Bluebook 6

Question explanations to accompany SAT practice test #6

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Problem 1

Official Answer: D

This frustratingly long sentence contains an introductory subordinate clause, a long parenthetical between the two dashes, and a participial phrase after the final comma. Ignore them. They're (mostly) irrelevant distractions. The spine of the sentence is this: "She is _____ direct experience." What would direct experience do for an artist? Compliment her? Confuse her? Bother her? Or inspire her? In a different context, "confuse" or "bother" might work, but the final phrase discusses the source of her ideas, the things that she "draws from" or is "inspired by". So "inspired by" is the most sensible choice.

Problem 2

Official Answer: D

We need something that means the opposite of "a range of styles". We need an adjective that means "all the same".

You probably know the meaning of the first three choices, or you can get the basic idea from the root words. If you don't know the meaning of "homogeneous", but you see that none of the first three choices mean "the same", go ahead and guess D. You might also recognize that the prefix "homo-" means the same. "Homogeneous" means "uniform" or "all the same" and is the most appropriate antonym for "ranging broadly in style".

Problem 3

Official Answer: D

What would you expect in the blank? "The measurements were surprising not only for being different, but also for the _____ of that difference." The *size* of the difference? Do any of the answer choices sound like "size"?

Answer B is almost comical. "The measurements were surprising not only for being different, but for the existence of that difference"? The other three choices could all make sense in different contexts, but we are expecting size to be the main issue, and the information after the colon reinforces the idea of size. The elaboration after the colon does not mention a cause or consequence, ruling out A and C, but it does mention the size of the measurements, confirming that D is the best answer.

Problem 4

Official Answer: B

We need to describe what dense vegetation does to high-frequency sounds. We are talking about communication, and the theory is that birds in dense vegetation sing at low frequencies, so we can reasonably assume that dense vegetation tends to muffle high-frequency sounds.

"Diminish" is a very bland word, but bland words don't bother the editors at the SAT. Furthermore, we actually need to do something to a distance, not a sound. Vegetation presumably *muffles sounds*, and *diminishes the distance* that sound can travel. And it's hard to see any context in which the other three choices would make any sense at all. Vegetation wouldn't exceed a distance, encompass a distance, or conceal a distance.

Problem 5

Official Answer: C

What is this passage about? It tells us about Francie's project to read all the books in the library, and how she is still in the B's. Do any of the answer choices sound like this? Answer C sounds ok, although it doesn't mention the specifics of the goal.

We can rule out the other choices because they are all inaccurate. Francie is not focused on one topic but many topics, making A incorrect. There is no mention of any activity other than reading, so B is clearly wrong. And the passage did list the topics of several books that Francie read, but it never described any special book, so D is also wrong.

(Incidentally, notice the rare use of an apostrophe to form a plural. Standard English allows us to use apostrophes to form plurals when referring to letters or digits, because it might get confusing if we didn't. But in "normal usage" and in the SAT punctuation questions, you should never, ever use apostrophes to form normal plural nouns. That's a sign of a lack of education.)

Problem 6

Official Answer: C

Notice that the underlined portion forms an introductory clause, joined to the rest of the sentence with the subordinating conjunction "while". "While fancy baths were only available in towns, country people still bathed regularly." The introductory clause provides a contrast to the main clause.

Is the introductory clause asserting anything about popularity? No, so answer A can't be right. Is it providing a description of historical studies? An explanation of Janega's motives? Or is it conceding a counterpoint before going on to make a general claim about cleanliness? Of the options given to us, only answer C is reasonable.

Problem 7

Official Answer: B

This is a "main purpose" question. Ignore specific facts and figures, scan the paragraph to get a sense of the "big picture", and try to summarize it in your own words. Then check the four answer choices to see which most closely matches your own expectations.

Perhaps a crude summary of this paragraph could go something like this: This person works really hard to be a great pianist, even though it looks really easy. Having summarized it like this, you can probably focus on B as the correct answer. The paragraph says nothing about her music selection process, her music preferences, or her approach to new music, ruling out A, C, and D, and confirming that B is the most reasonable answer.

Problem 8

Official Answer: B

The author of Text 1 is excited by new discoveries that he thinks indicate humans lived in caves in North America 33,000 years ago. The author of Text 2 is more skeptical of the discoveries, and seems more likely to attribute them to natural phenomena than to human activity. If we were to imagine Author 2 stating his opinion about Author 1's conclusion, what would this opinion look like?

Answer A is unreasonable, because the issue at hand is the timeline, not the connection between two groups of people. Answer B is pretty vague and general, but "correct answers" on the SAT often are, and answer B can be interpreted to contain the necessary criticism. The "assumption" can refer to the idea that the stone pieces were actually tools, and the observations about "other signs of human activity" and about human DNA can count as a lack of evidence. So answer B is reasonable. We can rule out C because Author 2 is clearly anti-Author 1, not pro-Author 1. And answer D makes no sense. It brings in new evidence from left field, and this evidence if it existed would indicate the opposite of what Author 2 seems to believe about when the Clovis people arrived. Answer B is the only reasonable expression of Author 2's likely opinion.

Problem 9

Official Answer: A

What's the main topic of discussion here? In a crude nutshell, we might say "Some eggheads want separate names for two different aspects of a story's plot, but another egghead doesn't like these two names."

After scanning through the answer choices, you can probably rule out C and D. Answer C focuses on *The Godfather*, which was only mentioned in the paragraph as an illustrative example, and it fails to mention the alternative viewpoint of Mikhail Bakhtin. Answer D has nothing to do with the fancy new vocabulary words or anybody's opinion of them. Both A and B mention Mikhail Bakhtin, but answer B puts words in his mouth. It invents a new viewpoint that was not present in the paragraph. So answer A is the most reasonable summary of the paragraph. It mentions the two words of other theorists and Mikhail Bakhtin's viewpoint on them.

Problem 10

Official Answer: B

If we check the answer choices against the data table for factual accuracy, we find that answer C is incorrect. (The mammoth became extinct *after* the cat, not before.) But the other three choices are all accurate, so we'll have to dig deeper.

What's the statement we need to complete? It has to do with extinct species. We need to pick the species that has the biggest problem. Reading the middle sentence, we find that the problem is how long the species has been extinct. The longer it has been extinct, the more trouble we'll have if we try to resurrect it. So to complete the statement, we'll probably need to pick the species that has been extinct the longest. Checking the table, we find that the saber-toothed cat has been extinct the longest, with the wooly mammoth coming in second. Answer B offers us the saber-toothed cat, so we'll pick that one. Answers A and D refer only to species that became extinct in the 20^{th} century, and those are presumably much less problematic than species that became extinct thousands of years ago.

Problem 11

Official Answer: C

What's the "claim" that we need to illustrate? That the narrator has mixed feelings. So the correct answer will need to include both positive and negative feelings. Answers A and D only express negative feelings, and answer B doesn't express any feelings at all. Answer C tells us that she is "fond of the room" but doesn't like the "horrid wallpaper", so this contains both positive and negative sentiments, and is therefore the most appropriate answer.

Problem 12

Official Answer: B

We are talking about two plant species in Antarctica, and they only give us the formal Latin names. Let's just call them Cq and Da for short. The final sentence sets up a contrast between the two: "While both species benefitted, Cq was different somehow." Glancing at the table to see how much they benefitted, we see that they both expanded their territories, but Cq expanded significantly more (at least percentage-wise, though the actual area was much less). So the correct answer should probably point this out, and that's exactly what answer B does.

Answer A is not only factually inaccurate, it brings in the issue of interactions between the plants, about which we have no data. Answer C refers to the size of the plants rather than the area covered, answer D refers to changes in the landscape, and we have no information about either of these things.

Problem 13

Official Answer: B

What's the idea we need to support? "NFM may reduce voting probability through an indirect effect." To figure out what in the world this means, we'll have to dive into the paragraph. "NFM" is an invented term indicating people's tendency to wait for news to pop up in their social media feeds, rather than expending any effort to find it. It means passivity in regard to how you get your news. The middle third of the paragraph simply says "these researchers did some work on NFM and voting behavior, but their work didn't amount to much." There is no mention in the paragraph of any concrete links between NFM and voting behavior, direct or indirect, which is frustrating. We'll have to search the answer choices for a plausible *guess* at how this alleged hypothetical effect could maybe, possibly happen. We'll have to search for some kind of correlation between NFM and voting behavior.

Answer A correlates NFM with time, and voting behavior with major vs minor elections, which is not what we want. Answer B correlates NFM with political awareness, and political awareness with voting behavior, which means there must therefore also be a correlation between NFM and voting behavior. So answer B makes sense ... or at least more sense than anything else here. Answer C says that NFM does NOT correlate with anything, which doesn't help support the idea of a link. Answer D is just a mess. It correlates voting behavior with political knowledge, and correlates the *relationship* between NFM and political knowledge with the size of one's social circle, which doesn't exclude the possibility of a *very* indirect relationship between NFM and voting behavior, but bringing in the new issue of the size of one's social circle is too much. It makes any possible relationship between NFM and voting behavior dependent on the size of one's social circle. Answer B presents a clearer connection between the two things, and it is also the officially sanctioned answer.

Problem 14

Official Answer: A

People in Scotland and people in the Upland South pronounce their r's the same way, and the Upland South was settled by people of Scottish descent. What's the natural conclusion? That the second thing explains the first? People in the Upland South pronounce their r's the way they do because they came from Scotland? This is more or less what answer A states. Answer B makes an unsupported prediction about the future, answer C has the influence going in the wrong direction, and answer D says that the Scottish settlers *abandoned* their way of speaking, which wouldn't explain why it still exists.

Problem 15

Official Answer: B

What would you expect in the blank? The paragraph discusses the role of the appendix, and ends with the discovery that it is associated with extra immune tissue. Therefore...it somehow helps the immune system? That's just what answer B states. Answer C might also look tempting, but it makes a prediction about the future which cannot be supported, rather than a statement of fact. Answers A and D both compare the

past to the present and say nothing about the immune system.

Problem 16

Official Answer: B

What's the spine of this sentence? "The strings are plucked." A subject and its verb belong together and should never be separated by a mark of punctuation. Answer choices A, C, and D all place a punctuation mark between "strings" and "are plucked". The words "inside the instrument" form a prepositional phrase modifying "strings". They are simply a modifier telling us something about the strings, and they don't make punctuation necessary. The correct answer is the one with no punctuation.

Problem 17

Official Answer: D

Something is creating emphasis. What? The "writing technique". Let's ignore everything else and pair this subject with the four verb choices in simple sentences.

The technique create ...
The technique are creating ...
The technique have created ...
The technique creates ...

The first three verbs are only appropriate with plural subjects. Only answer D agrees with a singular subject.

Problem 18

Official Answer: B

This sentence is a statement about a question, not a question itself, so it needs to end in a period rather than a question mark. But that still leaves both B and D as possibilities. You'll probably realize that answer B just sounds better than answer D. But why?

The difference between the two choices is the subject-verb order. Putting the verb before the subject is the usual way of indicating a question grammatically. (You can also raise your pitch at the end of a sentence in spoken English, or use a question mark in written English, but we're talking about word order here.) Technically, reversing the order signifies an "interrogative clause". Normal word order indicates a "declarative clause". And you always need to use a declarative clause after a "how".

