 1$.

- 8 **C ATM** Perpendicular lines have slopes that are negative reciprocals. Therefore, you must first find the slope of the given line and then take the negative reciprocal. The easiest way to find the slope of a linear function is to put it in slope-intercept form, $y = mx + b$, where m is the slope.

$$y = \frac{-6x + 9}{2}$$

$$y = -3x + \frac{9}{2}$$

The slope is -3 , so the slope of a perpendicular line would be $\frac{1}{3}$. Choice (C) is the only equation with that slope.

- 9 **B HOA** It may be easier to make sense of the equation by isolating p , the amount of money Katie profits in dollars.

$$44.50h = p + 2.20h$$

$$p = 44.50h - 2.20h$$

Since \$2.20 is the average per-student travel expense, $2.20h$ is the travel cost for h hours of tutoring. Profit is usually determined by calculating revenue minus cost. Thus, $44.50h$ is the revenue, or amount of money Katie makes for h hours of tutoring. 44.50 must be the amount of money she charges per hour.

10 C PAM



Do not be intimidated by the exponential functions in the answer choices. Start by figuring out how many players are left after each round. This is a form of plugging in numbers. After 0 rounds, there are 64 players. After 1 round, half are eliminated, so there are 32 players remaining. After 2 rounds, there are 16 players remaining, and so on. Now, use these combinations of r , the number of rounds, and $f(r)$, the number of players left after each round, to test the answer choices. Start with $r = 0$ and plug it into each choice:

$$\text{A) } f(0) = 64(2)^0 = 64 \cdot 1 = 64 \quad \text{B) } f(0) = \frac{1}{2}(64)^0 = \frac{1}{2} \cdot 1 = \frac{1}{2}$$

$$\text{C) } f(0) = 64\left(\frac{1}{2}\right)^0 = 64 \cdot 1 = 64 \quad \text{D) } f(0) = 2\left(\frac{1}{2}\right)^0 = 2 \cdot 1 = 2$$

Since only (A) and (C) give the correct number of players, eliminate (B) and (D).

Now try $r = 1$ in choices (A) and (C).

$$\text{A) } f(1) = 64(2)^1 = 64 \cdot 2 = 128 \quad \text{C) } f(1) = 64\left(\frac{1}{2}\right)^1 = 64 \cdot \frac{1}{2} = 32$$

Choice (C) gives the correct number of players after one round.

11 C ATM

To simplify a rational expression with complex numbers, multiply the numerator and denominator by the complex conjugate of the denominator. The complex conjugate of a

complex number $a + bi$ is $a - bi$. The complex conjugate of $2 - 5i$ is $2 + 5i$. Multiply $\frac{6+3i}{2-5i}$ by $\frac{2+5i}{2+5i}$. This changes the form but not the value of the expression because $\frac{2+5i}{2+5i}$ is just a

clever form of the number one. To multiply, double distribute, or FOIL. Also recall that since

$$i = \sqrt{-1}, \quad i^2 = (\sqrt{-1})^2 = -1.$$

$$\frac{6+3i}{2-5i} \cdot \frac{2+5i}{2+5i} = \frac{12+30i+6i+15i^2}{4+10i-10i-25i^2} = \frac{12+36i+15(-1)}{4-25(-1)} = \frac{12+36i-15}{4+25} = \frac{-3+36i}{29}$$

12 C HOA



The plants have equal heights when $A = B$. Set the equations equal to each other and solve for d . Since this is on the No Calculator section, you will have to do some arithmetic with decimals by hand, but the numbers work out fairly nicely.

$$14.6 + 2.35d = 6.9 + 3.45d$$

$$14.6 - 6.9 = 3.45d - 2.35d$$

$$7.7 = 1.10d$$

$$d = 7$$



Alternatively, you could use the answer choices to back solve. However, you would have to do decimal multiplication, which would be time-consuming without your calculator.

