Bluebook 7

Question explanations to accompany SAT practice test #7

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Problem 1

Official Answer: D

Boil down the relevant clause: "Maple trees may _____ changes in climate." What would trees do to or with a changing climate? Would the trees "respond to" changes in climate? Do any of the answer choices sound like "respond to"?

Unless they can pull up their roots and walk away, the trees can't "relocate from" changes in climate. Unless they grow voices and start complaining, they can't "refer to" changes in climate. And unless the trees mutate into something new, they can't "originate from" changes in climate. Obviously the trees are going to "adapt to" changes in climate.

Problem 2

Official Answer: D

This one is pretty simple. The prose is quite understandable, and we clearly need a synonym for "invisible". The answer is obviously "transparent".

Problem 3

Official Answer: D

If the bursts typically last for less than 2 seconds, and this one lasted for 200 seconds, how would you describe it? The emphasis here needs to be on how *unusual* this is. You might call it a "coincidence" or an "incident" in a different context, but only "oddity" conveys that it is unusual.

Problem 4

Official Answer: B

When you see "this" followed by a blank, that's always a clue. This what? Look at the previous sentence to find out. In this case, we are referring to his "popularity". What's a good synonym for "popularity"? "Esteem" might sound a little unfamiliar when used in this way, but hopefully you'll realize that it means something like "positive opinion". If not, perhaps you'll at least realize that none of the other choices work as synonyms for "popularity".

Problem 5

Official Answer: A

You can probably realize that this sentence is setting the context for what comes next. It presents a common belief, so that the rest of the paragraph can say, "no, that's wrong!" This is more or less what answer choice A says.

You can probably rule out B and C easily. There is no experiment and no design, only collection of data, and that is only mentioned two sentences later. There is also no disagreement between Tharp and Heezen anywhere in the passage. Answer D might sound plausible after a very hasty reading, but closer inspection should show you that there is no data in the sentence.

Problem 6

Official Answer: B

A — Does the underlined sentence compare radio with television? No, the previous sentence did that.

B — Does the underlined sentence identify a reason for advertisers to be hesitant about TV? Yes. TV manufacturing was down.

C — Does the underlined sentence describe broadcasters' efforts to convince advertisers to support TV? No. The *next* sentence says that they *needed to*, but it doesn't say *how*, and anyway, it's the wrong sentence.

D — Does the underlined sentence explain the popularity of one type of programming? No sentence anywhere in the paragraph does that.

So the most appropriate answer is B.

Problem 7

Official Answer: D

What's the main topic of discussion, and what's the main thing being said about this topic? This paragraph is all about pteropods and their shells. More specifically, it's about whether the shells will dissolve or not, and the discovery that they're more resilient than expected.

There is no call to action, so we can rule out A. Answer B might look tempting at a first glance, since much of the paragraph does concern the conclusion of a research study. But careful attention to the words shows that this one has the jargon backwards. The periostracum protects the calcium carbonate, not the other way around. You can probably rule out C pretty easily. It's too broad and off-topic. Answer D is the only acceptable choice. The text does present findings, there was a concern mentioned about acids dissolving shells, and the findings do suggest that that concern may be unwarranted.

Problem 8

Official Answer: D

What do "some researchers contend"? That tectonic activity is about 3 billion years old, judging from computer simulations. Does the author of Text 2 have anything to say about the age of the activity or about computer models? Text 2 begins by saying that empirical evidence is necessary, thus implying that computer models are insufficient, and then cites empirical research pointing to a much earlier date. So Author 2 would probably say something like this: "The contentions of some researchers are wrong. Their estimates are too recent, because they relied on computer models. Chemical evidence is better, and chemical evidence says it happened much earlier." Answer D isn't this specific, but otherwise it says more or less this same thing.

Author 2 said nothing about temperature, so we have no grounds for choosing answer A. Author 2 preferred physical evidence over computer models, not one computer model over another computer model, which makes answers B and C inappropriate.