Problem 19

Official Answer: B

All four choices are grammatically consistent with the subject "lamp". The issue here is not subject-verb agreement, but tense. The rest of the paragraph is written in the present tense, so we need to pick the only available present-tense verb, which is "illuminates".

Problem 20

Official Answer: D

The word "phrase's" needs to be a possessive. It tells us "the simplicity of what", and it needs an apostrophe. This rules out B. We are talking about *the* phrase, meaning one singular phrase, and singular possessives always end in apostrophe-s instead of s-apostrophe. This rules out A. To distinguish between C and D, we need to decide whether the pronoun at the end of the choices is referring to a singular thing (its) or several things (their). The thing that is complex is the same thing that is simple: the phrase. So we need the singular possessive pronoun "its", making D the correct choice.

Problem 21

Official Answer: A

This is a variation on the "profession Individual's Name" pattern. When you introduce "scientist Isaac Newton" or "author Rudyard Kipling", you don't include any punctuation, and you shouldn't include any here, either.

Technically, the proper noun or individual name in these cases is a "restrictive appositive". It is essential to identify the unique person (or crab) being discussed, and the sentence would not be the same without it. Such phrases should not broken away from the rest of the sentence by punctuation marks.

Problem 22

Official Answer: D

How are the sentences related? The first two sentences describe a technique for making pottery, and the final sentence describes the outcome or result of the technique. The sentences do not express an opposition or contrast, making answer A inappropriate, and they do not express a generalization-and-example relationship, making B inappropriate. A chronological word like

"finally" might work in the blank, but "previously" has the sequence backwards, so answer C is also wrong.

Since the final sentence expresses the result of the techniques described in the preceding sentences, "as a result" is a perfectly appropriate transition.

Problem 23

Official Answer: D

The second sentence describes something that happened after the first, so you might wonder if "second" would be an appropriate transition. It might be, if the paragraph were describing a list or an enumerated series of events, but that's not what's happening here. The focus is not on the timeline, but on comparing the similar accomplishments of the two people. This makes "similarly" or "likewise" appropriate transitions.

The second sentence does not provide a contrast to the first, so "however" is not appropriate, and it does not amplify or elaborate on the first, so "indeed" is not appropriate.

Problem 24

Official Answer: D

How are the two sentences related? The second sentence is not a consequence or effect of the first, so answer A doesn't work. The others might all work if the context were changed slightly, but we can only work with what we're given.

If we knew nothing about Mary Ellen Pleasant, and if these two sentences were part of a longer list of events, "then" or "in addition" might be appropriate transitions. They would transition from one accomplishment to another. However, there are no additional events or accomplishments described, and if we look more closely, we see that the two sentences are describing the same event, the first broadly ("challenging discrimination in the state") and the second specifically ("sued a streetcar company"). So "specifically" is the most appropriate transition for this context.

Problem 25

Official Answer: C

How are the sentences related? They both refer to uses of quipus. The first says that they were used to record countable information, and the second says that they were also used to record more complex information. The second extends or adds to the first, so "in addition" is the most appropriate choice.

Problem 26

Official Answer: A

What's the goal? To emphasize Janaki Ammal's achievement. What's the achievement? We find the answer in the last bullet point: She succeeded in creating sugarcane hybrids that would grow well in India. So the correct answer should mention something about hybridizing sugarcane and growing well in India's climate.

Scanning the answer choices, we see that answer A does just this. The second half of answer A is in fact a verbatim copy of the last bullet point. Answer B focuses on the Institute and the motives, answer C emphasizes the time of Ammal's recruitment, and answer D doesn't mention Ammal at all.

Problem 27

Official Answer: C

What's the goal? To specify how salt enables energy storage. Searching the bullet points, we find that it involves freezing and thawing. All four answers include "salt" and "freeze-thaw", so we'll have to refine our information. *How* does salt enable energy storage? Focusing on the fourth bullet point, we find that energy is stored when the salt solidifies. Only answer C mentions solidification.

Problem 1

Official Answer: A

This question has a long introduction with many long names that are easy to stumble over. Ignore it and refer back to it only if you need to. Among the answer choices, you might not know the meaning of "blemish", but you'll probably know the other three. Reading the passage and focusing on the underlined word, you can probably realize that "evidence" is closest to "trace".

You might trace out a figure of some kind in sand, like a sketch, and Fox-Foot presumably wouldn't like this, but you wouldn't call this a "trace of their passing". If you know that "blemish" means a stain or defect of some kind in something that is otherwise pretty, then you might be tempted by this word, because you might be thinking that footprints or fire remains might be a "blemish on the land". But you wouldn't call such a thing a "blemish of their passing". Maybe a blemish *caused by* their passing, but not a blemish of their passing. You might also be tempted by "amount". Signs or signals that someone has been here would be a concern. But you would be concerned about an *amount of evidence*, not an *amount of their passing.*

Problem 2

Official Answer: C

If you were reading this in a book, and the word in the blank was smudged out, what word would you guess was supposed to be there? What would art works be doing in a museum? They would probably be "displayed" or "presented". Also notice that the second clause says that her earlier works were "displayed". Which of the four answer choices could be a synonym for "displayed"?

You would never describe murals as being "invented". "Adjusted" or "recommended" might make sense in different contexts, but not here. Only "featured" makes sense in the blank.

Problem 3

Official Answer: C

Whenever you see a contrasting word like "but", that's a clue. The second clause after the "but" tells us that the parrot was using the stones deliberately, so the clause before the blank should indicate that the parrot was *not* using the stones deliberately. If a parrot is not using a stone deliberately, how would you describe its interactions with the stone? Coincidental? Random? Accidental? "Accidental" makes sense, and none of the other answer choices contrast with "deliberate".

Problem 4

Official Answer: A

If you are overly permissive, what might you do with the vices of those around you? Overlook them? Tolerate them? Excuse them? "Indulge" might seem to go a little beyond passive tolerance into active support, but it's the only appropriate answer choice. To despise or criticize vices is not being overly permissive. And does it make sense for someone to "moderate" the vices of someone else?

Problem 5

Official Answer: C

With underlined-sentence questions, read the passage, read the answer choices, and then try to tear them apart. Nitpick. Find the flaws. In this case, we can rule out answer A, because the underlined sentence describes similarities between the two places, not the contrasts. There is no discussion of how the harsh conditions hinder researchers, or any other forms of life, so we can rule out answers D and B. This just leaves C, which seems appropriate. The sentence does indicate why scientists who are mainly interested in life elsewhere would want to study places on Earth. It's because of their similarities.

Isn't it remarkable that there is an entire profession devoted to the search for something that we haven't even discovered to exist yet? We must have a very wealthy and curious civilization to be able to afford such research.

Problem 6

Official Answer: C

If "main idea" questions are like trying to find the theme in a work of fiction, "overall structure" questions are like trying to find the plot. What's the basic sequence of events or claims in this paragraph? The first half of the paragraph gives a couple of particular examples of something, and the second half makes some general claims about the pattern. Do any of the answer choices say something like this?

Answer A discusses other languages, which were not mentioned anywhere in the paragraph. Answer B mentions *frequently occurring* words, but the paragraph said nothing about how often the words occur. Answer C is completely accurate. The paragraph does in fact present some specific words (*misip-lin* and *lataf-kan* and their plural forms), it presents a generalization exemplified by these words (subtractive morphology), and

finally states this this occurs frequently (or "is pervasive") in Koasati. Answer D starts out plausibly, but then it mentions controversy. The paragraph said nothing about whether or not subtractive morphology is or has been controversial.

Problem 7

Official Answer: A

If you were to summarize this passage, what would you say? How about this: "Lutie is watching a peaceful evening scene with children playing in the street"? If you examine the answer choices, you'll find that answer A says more or less the same thing...in a vague and abstract way. There is no indication that Lutie is annoyed or puzzled, so we can rule out answers B and C, and answer D doesn't mention the street scene at all.

Problem 8

Official Answer: D

Try to summarize the paragraph in simple, normal-person language. You may need to refine your summary later, but start with the clearest "big picture" you can form in your mind. This paragraph is mostly about a particular individual – Hallie Flanagan – and her achievements as the director of the FTP. Only two answer choices mention the FTP, and only one mentions Flanagan. There are four sentences in the paragraph, and Flanagan is the subject of three of them, yet answer choices A through C completely fail to mention her at all.

Problem 9

Official Answer: D

This is a fact-finding question, and they tell you exactly what fact to find. Scan the paragraph, keeping your eyes open for anything that might surprise scientists. We can find it in the middle of the paragraph. The second sentence tells us that they discovered that all marsquakes started in the same place. The third sentence tells us that this was surprising. So we choose answer D, which says that all marsquakes started from the same place.

Problem 10

Official Answer: A

This one's a piece of cake. They give us a data table, and the four answer choices describe patterns in the data. Just check the answer choices against the data table, and you'll discover that three of them misrepresent the data. The numbers in the first column get bigger as you go down the list, and the numbers in the second column get smaller, making answer A the only accurate description.

Problem 11

Official Answer: D

What's the "claim"? Apparently, we are supposed to illustrate a banker being very upset. Answer A describes a banker being cautious, answer B describes him listening to 3 a.m. silence, answer C describes a banker being delighted, and answer D describes a banker crying with emotion. Which one is closest to "being upset"?

Problem 12

Official Answer: A

What's the claim we need to complete? That the recent Chinese samples of moon rock are significant for some reason. Glancing at the table, what do you notice? You might remark that the Chinese samples were collected from *Oceanus Procellarum* instead of one of the *Mare*s. But if know anything about features on the moon, you know that these sites are not all that different. "Mare" is Latin for "sea", and all of the sites mentioned are comparatively flat and smooth, like bodies of water. And anyway, only one answer choice (B) mentions the landing sites, and a quick glance at the table shows that the claim in answer B is completely false. So the landing site is not an issue, and we can ignore that column in the table.

The other thing that should stand out from the table is the age of the samples. The Chinese samples are much younger in age than the Apollo samples, and this is exactly what answer A states.

Answer C is factually false, and answer D comes out of left field and does not "use data from the table".

Problem 13

Official Answer: D

This one seems like it was written by a junior staff writer who didn't really understand the science involved. Or more likely, the writer was unwilling to explain it clearly. For starters, if normal water consists of a stable network of molecules, then wouldn't that make it ice? How can

a fluid have a "structure"? And to speak of the "compressibility of water" without qualification or elaboration makes it sound as if you can have compressed water the same way you can have compressed air.

In cases like this, just try to ignore the jargon and get the gist of the discussion in crude terms. This paragraph seems to be saying that water is different at very high pressures, making it harmful to living things, but deep-water organisms have a chemical in their bodies that counteracts this harmful effect.

Now, what's the hypothesis that we need to support? That TMAO (whatever that is) reduces water's compressibility (whatever that means). TMAO changes pressurized water in a way that's good for the fish.

Answer A seems to be saying that TMAO can't influence water whether it's under high pressure or not, so that's probably not the right answer. Answer B is similar. Answer A contains "impervious...even when" and answer B contains "retain...even as", so both of these claims support things staying the same, not things changing when you add TMAO. Furthermore, answer B discusses what's happening to the TMAO, not what's happening to the water.