- 13 **A PAM** FOIL the left side of the equation to get it in standard form ($ax^2 + bx + c$), so it looks like the right side of the equation: $(ax + 4)(3x + b) = 3ax^2 + abx + 12x + 4b = 3ax^2 + (ab + 12)x + 4b$. Now set this equal to the right side of the original equation.

$$3ax^2 + (ab + 12)x + 4b = 18x^2 + cx + 12$$

Since the trinomials are equal, the coefficients of the corresponding terms must be equal. For example, since $3a$ and 18 are the coefficients of x^2 , they must be equal, and you can solve for $a = 6$.

Likewise, $ab + 12 = c$ and $4b = 12$. Solve for $b = 3$ and use it to find c :

$$ab + 12 = (6)(3) + 12 = 18 + 12 = 30. \text{ Thus, } c = 30.$$

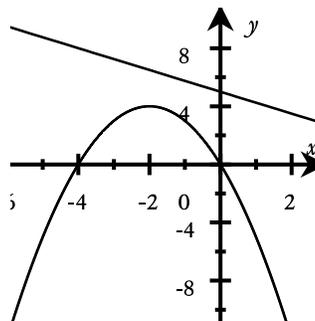
- 14 **A PAM** The equation $3x + 4y = 20$ graphs as a straight line and the equation $y = x(-x - 4)$ graphs as a parabola since it is a quadratic function (this may be clearer if you re-write it as $y = -x^2 - 4x$). A straight line and a parabola can intersect at one point, two points, or not at all (0 points). To determine how many points of intersection exist, sketch the graphs of the line and the parabola.

To graph $3x + 4y = 20$, put it in slope-intercept form: $y = -\frac{3}{4}x + 5$. The y -intercept is 5 and the slope is $-\frac{3}{4}$.

The quadratic function $y = x(-x - 4)$ is already in factored form, so the x -intercepts are 0 and -4 (to find x -intercepts, set $y=0$ and solve for x). The equation $y = x(-x - 4)$ can be re-written as $y = -x^2 - 4x$. The parabola opens down since the coefficient of x^2 is negative. The x -coordinate of the vertex is -2 because that is halfway between the x -intercepts 0 and -4 . You can find the y -coordinate of the vertex by plugging $x = -2$ in either $y = x(-x - 4)$ or $y = -x^2 - 4x$.

$$y = x(-x - 4) = -2(-(-2) - 4) = -2(2 - 4) = -2(-2) = 4$$

Thus, the vertex is $(-2, 4)$. Sketch the graphs of the line and parabola, and notice they do not intersect, so there are 0 solutions.



- 15 C PAM Use exponent rules to simplify $\frac{9^a}{3^b}$. First, get the same base in the numerator and denominator by re-writing 9 as 3^2 . By the power rule, $\frac{(3^2)^a}{3^b} = \frac{3^{2a}}{3^b}$. Then, by the quotient rule, $\frac{3^{2a}}{3^b} = 3^{2a-b}$. Remember, you are given the equation $4a - 2b = 10$.



Notice that half of $4a - 2b$ is $2a - b$, so $2a - b = \frac{1}{2}(10) = 5$. Therefore, $3^{2a-b} = 3^5 = 243$.

Student-Produced Response Questions

- 16 PAM 2

Solve for k by isolating the variable and taking the fourth root.

$$k^4 + 5 = 21$$

$$k^4 = 16$$

$$k = 16^{1/4}$$

$$k = 2 \text{ or } -2$$

Since $k > 0$, $k = 2$.

- 17 HOA 0

Sometimes when a question asks for an expression, such as $j + k$, there is a shortcut so you do not have to solve for j and k individually. Unfortunately, there is not an obvious shortcut in this problem. You must solve the system of equations for each variable and add the answers. A quick way to solve the system is by using elimination.

$$\begin{array}{rcl} 5(3j - k = -4) & \rightarrow & 15j - 5k = -20 \\ 2j + 5k = 3 & \rightarrow + & \underline{(2j + 5k = 3)} \\ & & 17j = -17 \\ & & j = -1 \end{array}$$

Once you have $j = -1$, plug that into either original equation to solve for k :

$$3j - k = -4$$

$$3(-1) - k = -4$$

$$-3 - k = -4$$

$$-k = -1$$

$$k = 1$$

So $j + k = -1 + 1 = 0$.