Problem 9

Official Answer: A

This looks like a fact-finding question, but they ask us broadly about pearl octopuses and the Octopus Garden, and most of the paragraph is about these things, so it is difficult to focus on any particular fact. Let's just try to pick the most interesting information from the paragraph, and then nitpick the answer choices one by one.

In a nutshell, the paragraph describes an unusual deep-water site with (relatively) warm water and lots of octopuses. The second half describes how it is probably used *exclusively for reproduction*, since there are no juveniles present, only adults (presumably mothers or mating couples), along with hatchlings and eggs.

Answer A gives a perfectly reasonable inference from this discussion. Since no adolescent octopuses are found there, we can reasonably assume that they leave, only to come back as adults when it is time to mate.

The paragraph made no mention of variations in temperature or in population, so B is a non sequitur. Similarly, the paragraph made no mention of the sizes of nests or of eggs, and it made no mention of food supply or feeding behavior, so answers C and D are out as well.

Problem 10

Official Answer: B

What's the gist of the paragraph? What's the theme? There's an introductory sentence that sets the context (using nature to protect ecosystems) and the rest of the paragraph is a discussion of a specific example of this.

This problem is a tricky one, because all four answer choices might make sense after an initial reading. We'll have to get out our magnifying glasses and inspect each answer choice more closely.

A — The partnership between the Quinault Indian Nation and Wild Salmon Center was a significant part of the paragraph, but what was the significance? Was it to show the importance of *collaboration*? That's not what the introductory sentence mentioned. The introductory sentence mentioned *nature-based initiatives*, and the rest of the paragraph gave an example of a nature-based initiative.

B — The introductory sentence did mention nature-based approaches, and the rest of the paragraph can be viewed as a successful example of a nature-based approach, so this one seems ok.

C — According to the paragraph, logjams can help blueback salmon thrive and reproduce, or at least they did in this example, and this was "indicated by a recent project". This answer is a perfectly reasonable statement based on the paragraph...but was it the *main idea*? The trials and tribulations of blueback salmon were only discussed as an example of a broader theme, the one mentioned in the introductory sentence.

D — This might also sound reasonable, but it makes it sound as if scientists had been foolish before, and now they know better. There was no discussion of scientists changing their minds. There was also no discussion of long-term versus short-term solutions.

Answer B is pretty broad, but that's quite common for a "main idea" question on the SAT, and answer B is the most appropriate of the choices.

Problem 11

Official Answer: B

What in the world is going on in this graph? It takes a while to figure this out. The x-axis is apparently some kind of ranking of the "ignobility" ... of *participants*. Apparently, some researcher invented a way of rating your "ignobility", and then he gathered together some "participants" and rated them all on a scale of 1-7.

The y-axis is some kind of likability rating ... for *candidates* for some kind of political office, apparently. This researcher seems to have made up a way of ranking "likability" along with "ignobility", and then used it to evaluate different people in different ways. After chewing on the mess of information for a while, we see that the "researchers" gave an "ignobility score" to the *participants*, and then the *participants* gave a "likability score" to the candidates-for-something.

The legend distinguishes between "admirable" and "ignoble" candidates-for-something, based on how they are portrayed in some made-up stories. Judging from the paragraph, the participants are asked to judge the likability of both admirable and ignoble people in the stories, and the researchers are trying to see if bad people like bad people more than they like good people ... or something like that.

The setup may be weird, but the trends in the graph are pretty clear. (Lines this straight in a sociological study with made-up ranking scales should make a critical thinker wonder whether the data is also made up, or at least "smoothed" in some way.) Judging from the graph, good candidates are liked by good and bad people equally. But bad candidates evoke a much more varied response. Good people don't like bad candidates much, but the less good you are, the more you like the bad candidate. Really bad people like bad candidates even more than they like good candidates.

Before we try to tackle the long answer choices and see if we can figure out what each of them means, let's look at the conclusion that we are supposed to support. The conclusion is apparently that everybody likes the good candidate better than the bad candidate, except for the very worst participants, who like the bad candidate a little better than they like the good candidate. We can support this simply by pointing out that the black triangles are higher than the gray squares everywhere except at the far right end of the graph.

Now we have to figure out which of the very long answer choices actually says this.