Answers C and D might both sound reasonable. They both seem to be relating different amounts of TMAO to compressibility. But answer C refers to a "positive correlation", which seems to mean that TMAO makes the water more compressible, which would make the situation worse for the fish.

Answer D says that TMAO stabilizes hydrogen bonds (apparently turning the water back into ice?), making it more like normal surface water and less like pressurized water and less harmful to the fish, and this supports the hypothesis. So this is probably the answer that they will count as correct.

Problem 14

Official Answer: A

What would you expect the scientists to say? "We need to be cautious"? "We can't say for sure yet that this impact crater could have caused the cold spell"? The correct answer is probably going to be some kind of cautionary statement about jumping to conclusions. Answers A and B could both work, except that answer B warns us about a different conclusion. The issue at hand is what caused the cold spell, not what caused the crater. This also rules out C, which, like answer B, focuses on the cause of the crater. Answer D refers to "incorrect assumptions", which was also not an issue.

Problem 15

Official Answer: A

Try boiling down the sentence to a minimum. To save time, you can just replace the subject "Nery and her colleagues" with "they".

They published a study.
They publishing a study.
They having published a study.
They to publish a study.

Answer A gives us a true verb to pair with the subject of the sentence, and all of the other choices give us "verbals", useful as modifiers but not as the main verb of a sentence.

Problem 16

Official Answer: A

This problem is almost a duplicate of the previous one. Who or what is doing the using? Edwin Land is. Match the verb choices to this subject, and throw away the rest of the sentence.

Land used his technology.
Land to have used his technology.
Land to use his technology.
Land using his technology.

Answer A gives us a true verb, and the other three give us "verbals".

Problem 17

Official Answer: A

We need to pick one of these pronouns. To what does the pronoun refer? Well, what is being considered dangerous? The eating utensils. "Utensils" is plural and requires a plural pronoun, but answers B, C, and D all give singular pronouns.

Problem 18

Official Answer: D

What is the subject that needs to be paired with this verb? Who or what is doing the "ensuring"? Be careful. It's the action of using a song. Now try pairing this subject with the four verb choices.

Using a song are ensuring...
Using a song have ensured...
Using a song ensure...
Using a song ensures...

"Using a song" is a singular subject, and needs to be paired with a singular verb. Answers A-C are all plural. Only answer D is singular.

Problem 19

Official Answer: B

As with all apostrophe questions, start by asking whether you need apostrophes in the first place. Possessives and contractions do. Normal plural nouns do not. In the phrase "When you place your hands between the two antennas...", is "hands" a contraction? A possessive? What about "antennas"? Both of these words are just normal plural nouns, and neither should have apostrophes, making B the correct answer. (More precisely, "hands" is the direct object of the verb "place", and "antennas" is the object of the preposition "between". Objects of verbs and prepositions should not have apostrophes.)

Problem 20

Official Answer: C

This is another of those science questions that sounds like it was written by a junior reporter at a small-town newspaper. To say that light "is known as one of the fastest-moving substances" is like saying "the universe is known as one of the biggest objects". And light doesn't slow down when passing through *some* types of matter, it slows down when passing through *all* types of transparent matter, more in some and less in others.

The parenthetical acronym (BEC) is identical in all four answer choices, and it is there merely as a distraction. Ignore it. The differences among the four choices concern how to join the preceding words with the subsequent words. We have four comparatively "weak" options, and one "stronger" option, namely the semicolon, suggesting that we might be dealing with two independent clauses. "One type is a form of gas called a BEC" can stand on its own, and so can "Lene Hau used a BEC to slow light." So we are in fact dealing with two independent clauses, and this requires the semicolon, so C is indeed the correct answer.

Problem 21

Official Answer: C

The sentence before the blank says that they love cats, and the sentence containing the blank provides an example of how much they love cats. That's an amplification, and "in fact" is perfectly appropriate here.

They didn't make the video game intermittently, as far as we know, so answer A is not appropriate for the given context. The two sentences also do not clash or contrast with each other, so contrasting words like "on the other hand" and "nevertheless" are also inappropriate.

Problem 22

Official Answer: C

This one is pretty obvious. The previous sentence says something about most deer, and the subsequent sentence says very simply that reindeer are different. This requires a contrasting work, and "however" is the only contrasting word among the choices.

Answer A is almost silly. You wouldn't say "Similarly, reindeer are different." The paragraph is not describing a sequence of events, so "next" is inappropriate, and the second sentence is not a consequence of the first, so "thus" is also inappropriate.

Problem 23

Official Answer: C

The first sentence mentions something that happened in 2014, and the sentence containing the blank mentions something that happened in 2017. So a chronological word, like "later", is perfectly appropriate.

Problem 24

Official Answer: D

How are the sentences related? The sentence before the blank mentions Jelly Roll's exaggeration about inventing jazz. The sentence containing the blank mentions his innovations and his influence on jazz. The first, by pointing out the exaggeration, demotes Jelly Roll's influence, and the second promotes it, making a contrasting word like "though" appropriate. The second sentence does not flow from the first, making "therefore" inappropriate, it does not present the second item in a series, making "in the second place" inappropriate, and it is not a restatement of the first, making "in other words" inappropriate.

Problem 25

Official Answer: B

What's the goal? To present the study and its findings. Whenever they ask you to present findings, focus on the conclusions, outcomes, or results of the study, and ignore the motivations and the methods. In this case, the last bullet point tells us the conclusion: a map was drawn in the twentieth century. The only answer choice that mentions this finding is answer B. Answers A and D tell us about what the researchers did, not what they concluded, and answer C barely mentions the study at all.

Problem 26

Official Answer: D

What's the goal? To emphasize a difference between two ways to dye blue jeans. Scanning the bullet points for ways to dye blue jeans, we find the information scattered among all of the bullet points. Summarizing, we might say that traditional methods dipped the jeans in indigo juice, but there's also a recent invention involving "hydrogel" and "nanocellulose".

Answer B doesn't mention blue jeans at all, so that is clearly wrong. Answer C mentions only one method of dyeing.

Answer A might be tempting after a casual reading. It does allude to two different processes, but the processes are for the creation of dye, not for the dyeing of blue jeans. There is still no comparison of methods used to dye blue jeans.

Answer D doesn't mention dyeing or blue jeans explicitly, which is a little sneaky, since we are supposed to "emphasize a difference between the two approaches to dyeing blue jeans." But if we can assume, based on the context or the question prompt, that the "approach" is an approach to the dying of blue jeans, then this sentence does provide contrasting facts about the two methods for dyeing blue jeans. The wording is a little disingenuous, but it's the best of the four choices.

Problem 27

Official Answer: B

What's the goal? To emphasize the *aim* of the research study. What was the aim or the goal? Searching the bullet points, we find it in the third bullet point. "She wanted to know how ocean temperature affects where the whales forage for krill in that region." Answer B is nearly a verbatim copy of this aim.

Answers A and C present the results, not the aim. Answer D tells us what she did, not why she wanted to do it.

Problem 1

Official Answer: A

The clue comes after the comma. The War of 1812 was overshadowed by something, and it maintained the status quo. So it was not that significant? Not that important? "Historical memory" is a weird phrase, but if you had to describe the "place in historical memory" that the War of 1812 holds, would you say it has a "small" place? A minimal place? An unimportant place?

If you have a clear grasp of all four answer choices, you should realize that only one can work as a synonym for small or unimportant. The word "tenuous" occurs several times in the SAT practice tests, so it may be worth memorizing that word if you don't know it. It derives from the same root word as "tension" and "tendon", and it means thin or unsubstantial. Something is tenuous when it has been "stretched thin". (You might also think it sounds similar to "tenacious", but unfortunately that word doesn't help here.) If you don't know "contentious", have you heard of a "contentious" debate? "Contentious" sounds vaguely similar to controversial and has a similar meaning.

Problem 2

Official Answer: B

Whenever you see a colon in a vocabulary question, it's probably a clue. It is probably giving you the "context" for this "words in context" question. The writing in this passage is so obscure, however, that we need to read the rest of the passage just to understand the clue.

The clause before the colon is trying to establish a relationship between Morris's rejection of modern methods and the old-school productions of his publishing company. The clue comes after the colon. It tells us that the latter "exemplify" the former. But none of the answer choices are great synonyms for exemplify.

If you know the meanings of A, C, and D, you can probably rule them out for not making any sense. They aren't even close to "exemplify". The actions of a publishing company can't sense or scrutinize anything, so A and C don't make any sense. If you are having trouble wading through the dense prose, you might think that "complicated by" sounds reasonable. There is certainly complexity going on. But if you look at it closely, would the company's production methods complicate Morris's rejection of modern methods?

This just leaves "manifest", which as an adjective means "apparent" or "evident" or "obviously clear". The correct answer to this question is definitely not manifest, at least not at first, but it is in fact "manifest".

Problem 3

Official Answer: B

"Overemphasizing" makes it sound like the "long-standing trend" has problems. If scholars have recently started doing things differently, what would they be doing to the problematic trend? Fixing it? Addressing it? "Redressing" sounds a lot like "addressing", so should we pick that one?

Perhaps you have a sense of what "exacerbate" and "preclude" mean, and you think they don't seem right. You'd be right. "Exacerbate" means "to make worse", which is the opposite of what we want. "Preclude" is similar to "prevent", and that isn't right, either. Perhaps you don't know what "redress" or "epitomize" mean. If so, perhaps you should guess "redress", simply because it sounds like "address". It also happens to be the correct answer. "Epitomize" is similar to "exemplify" and doesn't work here.

Problem 4

Official Answer: D

You probably know all of the words in the answer choices. If you have trouble with this question, it is probably with the word in the passage. Let's look at what this word is doing in the sentence. It's a verb. (Well, actually it's a participle, but that doesn't matter right now.) Who or what is doing this action? "They" are, referring to the "multitude of Paris". What is the multitude of Paris disputing? The narrator's passage. They are getting in his way, with their wagons, handtrucks, and baskets. Which of the answer choices is closest to "getting in the the way"?

You might be misled by "asserting possession". One reason the multitude of Paris might get in the narrator's way would be if they thought they owned the street and wanted to prevent the narrator from using the space. But then they would be asserting possession of the *space*. They wouldn't be asserting possession of the narrator's passage.

Problem 5

Official Answer: A

When you see an underlined sentence in the middle of a paragraph, it is probably doing one of three things:

following up on the previous sentence, introducing the following sentence, or acting as a bridge from the previous to the next. If we summarize the three sentences in this paragraph, perhaps we could express them this way:

Sentence 1:	This painter really changed his style.
Sentence 2:	Here are some details about what it used to be like and what it became.
Sentence 3:	Here are more details about the new style.

What's the function of the middle sentence? You can probably rule out the last three answer choices with conviction. The underlined sentence says nothing about the painter's travels, it does not recount an event, and it doesn't call the previous sentence into question. The underlined sentence does elaborate on the previous sentence by providing more details about his transformation, and the first answer is clearly the correct one.

Problem 6

Official Answer: C

What does the underlined bit do? Ignore the parenthetical elaboration between the dashes, and you'll see that the underlined words are the main verb phrase—the verb and its direct object—of the first sentence. It tells us what scholarly accounts typically do, and thus it sets up the situation for the rest of the paragraph. The second sentence has a "however" near the beginning, so the initial sentence is setting up something for the second sentence to contrast with.