18 ATM 0.8 or $\frac{4}{5}$

Recall from SOH-CAH-TOA that cosine is the ratio $\frac{\text{adjacent}}{\text{hypotenuse}}$. Since cosine of b° is 0.8 (or equivalently $\frac{0.8}{1}$), you can label the leg adjacent to the b° angle as 0.8 and the hypotenuse as

1. Sine is the ratio $\frac{\text{opposite}}{\text{hypotenuse}}$, so using your labeled figure, sine of the a° angle is $\frac{0.8}{1}$ or 0.8.



Sine of a° equals cosine of b° because a and b are complementary (their sum is 90°) and sine and cosine are co-functions, that is $\sin a = \cos(90 - a)$.

19 HOA 28

This is a rate of change question. As the depth increases from 2,530 meters to 3,030 meters, the dissolved oxygen decreases from 205 ppm to 65ppm. The depth, therefore, increases by 500 meters, and the dissolved oxygen decreases by 140ppm. You can think of this as a rate of change.

$$\frac{\text{change in dissolved oxygen}}{\text{change in depth}} = \frac{140 \text{ ppm}}{500 \text{ meters}} = \frac{140 \text{ ppm}}{5 \text{ hundred meters}}$$

Since you are asked for the change per hundred meters, the answer is the quotient $140 \div 5$ or 28.

20 PAM 144

Substitute $b = 3\sqrt{5}$ into $4b = \sqrt{5x}$ and solve for x :

$$\begin{aligned} 4b &= \sqrt{5x} \\ 4(3\sqrt{5}) &= \sqrt{5x} \\ 12\sqrt{5} &= \sqrt{5x} \\ 12\sqrt{5} &= \sqrt{5} \cdot \sqrt{x} \\ 12 &= \sqrt{x} \\ x &= 144 \end{aligned}$$

Math Test – Calculator

Multiple-Choice Questions

- 1 A HOA The cost of installing carpeting is the cost of labor plus the cost of the carpeting. If Luis spends \$710 and the labor for the installation costs \$160, then the cost of the carpeting is \$550 ($710 - 160$). Since each square yard of carpeting costs \$50, the area of Luis' living room is 11 square yards ($550 \div 50$).

- 2 C PSD You can solve this problem by writing a proportion using the ratio of cups of coffee to ounces of coffee beans. Notice that you must convert the 1 lb to ounces, but the conversion is given (1 lb = 16 oz).

$$\frac{40 \text{ cups}}{16 \text{ oz}} = \frac{x \text{ cups}}{20 \text{ oz}}$$

Now solve by cross-multiplying.

$$\begin{aligned} \frac{40}{16} &= \frac{x}{20} \\ 16x &= 800 \\ x &= 50 \end{aligned}$$



Alternatively, you could find use conversion ratios:

$$20 \cancel{\text{ oz}} \times \frac{1 \text{ lb}}{16 \cancel{\text{ oz}}} \times \frac{40 \text{ cups}}{1 \text{ lb}} = 50 \text{ cups}$$

- 3 C HOA The amount of money the museum makes is the sum of the amount it makes from child tickets, adult tickets, and senior tickets. The museum makes $10c$ from child tickets (cost of child ticket \times number of child tickets), $15a$ from adult tickets, and $12s$ from senior tickets. The sum is $10c + 15a + 12s$. Take your time selecting the correct answer choice since many look similar. Only choice (C) is the same sum.

- 4 A HOA Use the given equation, $v = 27 + 6t$, and solve for t when $v = 66$.

$$\begin{aligned} 66 &= 27 + 6t \\ 39 &= 6t \\ 6.5 &= t \end{aligned}$$

When the car's velocity is 66 miles per hour, it has been accelerating for 6.5 seconds.

- 5 **A HOA** To isolate the variable z , multiply both sides by the reciprocal of $\frac{28}{9}$, which is $\frac{9}{28}$.

$$\frac{9}{28} \cdot \frac{28}{9} z = \frac{9}{28} \cdot \frac{35}{3}$$

$$z = \frac{15}{4}$$



You can also back solve by plugging in each answer choice for z to see which one makes the equation true.