A — This one is factually false. It has the two candidates reversed.

B — This one is a long-winded but accurate presentation of the data in the graph, and it points out that most of the better participants liked the admirable candidate more, but the worst participants liked them equally or even liked the bad candidate better. This must be the correct answer. (And given how convoluted and obscure the question is, it makes sense that the correct answer is also the longest one.)

C — This one is accurate, but it only mentions the good candidates and not the bad candidates. It makes no comparison between the two types of candidate, which was the main purpose of the study.

D — This one is also accurate, but it merely points out that there are differences, without saying anything useful about the nature of the differences.

Problem 12

Official Answer: A

Why do the SAT writers give us such painful challenges in English and math, but they don't seem to care about our education in geography? Do they really need to tell us that "Puerto Rico is an island in the Caribbean Sea"?

Anyway, what's the claim we are supposed to weaken? It's that guinea pigs probably came to Puerto Rico from Columbia and not Peru. If you *do* have a good education in geography, you'll probably realize that Columbia has a coast on the Caribbean Sea but Peru lies on the other side of the continent. So geographically, it makes perfect sense that the guinea pigs came to Puerto Rico from Columbia rather than from Peru. But we are supposed to argue *against* this conclusion. We need to support the idea that the guinea pigs actually came from far-away Peru instead of nearby Columbia. We'll have to look for evidence in the guinea pigs themselves, and you'll notice that all four of the answer choices have to do with the characteristics of guinea pigs. Any similarities of Puerto Rican guinea pigs to Peruvian guinea pigs would weaken the claim. So would any differences between Puerto Rican guinea pigs and Columbian guinea pigs. Answer A says that Puerto Rican guinea pigs were more like those in Peru than those in Columbia, so that's probably the correct answer.

Answer B says nothing about guinea pigs outside of Puerto Rico, so that doesn't do anything to support or weaken the claim. Answer C lumps all three countries together, and instead contrasts ancient guinea pigs with modern guinea pigs. Answer D brings in the size of the population of guinea pigs, but the population in the country of origin probably didn't have much to do with their emigration, and even if it did, a larger population in Columbia would help *support* the conclusion that they came from Columbia, not weaken it.

Problem 13

Official Answer: C

What's the hypothesis that we need to support? In a nutshell, we could put is like this: "having to think about what you're doing with an ad makes it more likely that you'll remember it." Or more simply, interactivity makes ads more memorable. What would support such a conclusion? Seeing active people remembering more ads, and passive clickers remembering fewer ads. Answer C gives us an example of this.

Answers A and B say nothing about remembering ads, so they can't support a claim about how likely you are to remember ads. Answer D brings in the issue of *how long* you can remember an ad, and says nothing about different kinds of interactions, so this can't support a claim that more interaction means better memory.

Problem 14

Official Answer: A

They give us a big table of data, and the answers are all quantitative. Let's start by checking the answer choices against the table for factual accuracy. (That's actually all we *can* do, since there is no conclusion or hypothesis for us to support or weaken. This is purely a data-lookup question.) The answer choices all refer to the time interval between consecutive pulses, and if you've never taken a physics class, the brief text tells you that this time period is called the "period". In other words, we can just focus on the middle column of data and ignore the other two. Checking the answer choices against the middle column in the table, we find that answer A is accurate and the other three are all false.

Problem 15

Official Answer: C

If you had to fill in the blank yourself, what would you say? "If the tusk were so important, then shouldn't they all have one?" That's more or less what answer C says, and the others are complete non sequiturs. Habitats and other animals besides whales were never mentioned, so A and B do not follow at all. And answer D makes a completely unwarranted prediction about the future. Predictions about the future are never correct on the SAT.

Problem 16

Official Answer: B

The foreign-derived noun may be a little distracting, but the "the" makes clear that it is a singular thing. Just try reading the four verb choices with "it" or "the thing".

The thing have been...
The thing is...
The thing were...
The thing are...

If you are a college-bound student, the answer should be obvious.

Problem 17

Official Answer: C

You might notice that all four answer choices contain the word "characterized". One has this word alone, and the other three supplement it with helping verbs. This may give you a hint that the one without helping verbs is the correct answer.