A casual reading may make you think that any of the given answers could work. If so, it's time to nitpick. Pay special attention to the second halves of the answers, because the first halves are all reasonable. Answer A looks perfect ... or nearly so. Can you find the flaw? Maybe the trend *should be* reevaluated in light of Herrera's work, but the text never actually says that it *has been*.

Answer B might also look good. Scholars may have overemphasized this aspect of the Chicano movement, but does the text ever actually say why? Was it *due to their political orientations*? The text never actually says this.

What about answer C? Does the text claim that the conventional approach "obscures the ideological diversity of the movement's participants"? If we boil down the verbiage, we can see that it does say this, more or less. The movement may "seem uniformly radical", but if we "shift our focus", we see "an array of orientations and approaches".

Can you find the disqualifier in answer D? Up to the words "misleading impression", this is an adequate description. But does the text actually suggest that the conventional approach creates a misleading impression *of the effectiveness of institutions and projects*? The effectiveness of community programs was never an issue.

So the first half of every answer choice sounds reasonable, but only answer C is acceptable all the way to the end.

Problem 7

Official Answer: D

This is a "fact-finding" question, and they tell you exactly which fact to find. Skim the paragraph, searching for any mention of skepticism. (The whole paragraph is about Bosco Verticale, so it doesn't do much good to scan for that particular keyword. The thing we need to find is "skepticism".) We find it the final sentence: People are worried that the trees won't survive. None of the answer choices mention trees explicitly, but two of them mention "plant life". Answer B refers to the diversity of the plant life, which was not an issue. Answer D refers to the survival of the plant life, which is the issue, so answer D must be the correct one.

Problem 8

Official Answer: C

This is a "main idea" question. Read through the pile of words and try to summarize the whole thing in simple language as best you can. One way to summarize it might be like this: "Foreign investors don't like natural resources ... maybe because they are unstable." Let's check the answer choices to see if any of them say something like this.

The first half of answer A looks good, but they give the wrong reason. Instead of instability, they mention the size of the initial investment. The paragraph did mention large investments, but it said that these were *not* a problem for foreign investors. (The paragraph seems to be equating foreign investors with multinational corporations. For the purposes of answering this question, we'll just roll with it.) So we can cross off answer A.

Answer B looks like they put the original paragraph in a blender. It's long and hard to make sense of, but it seems to be mixing up the causes and effects. It also

does not discuss why foreign investors might or might not like natural resources, which seems to be a theme of the original paragraph. Let's come back to this one only if we can't find any better answers.

Answer C discusses the amount of foreign investment, it mentions the "counterintuitive" appearance mentioned in the paragraph, and it ends with the reason why foreign investors don't like natural resources. It doesn't mention "instability" explicitly, but instability would certainly qualify as an "unattractive condition". So this is probably the correct answer.

Answer D discusses foreign investors and their willingness to invest in natural resources, but it distinguishes between initial investments and future investments, which was not part of the original paragraph, and it makes an unsupported prediction about the future.

Of the four choices, answer C sounds the most reasonable.

Problem 9

Official Answer: C

This is a "fact-finding" reading question, but it's hard to know what fact to focus on based on the question prompt. Let's just read the paragraph and see if we can pick out anything interesting. The main topic is finding life on other planets. If we could detect ammonia in the atmospheres of other planets, that might indicate that living things were there. Some researchers evaluated this idea, and found that it would work on rocky planets, but on "mini-Neptunes", ammonia might exist naturally, even without life.

Now we have to chew through each of the answer choices, and decide which one the researchers would likely agree with.

The team identified two reasons that atmospheric ammonia might exist, but they never said which one was more likely, so we can rule out answer A. Answer B has too many negatives. Ammonia's presence on a rocky planet might be a good indicator of life, but its absence doesn't mean anything. Answer D makes a claim based on no evidence. This leaves answer C, which is a rough restatement of our summary above, making it the most reasonable answer choice.

Problem 10

Official Answer: D

What's the claim? The SAT writer has claimed that the speaker in the poem has described having contradictory feelings. So the correct answer should indicate contradictory feelings somehow. It should include at least one positive and one negative feeling. Answers A through C, to the extent that you can read feeling in them, are entirely positive. Answer D includes both "pleasant thoughts" and "sad thoughts", so this is the only one that expresses any kind of clash or contradiction.

Problem 11

Official Answer: D

This is an example of a problem that you might want to save for last. There's a graph, but the answer choices do not contain numbers and you can't rule out any answer choices by comparing them to the data in the graph. The "conclusion" we need to support is not simple, and the paragraph and the answer choices are all lengthy and take time to chew through.

Let's start by highlighting the conclusion that we need to support. After chewing through the obtuse paragraph, perhaps we could summarize it this way: According to somebody's simulation of soil, trees, and weather, artificially adding nitrogen to soil can offset harmful effects of climate change ... but only up to a point. If we look at the graph, we see that all bars are fairly high under "current" and "moderate change", with the light gray bars being a little higher than the black bars, meaning that the digital trees grew a little better with digital nitrogen, and that "moderate change" (whatever that means) in the digital weather doesn't make much difference. But the bars are very low under "extreme change" (whatever that means), meaning that the digital trees grew much more slowly whether they had extra digital nitrogen or not. Let's take the black bar over "current climate" as the baseline (no added nitrogen and status quo in the weather), and we see that adding nitrogen (gray bars) always helps the trees grow faster. With "moderate change", the growth with nitrogen is still faster than the baseline, i.e. the "status quo", but under "extreme change", both bars drop well below the baseline. This is probably the point we need to mention to support the claim that nitrogen helps, unless the "change" is "extreme".

If we translate answer D into simple language, it says that trees grow faster with nitrogen even under "moderate change", but they grow slowly under "extreme

change" whether nitrogen is added or not. This is consistent with the heights of the bars in the graph, and supports the conclusion that nitrogen helps except under "extreme change". So answer D is probably the one they will count as correct.

Answers A-C all accurately compare various bars in the graph, but the comparisons are jumbled up, and none of them help to support the conclusion.

(A critical thinker should have a dozen questions about this "research". Besides wondering about the scientific validity of computer simulations of the growth of trees, one also has to wonder exactly which measurements are being "changed" and how it was decided what qualifies as "moderate" and what qualifies as "extreme". Did this research involve any actual measurements of anything? The original researchers may very well have specified and quantified their variables, but omitting them from this passage makes the research look very sloppy.)

Problem 12

Official Answer: D

This one seems like it was written by a junior staff writer who didn't really understand the science involved. Or more likely, the writer was unwilling to explain it clearly. For starters, if normal water consists of a stable network of molecules, then wouldn't that make it ice? How can a fluid have a "structure"? And to speak of the "compressibility of water" without qualification or elaboration makes it sound as if you can have compressed water the same way you can have compressed air.

In cases like this, just try to ignore the jargon and get the gist of the discussion in crude terms. This paragraph seems to be saying that water is different at very high pressures, making it harmful to living things, but deep-water organisms have a chemical in their bodies that counteracts this harmful effect.

Now, what's the hypothesis that we need to support? That TMAO (whatever that is) reduces water's compressibility (whatever that means). TMAO changes pressurized water in a way that's good for the fish.

Answer A seems to be saying that TMAO can't influence water whether it's under high pressure or not, so that's probably not the right answer. Answer B is similar. Answer A contains "impervious...even when" and answer B contains "retain...even as", so both of these claims support things staying the same, not things changing when you add TMAO. Furthermore, answer B discusses what's happening to the TMAO, not what's happening to the water.

Answers C and D might both sound reasonable. They both seem to be relating different amounts of TMAO to compressibility. But answer C refers to a "positive correlation", which seems to mean that TMAO makes the water more compressible, which would make the situation worse for the fish.

Answer D says that TMAO stabilizes hydrogen bonds (apparently turning the water back into ice?), making it more like normal surface water and less like pressurized water and less harmful to the fish, and this supports the hypothesis. So this is probably the answer that they will count as correct.

Problem 13

Official Answer: B

This one is another hot flaming mess. If you are allowing yourself one or two "throw-away" questions, this should be the first one you ignore. If you try it, it will take a long time to chew through, and there is still a good chance of getting it wrong.

We can check the answers against the table for factual accuracy, but we can only rule out one of the answers this way. (Answer D completely misrepresents the numbers, but the other three answers are all numerically accurate.) The graph, the paragraph, and the answer choices are all lengthy and difficult to interpret. You can't even scribble your own clarifying annotations on the paper, because the test is digital.

Let's start by trying to clarify the conclusion that we need to support. It is difficult to distill this into simple language. If precipitation is concentrated into fewer but more intense events, wouldn't this automatically imply that there are more "dry days" with no precipitation? Did the team really need to "conclude" this? The new and significant idea seems to be the effect on *irrigation*. Maybe we can summarize the conclusion this way: "More concentration means more irrigation...but it depends."

Next, let's see if we can figure out what in the world the table is trying to tell us. We should probably focus on the last two columns, because those give measurements of irrigation. (At this point, we might notice that answers A and C both compare irrigation water to water entering aquifers, which doesn't seem useful. It might be a good idea just to guess the remaining answer choice, B, and move on to the next question. If you have

time later, you can resume your analysis of the table at this point, and confirm that B is the correct answer.) The row labels both include "currently", and they seem to be giving us two baseline conditions, one with "concentrated" rainfall, and one with "evenly distributed" rainfall. But if both rows are giving us baselines for comparison, how are we supposed to determine the effects of *changes* in the concentration? We are apparently supposed to assume that a fixed change from "status quo" to "more concentration" (whatever that means) is built into the simulation, and the displayed results are all the percentage changes in the simulated hydrologic effects as a result of this (unspecified and unquantified) change in the simulated weather.

How does the table help us to support the conclusion? Notice that all numbers are positive, meaning everything went up. "More concentration", however it was defined in the model, has produced more water usage for irrigation. But the irrigation numbers in the top row went up hardly at all–less than a percent. The numbers in the bottom row went up much more—8 or 9%. So the table seems to be telling us that irrigation water does go up if precipitation becomes more concentrated, but that the amount depends a lot on how concentrated it was to start with. So the correct answer should point out that all numbers are positive, but the numbers in the bottom row are much larger than those in the top row. This is more or less what answer B does.

Problem 14

Official Answer: A

If carnivores in captivity get used to being fed regularly, and if this makes them do uselessly repetitive things, then it wouldn't be surprising if ... we discovered captive lions doing uselessly repetitive things.

Answer B makes observations about aggression, which is not an issue. Answers C and D both mention repetitive behavior, but both of them claim that the repetitive behavior of captive lions is similar to the repetitive behavior of wild lions, just under different conditions. We need to observe the captive lions doing something repetitive that wild lions don't do. Only answer A does that.

Problem 15

Official Answer: A

What is it that is doing the epitomizing? What subject needs to be paired with this verb? Ignore the parenthetical between the commas and you'll see that the subject of this sentence is French recipes. Now pair the subject "recipes" with each of the verb choices. Since "recipes" is plural, you could also use "they" as the subject if you wanted to.