- 6 **D PSD** In this unit conversion problem, you must convert 3 dekaliters into milliliters:

$$3 \cancel{\text{ dekaliters}} \times \frac{10 \cancel{\text{ liters}}}{1 \cancel{\text{ dekaliter}}} \times \frac{1000 \cancel{\text{ milliliters}}}{1 \cancel{\text{ liter}}} = 30,000 \text{ milliliters}$$

- 7 **D PSD** Sonny sold 14 computers in May and 14 computers in June for a total of 28 computers in the two months. The entire staff sold 109 computers in the three-month period (see the cell at the bottom of the “Total” column). Therefore, Sonny’s May and June computer sales make up $\frac{28}{109}$ of all computers sold.

- 8 **C PAM** If two variables are directly proportional, when one increases, the other also increases. This is typically represented by the equation $y = kx$, where k is a constant. In this problem, you are told that an object’s momentum is directly proportional to its velocity, v , so the relationship can be expressed as $y = mv$, where m is a constant mass. You can find m by using the information about the bowling ball: $v = 2$ and $y = 12$, where y represents momentum. $12 = m(2)$, so $m = 6$. Since m is constant, the ball’s momentum can be expressed as $y = 6v$. The question asks for the ball’s momentum if it has a velocity of 10 meters per second. The momentum is $6 \cdot 10 = 60 \text{ kg} \cdot \text{m/s}$.

- 9 **B PSD** You must first determine the velocity of the bowling ball when it hits the pins. The velocity is initially 4 meters per second but decreases by 27%. To find the new velocity, multiply the original by $(1 - \text{percent change})$.

$$\text{new velocity} = 4(1 - 0.27) = 4(0.73) = 2.92$$

Now, you must use the momentum equation from question 8, $y = 6v$. Plug in the new velocity: $6(2.92) = 17.52 \text{ kg} \cdot \text{m/s}$.

- 10 **A PAM** Since the function $f(x)$ has zeros at $x = 5$, $x = 2$, and $x = -3$, it has the factors $(x - 5)$, $(x - 2)$, and $(x + 3)$. You can write the function as $f(x) = (x - 5)(x - 2)(x + 3)$. Now look at the answer choices. Choice (B) is incorrect because it has the factor $(x + 2)$. The other three choices have $(x - 2)$, so to decide between them, you must multiply $(x - 5)(x + 3)$ to see which trinomial it matches. Using FOIL, $(x - 5)(x + 3) = x^2 - 2x - 15$, so $f(x) = (x^2 - 2x - 15)(x - 2)$, which is choice (A).



Always be aware that when you are on the Calculator section of the SAT, using the graphing element of your calculator can often be a way to check, or even do, a problem. Here you could set y equal to each of the choices and look to see which graph hits 5, 2, and -3 on the x -axis.

- 11 **B PSD** Kate is correct because one cannot make conclusions about an exact percentage of a population based on a sample of it. One can only use a sample to estimate a percentage of a population. Elizabeth is also correct: Eddy's conclusions are unreliable because of a bias in his chosen sample. Eddy wanted to make a generalization about the entire student body, but he only surveyed students who were waiting in line to buy lunch in his school's cafeteria. These students would more likely prefer the school lunch to the local fast food restaurant since they had already chosen, for whatever reason, to eat the school lunch rather than fast food. Thus the sample is biased. Ian is incorrect in saying that no whole number is exactly 90 percent of 330. 90% of 330 is $(0.9)(330) = 297$. The answer is choice (B) because only Kate and Elizabeth are correct.

- 12 **C PSD** In most data sets, if an outlier is removed the range will be most affected. The initial range is 65 ($100 - 35$), but after 35 is removed, the range becomes 29 ($100 - 71$). The mode (most common score) and the median (middle score) do not change in this case when 35 is removed. The mode remains 87, and the median stays at 88. The mean, or average, does change from 85.7 to 87.9, but this is a much smaller change than the change in the range.