To decide for sure, boil down the sentence: "This painting is inspired by the tradition of {foreign name}, a type of painting _____ by the use of stuff." The main clause is "the painting is inspired by a tradition", and the stuff after the comma is a supplementary comment describing the tradition. Answers A, B, and D all try to turn the supplementary comment into a second independent clause by filling the blank with a verb. They might be valid and interesting clauses, but we can't attach them to the previous clause with merely a comma. Answers A, B, and D all result in a comma splice, and only answer C avoids this mistake by filling the blank with a participle. Participles like "characterized" can work alone as adjectives, or in conjunction with various helping verbs to form various verb tenses. We need the adjective, not another verb.

Problem 18

Official Answer: C

Check both sides of the blank. "Scholars dreamed of locating a copy of the lost work" is a valid independent clause. So is "That fantasy became reality." We are dealing with two independent clauses, and that requires either a period to separate the clauses, or a strong joint to make a valid compound sentence. Lacking a semicolon or a comma-plus-conjunction, our only option is to isolate the clauses in two separate sentences, which is what answer C does.

Problem 19

Official Answer: D

Where are the main clauses in this mess of words? There is only one: "Transitional design splits the difference." Everything else is supplementary stuff. "With a blend of stuff" and "a mixture that is seen in the US" are both supplementary phrases, not independent clauses, and they cannot stand on their own as complete sentences. Colons, dashes, and periods all require a complete clause to precede them, ruling out A-C. The comma is the appropriate mark to separate the initial supplementary stuff from the subsequent main clause, making D the correct answer.

If you noticed that the answer choices contain three "strong" marks and one "weak" mark, this should have given you a strong suspicion from the beginning that the weaker comma would be the correct answer.

Problem 20

Official Answer: C

What's the difference between the answer choices? Mainly the pronouns. What is the pronoun referring to? Something that consists of one or two suppliers. A "given industry". This is a singular antecedent, which rules out A and B because those both contain plural pronouns.

If you have trouble deciding between "it" and "this", try boiling down the sentence. "When a given industry has these problems, this often consists of only one or two suppliers." This *what*? "This" is a demonstrative pronoun, and you need to be pointing to something when you use it, or you need to have established a very clear antecedent. "When a given industry has problems, *this industry...*" or "when a given industry has problems, *these problems...*" would work, but merely saying "this" is too ambiguous. "It" is less ambiguous in this context. "When a given industry has these problems, it [meaning the given industry] often consists of only one or two suppliers."

Problem 21

Official Answer: B

How are the two sentences related? The previous sentence brings up a concern, and the sentence containing the blank describes what people did in response. The second follows the first, making "as a result" an appropriate transition.

The second sentence does not present a parallel or similar situation, it does not present a specific example of a previous generalization, and it does not present a comparison to the previous sentence, making the other three choices inappropriate.

Problem 22

Official Answer: A

How are the sentences related? Both of them present something that guard cells do, making "additionally" an appropriate transition word. One thing doesn't happen before or after the other, so "previously" is not appropriate. The two functions do not conflict or clash or contrast in any way, so "instead" is not appropriate. And the final sentence does not sum up or draw a conclusion, so "in conclusion" is not appropriate.

Problem 23

Official Answer: B

How are the two sentences related? The sentence before the blank tells us what someone wanted to do with a urinal. The sentence containing the blank states that the urinal actually realized this person's intentions. This requires a confirmation or amplification as a transition, making "indeed" the most appropriate choice.

By the way, calling something that already exists a "ready-made sculpture" is something a child would do. The *Venus de Milo* and the *David* were not created in an afternoon by carrying a urinal through a doorway. Instead of pushing the boundaries of art into the toilet, why doesn't the SAT ever give us paragraphs about Praxiteles, Michelangelo, or Rodin?

Problem 24

Official Answer: D

How are the two sentences related? They seem to be saying much the same thing, except the first sentence provides more introductory context, and the second sentence elaborates on a few of the details. They do not conflict or contrast, which would make "however" or "admittedly" appropriate choices, and the second is not a consequence of the first, making "hence" inappropriate. The extra details provided in the second sentence make "specifically" the most appropriate answer choice.