Recipes epitomize ...
Recipes has epitomized ...
Recipes epitomizes ...
Recipes was epitomizing ...

"Recipes" is plural, and only answer A gives a plural verb.

Problem 16

Official Answer: B

Perhaps we can use the word "mechanics" in a general sense to mean "the way things work", but was there really any reason not to just say "the *optics* of the pinhole camera", especially since the SAT writers ought to be in favor of the precise use of words? A pinhole camera has no moving parts.

Anyway, we have a long series of words with a blank in the middle, and the best place to begin is by finding the independent clauses. "A ray diagram reveals how this works" and "all light can only arrive at a single destination" can both stand on their own and are independent clauses. This means that the sentence must contain a "strong" punctuation mark to link the clauses (or a period to separate them). "Because the size restricts light" is a dependent clause attached to the second independent clause, but if we add "it's", then this makes it into yet another independent clause, making the comma between "ray" and "all light" inappropriate. Answer B turns the second portion of the paragraph into this pattern: "Independent clause. Dependent clause, independent clause." "A diagram reveals something. Because the size restricts light, all light can only arrive at one place." That's perfectly a perfectly legitimate pattern, and B is the correct answer.

Ignoring the participial phrase at the end, which never changes, answer A turns the words into this pattern: "Independent clause dependent clause, independent clause." Answer C makes this pattern: "Independent clause, independent clause, independent clause." Answer D makes this pattern: "Independent clause: independent clause, independent clause." None of these are appropriately punctuated.

Problem 17

Official Answer: B

Learn to recognize the "profession Individual Name" pattern. It comes up a lot on the SAT. The proper noun is almost always essential to the sentence, it forms a "restrictive appositive", and there should be no punctuation separating the profession from the name. If they had said "It was the work of a little-known French portrait artist...", then the proper noun would have been supplementary information, and any choice except B would have been acceptable. As written, the proper noun is essential, and only B is acceptable.

One who has any appreciation for the devotion, talent, and painstaking work that went into creating the masterpieces of 18^{th} and 19^{th} century painting might wonder why the SAT chooses to include modern artists almost exclusively. They do mention the great Jacques-Louis David in this question, but only to point out a misattribution, and thus to take a work away from him.

Problem 18

Official Answer: B

This one is tricky, because it involves juggling multiple punctuation marks into the correct order. Start by noticing the dash earlier in the paragraph. The only way a single dash can work is if it follows the "Main Idea – Followup" pattern. The stuff before the blank is an independent clause and could stand on its own, but the stuff after is too messy to be a "followup". The words "to powerful effect..." continue the thought that began with "Calle paired excerpts", and these two things should not be separated by a dash, or not a single dash anyway.

We can't change the previous dash, and if a single dash doesn't work, then we must need a pair of dashes. And the only way a pair of dashes can work is if they surround a parenthetical, like a matched pair of parentheses. This narrows the answer choices to B and C, but leaves open the question of where the second dash should go. To distinguish between these two choices, we need to decide where the parenthetical should end and the "main idea" should resume. The words "from hair to grass to sculptures" describe the "items" mentioned previously, so these need to be inside the parenthetical alongside the "items". The full parenthetical is "both of interviewees and the items they described, from hair to grass to sculptures", making B the correct answer.

Problem 19

Official Answer: C

"Artist Richard Serra intends his installations to do something..." sounds like the beginning of a valid sentence. So does "Artist Richard Serra, intending to do something, ...". In the latter case, however, we need to find the actual verb of the sentence farther on. Is there another verb? Yes. "He assembles large-scale plates..." So the actual skeleton of the sentence is "Serra assembles plates", and the part about his intention is a parenthetical and must be surrounded by a matched pair of marks. A second comma is already given after "environment", and we need to supply the first one before "intending". This makes C the correct answer.

Problem 20

Official Answer: B

What is the subject that needs to be paired with this verb? What is doing the increasing? The toxins. Try pairing this subject with the four choices, and see which one sounds best.

The toxins is increasing ...
The toxins increase ...
The toxins increases ...
The toxins has increased ...

"Toxins" is plural, and only answer B contains a plural verb.

Problem 21

Official Answer: D

How are the sentences related? The sentence before the blank mentions Jelly Roll's exaggeration about inventing jazz. The sentence containing the blank mentions his innovations and his influence on jazz. The first, by pointing out the exaggeration, demotes Jelly Roll's influence, and the second promotes it, making a contrasting word like "though" appropriate. The second sentence does not flow from the first, making "therefore" inappropriate, it does not present the second item in a series, making "in the second place" inappropriate, and it is not a restatement of the first, making "in other words" inappropriate.

Problem 22

Official Answer: B

In this problem, the blank comes after a semicolon, so we need to ask how the clauses on each side of the semi-

colon are related. The first clause describes extreme differences, and the second can be regarded either as a consequence of those extreme differences or an illustration of how extreme those differences are. We don't have any "thus"s or "therefore"s to choose from, but we do have an "in fact". In fact, B must be the correct answer. The second clause does not present a contrast with the first, so "by contrast" and "nevertheless" are definitely wrong. And the second is not a restatement of the first, so "in other words" is definitely wrong.

Problem 23

Official Answer: B

How are the two sentences related? The first sentence claims that a complicated theory was obvious. The second sentence says that it wasn't a coincidence that two scientists arrived a concept at the same time. The second follows (more or less) from the first, making "then" an appropriate transition. It's a little sneaky, because you are likely to think of "then" as a chronological word, signifying that something comes after something else. But it can be used to signify a consequence as well, as in any "if ... then" construction.

The second sentence does not clash or contrast with the first, making "however" inappropriate. The second sentence does not add additional evidence to support a broader claim, making "moreover" inappropriate. One might try to argue that Darwin and Wallace arriving at similar ideas at the same time provides an example of a broader claim about historical developments, which would make "for example" appropriate. But while the events themselves may provide an example, the claim that these events *may not have been a coincidence* does *not* provide such an example, so "for example" is not appropriate.

Problem 24

Official Answer: B

The second sentence amounts to an explanation of what the terms diurnal, nocturnal, and crepuscular mean. Otherwise, the two sentences state basically the same thing – that researchers studied these things in cows. The second sentence is a clarification or restatement of the first, making "in other words" perfectly appropriate.

Problem 25

Official Answer: A

What's the goal? To emphasize a similarity between P waves and S waves. The last three bullet points all provide differences, and the only similarities we have to work with are those given in the first two bullet points. Both types of waves emanate from the focus and they both travel beneath the surface. ("As opposed to what?" you might wonder. There are seismic waves that ripple along the surface like water waves, but those aren't part of this discussion. There are also seismic waves that travel through the air, but we call those "sound waves".) Answer A states the similarity that both waves move underground, as well as the similarity that they "cause the ground to move". You could argue about whether this qualifies as "emphasis", but answer A definitely presents a similarity.

Answers B and D both present differences rather than similarities, and answer C fails to mention S waves at all. So A must be the correct answer.

Problem 26

Official Answer: D

What's the goal? To indicate this frog's FWS classification category. Searching the bullet points to discover what in the world this means, we find in the first bullet point that FWS means "Fish and Wildlife Service", that the frog in question is "likely to soon become endangered" in the last bullet point, and that this status is classified as "threatened" in the second-to-last bullet point. So the correct answer needs to include the word "threatened". Answer D contains all of this information. Answer C places the frog in the wrong category, and answers A and B fail to mention the frog's category at all.

Problem 27

Official Answer: C

What's the goal? To make a generalization about materials used to make replicas. What were the materials? The first two bullet points don't concern materials, so we can probably ignore those. The last is too specific. The third and fourth bullet points tell us that there's a mix of materials, but most of them are traditional. So that's about the only generalization we can make about materials from the information given. The answer choice should probably mention traditional versus modern materials.

Scanning the answer choices, we see that answer C says exactly what is needed: mostly traditional, but some modern materials, too. Answer A names specific materials and doesn't make a generalization. Answers B and D give some information about the dhow, but fail to say anything about materials.

Problem 1

Official Answer: A

Four seconds at 16 meters per second makes 16·4=64 meters.

Problem 2

Official Answer: D

If you are familiar with slopes, intercepts, and the slope-intercept form of linear equations, this one is obvious. You could write the equation for a line with a slope of 4 and a y-intercept of 6 to obtain $y = 4x + 6$, which is answer choice D. Or you could just examine the four answer choices and realize that A and B have the wrong slope, and A-C all have the wrong y-intercept.

Problem 3

Official Answer: B

None of the terms are like terms so they can't be combined. You'll also notice that all four choices consist of a monomial multiplying a polynomial, so this is a question of factoring out a common factor. None of the numbers have common factors, but we can factor out x^3 from the variable part of all terms, leaving behind $5x^2 - 6x + 8$, so the factored form of the given polynomial is $x^3(5x^2 - 6x + 8)$, which is answer B.

(If you are not in a hurry and you want to double-check your answer, especially since B and C are so similar, you can always multiply the monomial by the trinomial to see if you get back to where you started.)

Problem 4

Official Answer: B

If one number is 670, and the total of both numbers is 1440, then the other number must be the difference: 1440-670=770, which is answer B.

Problem 5

Official Answer: B

Whenever you see "selected a sample at random" in an SAT problem, there's a good chance it will reduce to a proportion problem. Samples are always taken on the assumption that the sample is representative of the larger group from which they are taken, and that we can extrapolate or "scale up" from the sample to the larger population. In this case, we want to estimate how many out of 400 are enrolled in something, based on 16 out of 20 being enrolled. Setting this up as a proportion problem, we have this:

$$\frac{16}{20} = \frac{x}{400} \tag{1}$$

$$x = 400 \cdot \frac{16}{20} = 320 \tag{2}$$

You could also calculate that 16 out of 20 is 80%, and 80% of 400 is 320.

Problem 6

Official Answer: A

Notice that the expression in parentheses is the same as the left-hand side of answer choices A and B. What happens if we just divide the entire equation by 7? We obtain $2x - 3 = 9$, which is answer choice A.

Problem 7

Official Answer: A

To obtain c by itself on one side of the equation, all we need to do is add 7:

$$c - 7 = 25p + k$$
$$c = 25p + k + 7$$

Problem 8

Official Answer: C

The only difference among the four answer choices lies in the "base" or rate factor. What base corresponds to an increase of 3%? Answer C is correct. Answer A corresponds to a tripling, or an increase of 200%, answer B corresponds to an increase of 97%, and answer D corresponds to a *decrease* of 3%.

Problem 9

Official Answer: B

This one is straightforward, if messy. We need to expand the parentheses, and then combine like terms:

$$(x^2 + 11)^2 + (x - 5)(x + 5)$$
$$= x^4 + 22x^2 + 121 + x^2 - 5x + 5x - 25$$
$$= x^4 + 23x^2 + 96$$

In problems like this, you can often save a lot of time simply by checking the leading and trailing terms. In

this case, the leading term must be x^4, which doesn't help us, since all four answer choices give this term correctly. However, the trailing or constant term must be $11^2 - 25 = 96$, and only answer B contains this number as the trailing term.

Problem 10

Official Answer: 18

The height from which the egg was thrown is the starting height, i.e. the height at $t = 0$. From the formula, we see that $h(0) = 18$. The egg was thrown from a height of 18 meters (with an upwards velocity of 9 meters per second, and a downwards acceleration of 9.8 meters per second per second). The correct answer is 18.