Knowing that the range is much more drastically affected than the other statistics in this problem should allow you to answer it quickly without having to even bother with the calculations above.

- 13 **C PAM** In the exponential growth function given, 80,000 represents the principal, or initial, price. If the value of the boat decreases by 25%, it will be worth $80,000(1 - 0.25) = 60,000$ dollars. In an exponential growth model, $A = P(1 \pm r)^t$, A is the price after t years. To determine the number of years it would take for the value of the boat to become 60,000 dollars while depreciating at 12% per year, use the equation $60,000 = 80,000(1 - .12)^t$ or

$$60,000 = 80,000 \left(1 - \frac{12}{100} \right)^t.$$

- 14 **A PSD** Start by sketching a best-fit curve for the data on the scatterplot. It should be a curved line that decreases from left to right.



If you are unfamiliar with what types of equations produce such a line, a great strategy is to plug in a value for m and graph each equation in the answer choices on your calculator.

Since $0 < m < 1$, try $m = \frac{1}{2}$. The equations become:

$$\begin{array}{ll} \text{A) } y = m^x = \left(\frac{1}{2}\right)^x & \text{B) } y = x^m = x^{1/2} \\ \text{C) } y = -mx = -\frac{1}{2}x & \text{D) } y = \frac{x}{m} = \frac{x}{1/2} = 2x \end{array}$$

Graph each equation in your calculator to see which most closely matches your line of best fit on the scatterplot. It should be choice (A).

- 15 **D ATM** First, you must find how much jam is in one batch by finding the volume of the vat. The volume of the vat is the volume of the cone plus the volume of the cylinder. Note that the radii of the cone and cylinder are the same, but the heights differ. Also, be careful about the units. The measures of the vat are in feet, but the volume of the jar is in inches. It is easiest to convert everything to inches at the beginning. Since $12 \text{ in} = 1 \text{ ft}$, $6 \text{ ft} = 72 \text{ in}$, $4 \text{ ft} = 48 \text{ in}$, and $8 \text{ ft} = 96 \text{ in}$.

$$\text{Volume of cylinder} = \pi r^2 h = \pi(72)^2(48) = 781,728.8$$

$$\text{Volume of cone} = \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi(72)^2(96) = 521,512.5$$

$$\text{Total volume of vat} = 781,728.8 + 521,512.5 = 1,302,881.3$$

To find the number of jars Vladimir can fill from one vat of jam, divide the volume of the vat by the volume of one jar: $1,302,881.3 \div 18 = 72,382.3$. He can fill approximately 72,000 jars.

- 16 **D PSD** The average (mean) is higher than the median due to a few extreme values. Several students must have scored much higher than the rest, and those scores are inflating the average. In any data set, the average is more affected by outliers than the median since the median is the middle value and relies less on the value of extremes.

- 17 **D HOA** Let's use x to represent the length of the first piece of the pipe. Since the second piece is 50 percent longer, it is $1.5x$. The third piece is twice as long as the second piece or $2(1.5x) = 3x$. The sum of the three pieces is 66 inches, so you can write and solve the following equation.

$$x + 1.5x + 3x = 66$$

$$5.5x = 66$$

$$x = 12$$



Be careful because choice (A) is 12, but the question asks for the length of the longest piece. The correct answer is $3x = 3(12) = 36$ inches.

- 18 **B** PSD  This is a good time to plug in numbers since all of the answer choices include the variable x , which represents the amount of candy Sheila has now. However, rather than picking a value for x , it is easier to pick a value for the original amount of candy. A good number to pick is 100 because it is easy to find percentages of 100.