Problem 25

Official Answer: B

What's the goal? To contrast the two songs. Searching the bullet points for differences between the two songs, we find that they were released by different singers in different decades, and that they were both protest songs but were protesting different things.

Answer A mentions a similarity, not a difference. Answers C and D only mention one song. Answer B is the only one that names both songs and states a difference between them.

Problem 26

Official Answer: D

What's the goal? To present the *conclusion* of the study. Answer choices that give the method or the motivation will not be correct. Searching the bullet points for the conclusion, we find it in the last bullet point. Tibetan mastiffs acquired their characteristics by interbreeding with wolves 24,000 years ago. There is only one answer choice that contains "interbreeding" or "24,000".

Problem 27

Official Answer: C

What's the goal? To compare some disadvantages of two kinds of bike-share programs. You might be tempted to search the bullet points for *shared* disadvantages, or disadvantages in common, but the bullet points don't give us any of those. The listed disadvantages of docked programs are that they "require significant space and money to implement", and the single listed disadvantage of dockless programs is that they can be "disorganized".

Answer A gives the disadvantage of dockless programs, and the *advantages* of docked programs. Answer B gives both advantages and disadvantages of dockless programs, and no disadvantages of docked programs. Answer D compares advantages of both, not disadvantages. Answer C isn't as direct as we might like, but it does identify that docked programs are "resource-intensive", which could be another way of saying that they require lots of time and money, and that docked programs have "organizational challenges", which is another way of saying they are disorganized. Thus answer C is the only one that states disadvantages of both programs.

Problem 1

Official Answer: A

When you see "this" followed by a blank, that's always a clue. What is "this" referring to? In this case, it's the prediction of the astronomers. "Astronomers predicted something. This _____ was later confirmed." Which word choice is closest to "prediction"? A "theory" is a bit more than a mere "prediction", but the word can be used in the sense of "an elaborate idea about how something might happen", and none of the other choices work. You don't confirm evidence, you can't do experiments with neutron stars, and "constant" makes no sense at all.

Problem 2

Official Answer: C

Colons and semicolons in vocabulary questions are always clues. In this case, the clause before the colon requires a verb to describe what happened to the art of photography, and the clauses after the colon tell us that photography became more commonplace and popular. So we need a word that means "to make common and popular". "Weaken" and "isolate" are negative, and we clearly need a positive word, so we can rule out A and D. Photographs can't praise anything, so we can rule out B. "Popularize" is clearly the correct answer.

Problem 3

Official Answer: D

In vocabulary questions, transition words are usually clues. In this case, the transition words "for example" signal that whatever comes after is an example of what came before. The words that come before describe a relationship between a painter's home garden and her work. The words that come after "for example" describe how a particular sight inspired Thomas to move her brush in a certain way. That's an example of inspiration or influence, not an example of restriction, distraction, or of an announcement.

Problem 4

Official Answer: C

As usual, the colon is a clue. The previous sentence describes an effort to increase the population of the bullfinch, and the words after the colon describe an increase in the population of the bullfinch. So the efforts were successful.

The efforts may very well have been costly, but we have no information about the cost, and the clause after the colon does not illustrate high cost. The information about the increase in population also does not illustrate amusement or disaster.

Problem 5

Official Answer: A

Notice that the underlined phrase is contained between parentheses. That means it's probably an elaboration or clarification of some kind. It's probably explaining something about the word or words that came immediately before. In this case, the parenthetical is clarifying what "surfactant" means. "Surfactant" qualifies as a scientific term, so answer A is accurate, if also a bit vague.

The *first* sentence in the paragraph describes an environmental concern, but the *underlined words* do not, so answer B is inaccurate. The underlined words also do not refer to any discovery or to research results, making C and D wrong.

Problem 6

Official Answer: C

If you give the paragraph a brief read and then run through the four choices, you can probably rule out three of them, since they come out of left field. There was no mention in the paragraph of modern artworks, there was no mention of political systems, and there was no mention of climate, so A, B, and D are all wrong.