Problem 11

Official Answer: B

$$\begin{aligned} 4\sqrt{2x} &= 16 \\ \sqrt{2x} &= 16/4 = 4 \\ 2x &= 4^2 = 16 \\ 6x &= 16 \cdot 3 = 48 \end{aligned}$$

If you finished your labors with $x = 8$ instead of $6x = 48$, you would have discovered that 8 isn't among the answer choices. That would have been a clue that you should go back and double-check what it was that they actually asked for. But you shouldn't rely on not finding your result among the answer choices as a clue that you've done something wrong. The SAT anticipates common mistakes, and often puts the erroneous results among the answer choices, so it can pay to get in the habit of doing a quick editing pass over your work, looking especially to ensure that you are giving them what they asked for and not something more obvious.

Problem 12

Official Answer: C

All four answer choices give a linear equation in slope-intercept form. You could figure out the intercept if you wanted to, but the slope is easier, and in this case it is enough to reach the correct answer. They tell you that y increases by 8 whenever x increases by 1, so the slope is 8, and only answer C has this slope.

If you want further confirmation, you can extrapolate backwards two steps at a slope of 8 from (2,18) to (0,2) to discover that the y-intercept is 2, confirming that C is the correct answer.

Problem 13

Official Answer: D

There is no way to square a number and produce a negative number. (Well, there is if you accept imaginary numbers, but there are no imaginary numbers on the SAT. They asked for *real* solutions, not imaginary ones.) If you try to solve the equation by taking the square root of both sides, you end up having to find the square root of a negative number, which doesn't exist. So there are no (real) solutions to this equation.

Problem 14

Official Answer: 4

Range of B:	10 - 1	= 9
Range of A:	5 - 0	= 5
Difference between Ranges:	9 - 5	= 4

Problem 15

Official Answer: D

A right square prism is a box with a square cross-section. If the side of the square is 6, the area of the square is 36. The volume of the box can be calculated as the product of the height and the base area, meaning that the height can be calculated as the volume divided by the base area. Dividing 2880 by 36 gives 80.

Problem 16

Official Answer: A

This one depends on your understanding of the base or rate constant in exponential functions, but you don't need to know much. The function is decreasing, which means that the rate factor must be less than 1, and there is only one choice that is less than 1.

If you want a more precise estimate, you could notice that in going from $x = 0$ to $x = 1$, the function drops from about 130 to about 110, which is a shrinkage factor of $110/130 = 11/13 \approx 0.85$, which is pretty close to answer A.

Problem 17 Official Answer: .3928, .3929, 11/28

This is obvious if you remember the definition of cosine. In this problem, you are given the measurements of the hypotenuse and the side adjacent to the angle in question, and these two sides are exactly what are required to calculate the cosine ratio:

$$\cos(x) = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{11}{28}$$

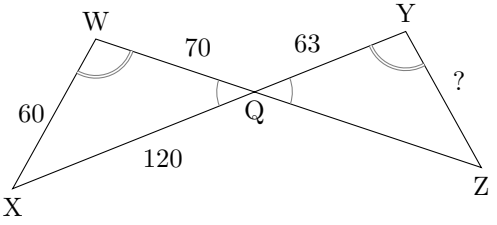
This one is classified as "hard", for some incomprehensible reason.

Problem 18 Official Answer: C

We're given a cubic equation in factored form, which makes the solutions very easy to see. They are -2, 5, and -9. The only positive solution, and the only solution listed among the answer choices, is 5, making C the correct answer.

Problem 19 Official Answer: 54

If you haven't done so already, draw a sketch and label everything that you know. It should look something like this:



The two angles at Q are vertical angles, and we are (rather subtly) informed that the angles at W and Y are also equal. The two triangles share two pairs of equal (or "congruent") angles, meaning the third pair is also equal and that we are dealing with similar triangles. Similar triangles have the same ratio among all pairs of sides, so we can set up a simple proportion:

$$\frac{YZ}{WX} = \frac{YQ}{WQ}$$
$$\frac{YZ}{60} = \frac{63}{70}$$
$$YZ = 60 \cdot \frac{63}{70} = 54$$

Problem 20 Official Answer: 336

They give us a function, and they ask us for the y-intercept.

$$g(x) = (x+14)(t-x)$$
$$g(0) = (0+14)(t-0) = 14t$$

If we can figure out the value of t, then we can find $g(0)$ by multiplying it by 14. To find the value of t, we need to use the other piece of information that they give us, namely that the curve passes through the point (24,0).

$$\begin{aligned} g(x) &= (x+14)(t-x) \\ g(24) = 0 &= (24+14)(t-24) \\ &= 38(t-24) \\ t-24 &= 0 \\ t &= 24 \end{aligned}$$

Multiplying 24 by 14 gives $g(0) = 336$.

Problem 21 Official Answer: 79

A math problem near the end of the test that doesn't seem obnoxious should set off a caution light in your head. Beware of sneaky tricks. In this case, notice that they reversed the years. They are asking for the 2014 value as a percentage of the 2018 value.

Otherwise, this problem is fairly straightforward. It boils down to: What is the percent change for a multiplication factor of 1/1.27?

$$\frac{1}{1.27} = 0.7874, \text{ or } 78.74\%$$

This is a free-response question, so be extra careful to give them what they ask for, which in this case is a whole number. Rounding the value of 78.74 to the nearest whole number gives 79.

Problem 22 Official Answer: A

Circle A: They give us both a graph and an equation, and from either one we can find the center and the radius. The center is located at $(-2, 0)$, and the radius is 3.

Circle B: Shifting Circle A down by 6 units moves the center to $(-2, -6)$, and doubling the radius gives a new radius of 6. The equation for a circle centered at $(-2, -6)$ with a radius of 6 is $(x+2)^2 + (y+6)^2 = 36$, which matches answer A.

Problem 1

Official Answer: B

A meter is bigger than a centimeter, so there should be fewer of them.

$$\frac{2300}{100} = 23$$

Problem 2

Official Answer: B

This is a "reverse evaluation" problem, which you can handle in exactly the same way as solving an equation:

$$\begin{aligned} f(x) = 8x &= 72 \\ x &= 72 \div 8 = 9 \end{aligned}$$

Problem 3

Official Answer: B

Ten percent of 440 would be 44, and doubling 44 gives 88. In symbols, $\frac{20}{100} \cdot 440 = 88$.

Problem 4

Official Answer: A

If you remember that angles in a pair of vertical angles are equal to each other, the answer is obvious. (Even if you don't remember this rule, it's almost obvious from the figure.) Angle 2 equals Angle 1 equals 72°.

Problem 5

Official Answer: A

You can either use trial-and-error, or solve the equation explicitly.

$$\begin{aligned} (p+3)+8 &= 10 \\ p+11 &= 10 \\ p &= 10-11 = -1 \end{aligned}$$

Problem 6

Official Answer: 3

If they gave you a number line with a dot on it, could you read the dot's position on the number line? That's all you need to do here. In this case, the dot is located at $y = 3$. This is a free-response question, so you have to assume that the dot indicates whole numbers, as opposed to $y = 3.02$ or some such thing, but that's a reasonable assumption in cases like this.

Problem 7

Official Answer: B

Remembering that "solution" = "intersection", we simply have to locate the intersection. It's at (2,4), which is answer B.

Problem 8

Official Answer: D

Since there's no linear term, just isolate the squared variable, and then take the square root.

$$\begin{aligned} k^2 - 53 &= 91 \\ k^2 &= 91 + 53 = 144 \\ k &= \pm\sqrt{144} = \pm 12 \end{aligned}$$

They ask us for the positive solution, so D is the correct answer.

Problem 9

Official Answer: 6

This "system" can be solved by simple substitution:

$$\begin{aligned} x + 3y &= 26 \\ 8 + 3y &= 26 \\ 3y &= 26 - 8 = 18 \\ y &= 18 \div 3 = 6 \end{aligned}$$

Problem 10

Official Answer: D

We are told that the airplane's speed varies between two limits. It is always greater than the lower limit and always less than the upper limit, and we can express this in a single statement like this: $150 \leq s \leq 170$.

Answer choices A-C all state that there is a maximum speed, but they don't say anything about a minimum speed. Answers A and B don't even give the correct maximum. Answer D is the only one that correctly expresses the range of speeds as being greater than 150, and less than 170.

Problem 11

Official Answer: C

Just read the coordinates of the dot: (1,5).

The point (4,2) may resemble an intersection of two lines, but if you remember that absolute value functions are typically V-shaped when you graph them, you'll realize that this point is simply the vertex of the absolute value function.

Problem 12

Official Answer: D

$$g(x) = |x + 18|$$
$$g(4) = |4 + 18| = |22| = 22$$

Problem 13

Official Answer: C

If there are two sides 10 feet long, and the total is 36 feet, then the remaining side must be 36-20=16 feet long.

Problem 14

Official Answer: 20

In a linear graph, the y-intercept represents the initial or starting value. (More generally, it represents the y-value when $x = 0$, but in most realistic situations this is probably a starting value of some kind, especially if time is the independent variable.) In this case, we can find the initial deposit into the account simply by locating the y-intercept of the graph. It's at $y = 20$.

(This is a free-response questions, so you might worry about whether the value is exactly 20 or only very close to it, but they say "to the nearest whole dollar", so you don't need to worry about fine distinctions. The SAT writers like to be ornery, but they aren't mean-spirited enough to make the correct answer 20.4 or 19.97. It's just 20.)

Problem 15

Official Answer: D

The three probabilities have to add up to 1, since there is a 100% chance of picking someone in one of the three theaters, so we can find the missing probability by subtracting the other two from 1. The probability of picking someone in theater C is therefore 1-0.48-0.24=0.28. The number of people in theater C must therefore be 0.28 or 28% of the total, or 0.28·350=98 people.

Problem 16

Official Answer: 774

This could have been worded more clearly. Considering that it's a free response question, it probably should have been. You might be tempted to interpret "in 9 weeks" to mean "9 weeks from now" or "in the ninth week". If you read it that way, you might think "That's just 2/5 of $215" and answer $86. But unless the problem is very near the beginning of the test, a problem that seems easy should raise a red flag in your mind. In this case, what they meant to say was "How much will he have saved altogether after 9 weeks have passed?" In other words, you need to multiply $86 per week by nine weeks to get a cumulative total of $774.

Problem 17

Official Answer: D

Start with $x = 0$, because that's easy to evaluate. $q(0) = 32$, which eliminates answers A and B. The difference between C and D lies at $x = -1$, so let's try that next. $q(-1) = 32(2^{-1}) = \frac{32}{2} = 16$, making D the correct answer.

You could also rule out answers A and C if you recognize that they do not show a geometric progression.

Problem 18

Official Answer: C

If you've forgotten how to calculate the volume of a cylinder, the formula is given in the reference pop-up. The rest is straightforward evaluation of the formula, as long as you remember to cut the diameter in half to get the radius.

$$\begin{aligned} V &= \pi r^2 h \\ &= \pi(11)^2 \cdot 6 \\ &= 726\pi \end{aligned}$$

Problem 19

Official Answer: 14.66, 14.67, 44/3

This is a messy equation, but it isn't too hard to rearrange it into "slope-intercept form" so that we can

determine the slope.