If Sheila started with 100 candies and gave away 70 percent, she gave away 70 candies. At that point, she had 30 remaining. Then, her friend gave Sheila 20 percent of the remaining amount, so 20% of 30 or 6 candies. Sheila now has 36 candies. Since x represents the amount of candy Sheila has now, $x = 36$. Plug $x = 36$ in each of the answer choices to see which gives you the correct original amount of candy, 100. Choice (B) is correct because

$$\frac{36}{(0.3)(1.2)} = \frac{36}{0.36} = 100.$$

- 19 **B** HOA You can write and solve a system of equations to find the value of B . If Mrs. Brennan buys x computers today, the total cost will be $1000x$. Her budget is less than the cost, and she will have to raise an extra \$2,000. Therefore, $1000x = B + 2000$ or $B = 1000x - 2000$. If she waits two months, the total cost will be $900x$ and she will have \$400 left over. This can be represented by $B = 900x + 400$. To find B , first find x by setting the equations equal and solving.

$$1000x - 2000 = 900x + 400$$

$$100x - 2000 = 400$$

$$100x = 2400$$

$$x = 24$$

You can substitute 24 in either of the original equations to find B :

$$B = 1000(24) - 2000 = 24,000 - 2000 = 22,000.$$

- 20 **C** PSD The first step is to find the percent of international tourists in 2012 who visited the United States. In 2012, 66,657,000 tourists visited the United States out of 457,179,000 total tourists.

To find the measure of the central angle in a pie chart, multiply this ratio

$$\left(\frac{66,657,000}{457,179,000} = 0.1458 \right) \text{ by the number of degrees in a circle, } 360. \text{ The product is } 52.488,$$

which rounds to 52.

- 21 **B** PSD Percent increase can be calculated as $\frac{\text{new} - \text{original}}{\text{original}} \cdot 100$. Since 22,354,000 tourists visited Thailand in 2012, and 26,547,000 visited in 2013, the percent increase is
- $$\frac{26,547,000 - 22,354,000}{22,354,000} \cdot 100 = 0.1876 \cdot 100 = 18.76\%. \text{ This rounds to } 19\%.$$

- 22 **C** PSD For this question, you must calculate the average yearly increase for Germany and compare that to the average yearly increase of each of the answer choices: the United Kingdom, China, France, and Spain. Average yearly increase is a rate of change and can be calculated for Germany as

$$\frac{\text{tourists in 2013} - \text{tourists in 2011}}{2013 - 2011} = \frac{31,545,000 - 28,374,000}{2} = \frac{3,171,000}{2} = 1,585,500.$$

Now, perform the same calculations for the four answer choices. The average yearly increase for the United Kingdom is 931,500. The number of tourists visiting China actually decreases by 947,500 per year. The average yearly increase is 1,588,000 for France and 2,242,000 for Spain. France has the closest average yearly increase to Germany.

- 23 **B** PSD Standard deviation is a measure of spread. A low standard deviation indicates that the data points tend to be close to the mean while a high standard deviation indicates that the data points are more spread out. A quick look at the table should tell you that the mean is around 80. Therefore, adding three numbers that are clustered closely around 80 will change the standard deviation the least. Choice (B) is correct because 70, 80, and 85 are fairly close to the mean compared to the values in the other answer choices.

- 24 **B** PAM This is an example of a literal equation where you are given an equation with only variables and are asked to solve for one of the variables in terms of the others. Start with the given equation and solve for r^2 .

$$F = \frac{Gm_1m_2}{r^2}$$

$$Fr^2 = Gm_1m_2$$

$$r^2 = \frac{Gm_1m_2}{F}$$

- 25 **B PAM** The trickiest part of this question is understanding what g represents in relation to the given equation, $F = \frac{Gm_1m_2}{r^2}$. It says g is the gravitational attraction between the planet and the star. This is another way of saying the force of gravity between two objects (the planet and the star), so g represents F . You must find g at the aphelion and at the perihelion. At both locations in the orbit, G , m_1 , and m_2 are the same. The only difference is r , the distance between the planet and the star. At the aphelion, the planet is three times farther from the star than it is at the perihelion. Let 1 represent the distance at the perihelion and 3 represent the distance at the aphelion.

$$\text{Aphelion: } g = \frac{Gm_1m_2}{(3)^2} = \frac{Gm_1m_2}{9} = \frac{1}{9}Gm_1m_2$$

$$\text{Perihelion: } g = \frac{Gm_1m_2}{(1)^2} = \frac{Gm_1m_2}{1} = Gm_1m_2$$

The ratio of g at the aphelion to g at the perihelion is $\frac{1}{9}$.