The passage does present a recent archaeological discovery, so answer C is vague but accurate.

Problem 7

Official Answer: A

If you have an active mind, you might be wondering ... If a book gives you space in the margins to scribble notes, does that really count as being "interactive"? Writing your own marginalia is an active-minded activity, and is often valuable ... but is the book responding in any way? Can you write a question in the margin and receive an answer in reply?

Anyway, this is an "underlined sentence" question, so let's try to get the gist of the paragraph, and then figure out what role the underlined bit is playing. If we were to try to restate the paragraph in a crude sum-

mary, perhaps we could say something like this: "Douglass said other people were wrong. He gave a couple of examples to back up his claim that they were wrong. Finally, he gave his own opposing viewpoint." In this interpretation, the underlined words constitute one of the supporting examples. Do any of the answer choices say something like "it provides an example of his disagreement with other people"?

Answer A isn't great. The *entire paragraph* could be viewed as a challenge to the "stance" mentioned in the first sentence, not just the underlined portion. A more precise description of the function of the underlined portion might be that it provides a particular concrete that helps support the challenge.

But the other three choices are all definitely wrong. The underlined words help support Douglass, not the earlier technologists, so B is inaccurate. The underlined words also include nothing about academics or investors, so C is wrong. And they also say nothing about challenges to reading, so D doesn't work, either. We'll have to pick A as the best of the bunch.

Problem 8

Official Answer: B

This is a fact-finding question, and they tell you what fact to find. Scan the paragraph, looking for something helpful when making rubber. It's in the third sentence. The bark "has a unique structure that makes it easy to collect latex." Answer B repeats these words verbatim.

Problem 9

Official Answer: D

This question could have been placed in the math test. It's a simple graph-reading question. The light gray bar representing "costs" rises to the 50% line, so the answer is 50%.

Problem 10

Official Answer: C

This one is as easy as the previous one. Just find where the "Bahrain" row crosses the "Area" Column, and read the number. It's 304.

Problem 11

Official Answer: C

What's the claim? The speaker feels protected by the mountain. We need to pick a quote that illustrates feelings of protection near a mountain. Two answer choices include the word "mountain", but neither of them indicate protection or safety in any way. Answer A refers to a ravine and a pasture, neither of which necessarily imply the presence of a mountain, and it also does not indicate protection. This leaves C, which is the only answer to include any reference to shelter or protection. It does not include the word "mountain", but we can assume that the pronoun "it" refers to a mountain, and this "it" is being compared to a wall that provides shelter.

Problem 12

Official Answer: D

What's the claim we need to illustrate? The SAT writer claims that the narrator was frightened of the sailor. All of the answer choices contain "[the sailor]", but only one answer contains any frightening words or imagery.

Problem 13

Official Answer: C

The paragraph discusses trees that have mostly died out due to airborne diseases, and the discovery of some remaining trees in a secluded valley. Why didn't these trees catch the disease? Apparently, the fungus couldn't reach them. One could imagine a few reasons that might prevent airborne fungus from reaching the trees, especially given the location: a coastal forest located in a valley.

Answer C refers only to the *distance*, and not to protection offered by neighboring oceans or mountain ridges. The paragraph makes it sound like coasts and valleys are the important protective features, not mere distance. If the paragraph had said that the fungus can't stand long journeys, instead of pointing out that the forest was on the coast in a hard-to-reach valley, it would have been clearer that *distance* was the main factor. So answer C has a logical glitch, but the other answers aren't even in the right ballpark. Answer choices A, B, and D are all complete non sequiturs. Just try to find any mention in the paragraph of twentieth-century scientists, chocolate, or the discovery of the fungus's ability to fly.

Problem 14

Official Answer: B

The first few sentences describe a mineral-based pigment that contains iron oxide, and the next sentence states that plant-based pigments contain carbon. So if we discover that a pigment has no iron but lots of carbon, what's the natural conclusion? That it was probably plant-based?