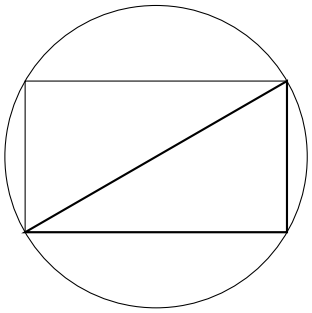
$$\begin{aligned} y &= \frac{1}{3}(29x + 10) + 5x \\ &= \frac{29}{3}x + \frac{10}{3} + 5x \\ &= \frac{29 + 15}{3}x + \frac{10}{3} \\ &= \frac{44}{3}x + \frac{10}{3} \end{aligned}$$

The slope is 44/3. You can also enter the decimal equivalent, rounded either way, into the answer box: 14.66 or 14.67.

Problem 20

Official Answer: 66

Try drawing a sketch. We have an oblong rectangle, inscribed in a circle, so the situation looks like this:



Next, they tell us that the diagonal of the rectangle is twice as long as the short side. Do you notice anything about the diagonal? It's the same as the diameter of the circle, which is what they want us to find. So if we can calculate the diagonal of the rectangle, we'll be done. Now, if you focus your attention on one triangle within the rectangle, do you notice anything? It's a right triangle, with the hypotenuse twice as long as the short side. That makes it a 30-60-90 right triangle, for which the ratios of the sides are given on the reference page. (If you don't recognize that it's a 30-60-90 right triangle, you can still calculate the length of the long leg, but you have to use the Pythagorean Theorem and it's messier.)

So far, we only know ratios or relative dimensions. The only absolute measurement they give us is the area of the rectangle, so we'll have to work backwards from that. If we let the length of the short side be x, then the length of the long side (from the 30-60-90 triangle ratios or from the Pythagorean Theorem) is $\sqrt{3}x$, and the area of the rectangle is therefore $\sqrt{3}x^2$. Since we know the area, we can work backwards to find x:

$$1089\sqrt{3} = \sqrt{3}x^2, \text{ or } 1089 = x^2, \text{ or } x = \sqrt{1089} = 33$$

Now, since we want the diameter of the circle, which is the same as the diagonal of the rectangle, which is twice as long as the short side, we simply have to double the value of x to find the diameter: $2x = 66$.

Problem 21

Official Answer: D

Do we really have to substitute all twelve coordinate pairs into the inequality to check for validity? Notice that all tables have the same three x-values and the same three y-values, just in different orders. One way to handle this in an efficient way would be to construct our own table of inequalities for the three x-values. We can solve for y, and then substitute the three values of x, like this:

x	$y < 2x - 883$
440	$y < -3$
441	$y < -1$
442	$y < 1$

Now we can check the four tables. For $x = 440$, $y < -3$, and only table D satisfies this requirement. We can stop here, although it would only take a few more seconds to check the other rows, just to help catch possible mistakes and boost our confidence in the answer.

Problem 22

Official Answer: C

This is a slight variation on the "set up a system" type of problem. We still need to set up two summation equations, but in this case, they both sum up a monetary bill — one before and one after a discount. *Be careful* when converting percents into decimals. In this case, we need to sum up the prices remaining after the discount, so we need to subtract the given percents from 100:

$$\begin{aligned} \text{Before Discount:} \quad & m + v &&= 60 \\ \text{After Discount:} \quad & 0.75m + 0.55v &&= 39 \end{aligned}$$

If you overlooked the fact that you need to subtract the percentages from 100, a quick scan over the answer choices might have given you pause. They are identical except for the coefficients, so what's the difference? Where did "0.55" and "0.75" come from? They came from subtracting the discount percentages (as decimals) from 1 to find the remaining proportions due.

Problem 1

Official Answer: B

You could set this up as an equation, but it may be easier just to reason backwards. To go from 4500 to 1700 means that 2800 cups were used. If they are used at the rate of 70 per day, then it will take $2800 \div 70 = 40$ days.

If you want to set this up as an equation and then solve the equation, it should look something like this:

$$\begin{aligned} 4500 - 70x &= 1700 \\ 70x &= 4500 - 1700 = 2800 \\ x &= 2800 \div 70 = 40 \end{aligned}$$

Problem 2

Official Answer: A

If the sum of all three angles is 180°, and $\angle R = 63°$, then this leaves 180-63=117° left over for the other two angles. Only answer A is less than 117.

Problem 3

Official Answer: A

All four data tables have the same three x values, so we'll have to check at most three values. Let's start by checking $x = 2$. Substituting this value for x into the inequality turns it into $y > 16$. Only answer A has a y-value greater than 16 in the $x = 2$ row of the table.

A complete list of cutoff values would look like this:

$x = 2$	$y > 16$
$x = 4$	$y > 24$
$x = 6$	$y > 32$

Answer A satisfies all of these requirements.

Problem 4

Official Answer: 3

$$f(x) = \tfrac{9}{7}x + \tfrac{8}{7}$$

$$5 = \tfrac{9}{7}x + \tfrac{8}{7}$$

$$\tfrac{9}{7}x = \tfrac{35}{7} - \tfrac{8}{7} = \tfrac{27}{7}$$

$$x = \tfrac{7}{9} \cdot \tfrac{27}{7} = 3$$

Problem 5

Official Answer: D

We are told that the airplane's speed varies between two limits. It is always greater than the lower limit and always less than the upper limit, and we can express this in a single statement like this: $150 \leq s \leq 170$.

Answer choices A-C all state that there is a maximum speed, but they don't say anything about a minimum speed. Answers A and B don't even give the correct maximum. Answer D is the only one that correctly expresses the range of speeds as being greater than 150, and less than 170.

Problem 6

Official Answer: B

The graph begins its reporting period at the end of November 2012, so just read the initial value or y-intercept from the graph. It's 5.

Problem 7

Official Answer: D

The independent variable went down by 2 (from 28 to 26) and the dependent variable went up by 7 (from 15 to 22), so the rate of change (i.e. the slope of a graph) is -7/2, ruling out A and B. If the independent variable continues to shrink from 26 all the way down to zero, the dependent variable is going to increase quite a lot more....definitely far above 23, making B the correct answer.

If you want to calculate the y-intercept explicitly, you can multiply 26 by 7/2 and obtain 91. The y-value must increase by 91, from 22 to 113, as the x-value goes from 26 to 0.

Problem 8

Official Answer: A

Perhaps the simplest way to answer this is to use trial-and-error. Pick a row from the data table, and plug the numbers into each equation. Be careful, because if the numbers don't work, then that answer choice is definitely ruled out, but if the numbers do work, that doesn't necessarily mean that that is the right answer.

Multiplying the number of people by 55 is clearly going to give a huge number, much larger than 9, so we can rule out C and D. We need to multiply the number of cars by 55, not the number of people. The only remaining question is whether $55c - p$ should equal 9 or -9. To

answer this, we can simply plug in $c = 3$ and $p = 174$, which gives $55(3) - 174 = -9$. So A must be the correct answer.

You could calculate the slope and the y-intercept from the given data, write the equation in slope-intercept form, and finally rearrange it into standard form to see which answer choice it matches. But why go to that much trouble if you don't have to?

Problem 9

Official Answer: D

Since all of the answer choices have a square root in them, we know the solutions will be irrational, so it won't do much good to try factoring. We'll have to either complete the square or use the quadratic formula. Let's use the quadratic formula.

$$\begin{aligned} x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\ &= \frac{-12 \pm \sqrt{12^2 - 4(1)(-40)}}{2(1)} \\ &= \frac{-12 \pm \sqrt{144 + 160}}{2} \\ &= -6 \pm \frac{\sqrt{304}}{2} \end{aligned}$$

The only answer that begins with -6 is answer D, so we could probably stop here. Continuing the calculation just to confirm that D is the correct answer...

$$\begin{aligned} x &= -6 \pm \frac{\sqrt{16 \cdot 19}}{2} \\ &= -6 \pm \frac{4\sqrt{19}}{2} \\ &= -6 \pm 2\sqrt{19} \end{aligned}$$

Only answer D matches one of these two solutions.

Problem 10

Official Answer: 189/5, 37.8

This is straightforward, if a bit messy. If we can rewrite the given equation in slope-intercept form, then we can read the intercept value as the constant term in the equation.

$$\begin{aligned} \frac{3x}{7} &= -\frac{5y}{9} + 21 \\ \frac{5y}{9} &= -\frac{3x}{7} + 21 \\ y &= -\frac{9}{5} \cdot \frac{3}{7}x + \frac{9}{5} \cdot 21 \end{aligned}$$

Thus the y-intercept is $\frac{9 \cdot 21}{5} = \frac{189}{5}$.

Another way to find the y-intercept this would be to plug $x = 0$ into the equation and solve for y.

$$\begin{aligned} 0 &= -\frac{5}{9}y + 21 \\ \frac{5}{9}y &= 21 \\ y &= \frac{9}{5} \cdot 21 = \frac{189}{5} \end{aligned}$$

Problem 11

Official Answer: D

This one is tiring.

You could try writing the equations of both lines, rearrange them into standard form, and then see which answer choice matches your equations. This strategy is complicated by the fact that the y-intercepts are fractional, and difficult to estimate. The slopes shouldn't be as much of a problem. The lower line appears to pass through (3,2) and (8,0), giving a slope of -2/5, and the upper line appears to pass through (3,4) and (8,0), giving a slope of -4/5. Thus the equations have to look like this:

$$\begin{aligned} y &= -\frac{2}{5}x + ... \\ y &= -\frac{4}{5}x + ... \end{aligned}$$

Rearranging these equations into standard form makes them look like this:

$$\begin{aligned} 2x + 5y &= \text{a constant} \\ 4x + 5y &= \text{another constant} \end{aligned}$$

This doesn't look like any of the answer choices, but if we double both equations and flip the signs of the second, we have this:

$$\begin{aligned} 4x + 10y &= \text{a constant} \\ -8x - 10y &= \text{another constant} \end{aligned}$$

Only answer D matches this pattern.

Instead of using a "brute force" approach, we could also just start by searching for anything interesting in the graph or the answer choices. In this case, we might remark that both lines in the graph cross at (0,8). This means we can try substituting $x = 8$ and $y = 0$ into every equation to see which equations work and which equations don't. This isn't too difficult, since we can effectively just ignore the y terms and substitute 8 for x. Doing so allows us to rule out A and B, but unfortunately, (8,0) satisfies both equations in C and D, so choices C and D are still both in contention.

Another thing we can easily check is the signs. Both lines clearly have a negative slope, which means that the coefficients of x and y must have the same sign when written in standard form. This rules out B and C and leaves only D.

Problem 12

Official Answer: 1677

Whenever you have an equation on the SAT with multiple parentheses, check to see if any of the parentheses have the same contents. If so, it can save you some work...especially if they ask for something other than just x or y. In this case, we could apply the distributive principle to everything, collect like terms, write both equations in standard form, solve the system for x and y, and then calculate the value of $6(x-2)$. But notice what happens if we just add the two equations:

$$\begin{array}{ll} (x-2) - 4(y+7) = 117 & \\ (x-2) + 4(y+7) = 442 & \\ \hline 2(x-2) & = 117 + 442 = 559 \end{array}$$

Since they ask us for $6(x-2)$, we can just multiply this equation by 3 to obtain $6(x-2) = 3 \cdot 559 = 1677$.