- 26 **C ATM** Since $\triangle ABC$ is equilateral, $\overline{AB} \cong \overline{BC} \cong \overline{CA}$. If chords in a circle are congruent, then the arcs they intercept are also congruent, so $\widehat{AB} \cong \widehat{BC} \cong \widehat{CA}$. Each arc is one third of the circumference of the circle. It is given that the length of \widehat{ABC} (the major arc from A to C including point B) is 18π .

\widehat{ABC} is two-thirds of the circumference since it is the sum of \widehat{AB} and \widehat{BC} . Therefore, $18\pi = \frac{2}{3}(2\pi r)$. Solve for r : $r = \frac{18\pi}{\frac{4}{3}\pi} = 13.5$.

27 **B** HOA  The surest way to get the correct answer is to pick several values of h and see if they satisfy each inequality. The height of a child, h , must be between 34 and 56 inches, inclusive. Use the minimum 34, maximum 56, and one value in between, like 40.

I. $34 \geq h \geq 56$ This says h is less than or equal to 34 and greater than or equal to 56. If $h = 34$, this inequality is false because 34 is not greater than or equal to 56. Cross it out.

II. $|h - 45| \leq 11$ This says that the absolute value of the difference between h and 45 is less than or equal to 11. In other words, h is less than or equal to 11 units away from 45. If $h = 34$, this inequality is true because $|34 - 45| = |-11| = 11$. It is also true for $h = 40$ since $|40 - 45| = |-5| = 5 \leq 11$. Finally, it holds for $h = 56$ since $|56 - 45| = |11| = 11$. It is a correct expression.

III. $56 - h > 22$ This says the difference between 56 and h is greater than 22. If $h = 34$, it is false because $56 - 34 = 22 \not> 22$. Cross it out.

The answer is (B) since only II is an expression that represents the correct range of heights.

28 **C** PSD This is an exponential relationship because the population of the ant colony is expected to increase by 34 percent each month. In an exponential growth relationship, the dependent variable increases by a percent of its current value. The rate of change is not constant, unlike in a linear relationship.

29 **B** PAM This question tests whether you know the polynomial remainder theorem, which says that when a polynomial $f(x)$ is divided by $x - a$, the remainder is $f(a)$. In this case, since $f(4) = 5$, the remainder when $f(x)$ is divided by $(x - 4)$ is 5.

30 **C** PSD There are a total of 48 students who studied at most six hours (14 students studied less than 3 hours plus 34 students studied 3 to 6 hours). Of those 48, 25 were from Class 1 (6 who studied less than 3 hours plus 19 who studied 3 to 6 hours).

If a student is chosen from those that studied at most six hours, the probability the student is from Class 1 is $\frac{25}{48}$.

Student-Produced Response Questions

31 HOA 15

Since the tree grows at a constant rate, the tree's height can be represented by a linear equation. The average rate of change, also known as the slope, is 1.2 meters per year, and the initial height is 1 meter. The y -intercept is 1 because when time equals 0, the tree is 1 meter tall. The relationship can be expressed as $h = 1.2t + 1$, where h is the height and t is the number of years that have passed. To find how many years it will take for the tree to reach a height of 19 meters, set $h = 19$ and solve for t .

$$19 = 1.2t + 1$$

$$18 = 1.2t$$

$$t = \frac{18}{1.2} = 15$$

32 HOA 24

A full tank can hold 14 gallons of gas, and the tank already contains 2 gallons. Therefore, it needs 12 more gallons to reach maximum capacity. The fuel pump can pump at 0.5 gallons per second, which is equivalent to 1 gallon every 2 seconds. To pump 12 gallons, it will take $12 \cdot 2 = 24$ seconds.

33 PAM 9

If the point $(2, 5)$ is on the graph of the function $g(x) = 2x^2 - 6x + c$, then $g(2) = 5$. Plug in 2 for x and solve for c .

$$5 = 2(2)^2 - 6(2) + c$$

$$5 = 2(4) - 12 + c$$

$$5 = 8 - 12 + c$$

$$5 = -4 + c$$

$$c = 9$$



A common mistake that students make is forgetting PEMDAS. For $2(2)^2$, first raise 2 to the second power and then multiply the result by the first 2. Exponents come before multiplication!