Problem 13

Official Answer: 1728

If they had given the function to us in vertex form, finding the minimum would be easy. What they are expecting us to do is to "complete the square" in order to turn standard form into vertex form. One alternative to this is just to graph the function in Desmos and locate the minimum graphically.

Another simple alternative, if you remember the "vertex formula", is to find the x-value corresponding to the minimum by plugging the appropriate coefficients into the formula, then substitute this x-value into the function to find the corresponding y-value.

$$\begin{aligned} x &= \frac{-b}{2a} \\ &= \frac{48}{2(1)} = 24 \end{aligned}$$

$$\begin{aligned} f(24) &= 24^2 - 48(24) + 2304 \\ &= (24-48)(24) + 2304 = 1728 \end{aligned}$$

To solve the problem by completing the square, we need to add and subtract the square of half of the linear coefficient, so that we can then write x inside the square of a binomial:

$$\begin{aligned} f(x) &= x^2 - 48x + 2304 \\ &= x^2 - 48x + 24^2 - 24^2 + 2304 \\ &= (x-24)^2 - 576 + 2304 \\ &= (x-24)^2 + 1728 \end{aligned}$$

Now the formula is written in vertex form, and we can read the coordinates of the vertex directly from the expression: (24,1728). They ask us for the minimum value of the function, so the answer is 1728.

Problem 14

Official Answer: B

You might be tempted to divide both sides by -49, giving $x = 2x$. Does this have any solutions?

You might also be tempted to divide both sides by x, giving -49=-98, which has no solutions. But if you do this, you will have forgotten that you can only divide by x if $x \neq 0$. You might also recognize from the beginning that $x = 0$ counts as a solution. So the correct conclusion is that this equation has no solutions *other than* $x = 0$. That's one solution, and B is the correct answer.

Problem 15

Official Answer: 25

Whenever you see polynomial functions in factored form, find the zeros. They are probably going to be useful. In this case, the three zeros of the function $g(x)$ are 0, 2, and -6. (The "zeros" are the values of the independent variable that make the function equal to zero, and you can easily find them for any function in factored form by finding the values that make each of the factors zero.)

Now for the obnoxious, twisted part.

In an awkward and very unclear way, they are telling you to equate the three zeros of the function to $7 - w$, find the three corresponding values of w, and then add these three values together. In other words, $7 - w = x$, $w = 7 - x$, and the three values of w corresponding to the zeros of $g(x)$ are these:

x	w
0	7
2	5
-6	13

The sum of these three values for w is 25.

Problem 16

Official Answer: C

This is a mess of information. A sketch of the grove is probably overkill, but a short organized list of information might help.

Birch: 6 rows, each with 8 tall and 6 short
Maple: 5 rows, each with 9 tall and 7 short

When simplifying information, be careful not to oversimplify. If you count 17 tall trees in total, and calculate that the probability of picking a maple is 9/17, you'll arrive at answer D, which is a trap answer. We don't want to overlook the importance of the *rows*, and our list still seems a bit messy, so let's carefully condense all of the information into a simple table of totals before we get carried away with calculations:

	Tall	Short
Birch:	48	36
Maple:	45	35

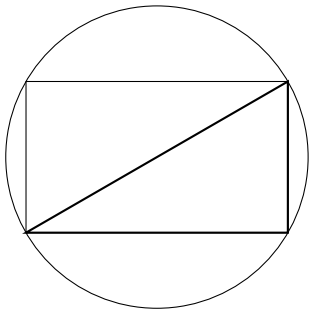
From among the tall trees (93 in total), we want to pick a maple, which gives us 45 choices out of 93. The fraction 45/93 simplifies to 15/31, which is answer C.

This one is classified as "hard", not because the calculation is hard, but because it is hard to wrestle with the confusing pile of information that they have given. And to say "a tree from one of these rows will be selected at random" seems almost deliberately misleading. It's as if they are intentionally trying to get you to focus on individual rows, rather than the whole orchard.

Problem 17

Official Answer: 66

Try drawing a sketch. We have an oblong rectangle, inscribed in a circle, so the situation looks like this:



Next, they tell us that the diagonal of the rectangle is twice as long as the short side. Do you notice anything about the diagonal? It's the same as the diameter of the circle, which is what they want us to find. So if we can calculate the diagonal of the rectangle, we'll be done. Now, if you focus your attention on one triangle within the rectangle, do you notice anything? It's a right triangle, with the hypotenuse twice as long as the short side. That makes it a 30-60-90 right triangle, for which the ratios of the sides are given on the reference page. (If you don't recognize that it's a 30-60-90 right triangle, you can still calculate the length of the long leg, but you have to use the Pythagorean Theorem and it's messier.)

So far, we only know ratios or relative dimensions. The only absolute measurement they give us is the area of the rectangle, so we'll have to work backwards from that. If we let the length of the short side be x, then the length of the long side (from the 30-60-90 triangle ratios or from the Pythagorean Theorem) is $\sqrt{3}x$, and the area of the rectangle is therefore $\sqrt{3}x^2$. Since we know the area, we can work backwards to find x:

$$1089\sqrt{3} = \sqrt{3}x^2, \text{ or } 1089 = x^2, \text{ or } x = \sqrt{1089} = 33$$

Now, since we want the diameter of the circle, which is the same as the diagonal of the rectangle, which is twice as long as the short side, we simply have to double the value of x to find the diameter: $2x = 66$.

Problem 18

Official Answer: D

When in real life would you ever meet a problem like this?

Let's try translating the words and the ridiculous percentage into algebra, starting at the end (where the relationships are simpler) and working backwards:

$$\begin{aligned} b &= 0.83c \\ b+c &= 0.83c + c = 1.83c \\ a &= 22.41(b+c) = 22.41 \cdot 1.83c = 41.0103c \end{aligned}$$

Be careful not to think you are done too early. Always double-check exactly what it is that they are asking for. In this case, it is a as a percent of b.

$$\begin{aligned} a &= 41.0103c \\ &= 41.0103 \cdot \frac{b}{0.83} = 49.41b \end{aligned}$$

Thus a is 4941% of b, and D is the correct answer.

Problem 19

Official Answer: 3.5, 7/2

This problem is just being annoying for the sake of being annoying. It's purely a test of your ability to manipulate a mess of symbols. Like many similar problems on the SAT, you have to rearrange the symbols into parallel patterns, and then match coefficients. (You might be tempted to try to clear the fractions by multiplying by a common denominator, but the mix of denominators means that you'll have to multiply by at least 56. It's huge numbers versus fractions. Let's just stick with fractions.)

The equations are both linear, so for the given system to have no solution, the slopes or rate coefficients must be equal. So let's rewrite both equations in slope-intercept form and then compare the slope coefficients. Combining like terms and then rearranging the equations into slope-intercept form makes them look something like this:

$$\begin{aligned} \frac{14}{8}y &= \frac{5}{8}x + \frac{4}{7} \\ py &= \frac{5}{4}x + \frac{7}{4} - \frac{15}{4} \end{aligned}$$

At this point, we can just ignore the constant terms, because all we care about is the slope. (If the constant terms turned out to be equal, then the system could not have "no solutions", so the problem setup guarantees that the constant terms must be different.) If we multiply the first equation by 2, this will make the slope coefficients equal, and allow us to compare p to the coefficient on y in the first equation.

$$\begin{aligned} \frac{14}{4}y &= \frac{5}{4}x + ... \\ py &= \frac{5}{4}x + ... \end{aligned}$$

Thus we can conclude that $p = 14/4 = 7/2 = 3.5$.

Problem 20

Official Answer: A

We are interested in $f(x)$, but the table only gives us values of $g(x)$, so maybe it would be useful to add a third column to the table representing $f(x)$. We can do this by inverting the given relationship between g and f.

x	$g(x)$	$f(x) = g(x) \cdot (x+3)$
-27	3	-72
-9	0	0
21	5	120

Since $f(x)$ is linear, finding the y-intercept of $f(x)$ is just a matter of interpolating the value of $f(0)$ from the data in the table. Going from $x = -9$ to $x = 21$ brings $f(x)$ from 0 to 120, which is a slope or increase rate of 120/30=4. At this rate, going from $x = -9$ to $x = 0$ should bring us from 0 to 4·9=36. If you really must express the y-intercept as a coordinate pair, it's (0,36).

If you want to be more formal, you could use a linear interpolation formula, which is basically just an equation of two slope calculations.

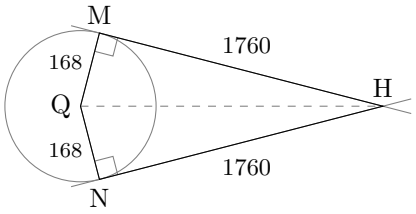
$$\begin{aligned} \frac{y_2 - y_1}{x_2 - x_1} &= \frac{y_3 - y_1}{x_3 - x_1} \\ \frac{y_{int} - 0}{0 - {}^{-}9} &= \frac{120 - 0}{21 - {}^{-}9} \\ \frac{y_{int}}{9} &= \frac{120}{30} \\ y_{int} &= 9 \cdot \frac{120}{30} = 36 \end{aligned}$$

Problem 21

Official Answer: D

If you haven't done so already, draw a sketch and label everything that you know.

The quadrilateral consists of two radii of the circle and two segments tangent to the circle. It's a symmetric "kite" shape. We can find the length of each tangent segment by subtracting twice 168 from 3856, and then cutting this in half: (3856-2·168)/2 = 1760



The quadrilateral is symmetric, and each half is a right triangle, for which we now know the legs. And the hypotenuse is what we are asked for. So now we can simply use the Pythagorean Theorem:

$$\sqrt{168^2 + 1760^2} = 1768$$

Problem 22

Official Answer: A

What a mess of symbols. Let's just take it step-by-step, and ask what we can easily figure out from what we are given. We might end up taking steps in erratic directions, but the sequence of steps should eventually bring us to an answer.

In this case, we see that the curve is quadratic, i.e. it's a parabola in the coordinate plane. They tell us that this parabola passes through the points (7,0) and (-3,0), i.e. two points on the x-axis. In other words, 7 and -3 are the zeros of the function. Since parabolas are always symmetric, we can deduce from this that the vertex and the axis of symmetry must lie exactly halfway between these points, at $x = (7 - 3)/2 = 2$.

The vertex formula seems like it might be relevant here, so let's see what we can learn from it.

$$x = \frac{-b}{2a}$$

$$2 = \frac{-b}{2a}$$

$$4a = -b$$

$$b = -4a$$

$$a + b = -3a$$

If a is an integer greater than 1, we can reason that $a + b = -3a$ must be an integer less than -3. Only answer A contains an integer less than -3.

Knowing that the two zeros of the function are 7 and -3, we could also have written the function in factored form like this:

$$\begin{aligned} f(x) &= a(x - 7)(x + 3) \\ &= ax^2 - 4ax - 21a \end{aligned}$$

From this we could have deduced that $b = -4a$, $a + b = -3a$, and then reasoned as before.