34 HOA 1020

The most efficient way to solve this problem is by setting up a system of equations. Let A equal the amount of money Andy contributes each month and J equal the amount Jen contributes each month:

$$A + J = 420$$

$$J = A + 80$$

You can solve this system of equations either by elimination or substitution, but it is set up nicely for substitution since the variable J is already isolated in the second equation.

$$A + J = 420$$

$$A + A + 80 = 420$$

$$2A = 340$$

$$A = 170$$



You may be tempted to stop here, but A represents the amount Andy contributes each month and the question asks how much will he have contributed after six months. Multiply 170 by 6 to get 1020. Remember, there is no safety net of choices in the Student-Produced Response section, so always read very carefully to make sure you've answered the "ask."

35 ATM 3

To find the radius of the circle, convert the equation of the circle to standard form, $(x - h)^2 + (y - k)^2 = r^2$, where (h, k) represents the center and r represents the radius. To do so, you must "complete the square" for both x and y . First, rearrange the equation so the terms with x are together and the terms with y are together. To complete the square for $x^2 - 6x$, take half the second term ($-6 \div 2 = -3$), square it ($(-3)^2 = 9$), and add it to the expression ($x^2 - 6x + 9$). Remember to add 9 to the other side of the equation as well to keep it balanced. Repeat this procedure with $y^2 - 8y$. You can then write each trinomial in factored form as a perfect square.

$$x^2 - 6x + \quad y^2 - 8y \quad = -16$$

$$x^2 - 6x + 9 + y^2 - 8y + 16 = -16 + 9 + 16$$

$$(x - 3)^2 + (y - 4)^2 = 9$$

In this form, it is clear that $r^2 = 9$, so $r = 3$.

36 PSD .333 or $\frac{1}{3}$

Seven lawnmowers were sold in 2001, and 21 lawnmowers were sold in 2004. As a fraction, this is $\frac{7}{21}$ or $\frac{1}{3}$. If you choose to write the answer as a decimal, $0.\bar{3}$ should be rounded to .333.

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PAM 3

The function $h(x)$ is undefined when the denominator equals zero. To find a value of x where the function is undefined, set the denominator equal to zero and solve for x .

$$\begin{aligned}(x+3)^2 + (x+3) - 42 &= 0 \\ x^2 + 6x + 9 + x + 3 - 42 &= 0 \\ x^2 + 7x - 30 &= 0 \\ (x+10)(x-3) &= 0 \\ x = -10 \text{ or } x = 3\end{aligned}$$

Since the question specifies $x > 0$, 3 is the only correct answer.



The SAT loves cute problems that can be solved with shortcuts. Rather than expanding $(x+3)^2 + (x+3) - 42$ and then factoring, you can factor it from its original form. Notice that it is written as a quadratic trinomial in the form $ax^2 + bx + c$ where x is replaced with $(x+3)$. This can be factored as $((x+3)-6)((x+3)+7)$.

$$\begin{aligned}((x+3)-6)((x+3)+7) &= 0 \\ (x+3)-6 = 0 \text{ or } (x+3)+7 &= 0 \\ x-3 = 0 & \quad x+10 = 0 \\ x = 3 & \quad x = -10\end{aligned}$$

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PAM 49

This is an example of exponential growth where the amount of money deposited into a bank account increases annually by a percentage of its current value. The formula $A(t) = P(1+r)^t$ represents exponential growth where A is the final amount, P is the principal (initial) amount, r is the rate as a decimal, and t is the number of times the rate is compounded. The amount Anthony has after 10 years can be expressed as $1200(1+0.015)^{10} = 1200(1.015)^{10} = 1392.65$. Shaun's balance is $1000(1+0.03)^{10} = 1000(1.03)^{10} = 1343.92$. Anthony has 48.73 dollars more than Shaun. Be sure to follow the directions and round your answer to the nearest dollar to get 49 even.