That might be enough to draw your attention to answer B, because it more or less states that the pigments in question were plant-based. Answers A, C, and D all mention plant-based pigments as well, but a closer inspection reveals flaws in all of these answers. The paragraph gives us no information about whether there were older pigments or not, so conclusion A is unwarranted. We have no information about the preferences of the Natufians, so conclusion C is likewise inappropriate. And we have no information about how easy it is (or was) to find ocher, so answer D is also flawed.

Problem 15

Official Answer: A

This is a subject-verb agreement question, and they haven't even tried to distract you with any messy sentence constructions. The subject is right next to the verb.

The map describes...
The map describe...
The map have described...
The map are describing...

If you are a college-bound student, the answer should be obvious. There are three plural verbs and one singular verb, and the subject is singular.

Problem 16

Official Answer: D

We need to pick a pronoun to go in the blank. To what does the pronoun refer? Eighteen letters. "Eighteen letters were found somewhere. These letters demonstrate..." "Eighteen letters" is a plural subject. This requires a plural noun, and only one of the answer choices is plural.

Problem 17

Official Answer: D

This is not a subject-verb agreement issue. The subject "dust storms" could go with any of the four verb forms in different contests. This is a tense issue. The other verbs in the passage ("was", "plagued", and "reached") are all in the past tense, so we need to pick the only answer choice that is also in the past tense.

Problem 18

Official Answer: A

This is a long series of words with a blank in the middle. Start by looking for independent clauses. There are two, although the first one has its subject and predicate reversed: "the rate is what increases" and "an airtight seal traps the vapor". Two independent clauses require a "strong" mark, like a semicolon, a colon, or a period, between them. A mere comma or lonely conjunction is not enough. The only "strong" punctuation mark we are offered is the period. None of the other options are sufficient to link together two independent clauses.

Problem 19

Official Answer: B

Notice that "through trade and centralized taxation" is a parenthetical comment. You can omit it and the sentence will still make sense. Such parenthetical comments require a matched pair of punctuation marks, like a pair of bookends or a pair of parentheses, to set them off from the rest of the sentence. One comma has already been supplied before "through", and we need to supply the other after "taxation".

Problem 20

Official Answer: D

This is a "dangling modifier" question. The blank follows an introductory descriptive phrase, and the answer choices all look like rephrased versions of the same thing.

In this case, the introductory descriptive phrase describes something that can "want", i.e. a person or a group of people, so the subject that follows had better be human. Answer A-C make a contest, an award, and a monetary amount, respectively, the subject of the sentence. None of these things can want to celebrate anything. Answer D makes a group of people the subject of the sentence. The Commission is what wanted to celebrate the anniversary.

Problem 21

Official Answer: C

Look for independent clauses. "Calculators were popular" and "these devices were replaced" can both stand on their own and are valid independent clauses. This means that we need a "strong joint" to link them together. A comma by itself is insufficient, but a comma strengthened by a conjunction is perfectly fine. You might also notice that only answer C provides the necessary contrast between the two clauses.

Problem 22

Official Answer: B

How are the two sentences related? The sentence before the blank says that his painting doesn't do something, and the sentence after the blank says that it does something. This contrast requires a contrasting word or phrase of some kind to express it, and "that said" is the only suitable alternative.

The second sentence does not provide additional evidence in support of an argument, which would make "moreover" appropriate, it does not say the same thing in different words, which would make "in other words" appropriate, and it does not provide an example of a preceding generalization, which would make "for example" appropriate.

Problem 23

Official Answer: A

What's the goal? To indicate where the story takes place. Searching the bullet points for this piece of information, we find it in the last bullet point: It takes place in Harlem. Only one answer choice includes the word "Harlem"...or a location of any kind.

Problem 24

Official Answer: D

What's the goal? To define the term "georeferencing". Searching the bullet points for this definition, we find it in the first bullet point: It's the process of assigning geographic coordinates to an image. The second bullet point might also be relevant, since it could be considered supplementary information about georeferencing. Answer D repeats the first two bullet points almost verbatim, and none of the other answer choices are even close.

Problem 25

Official Answer: D

What's the goal? To indicate how Fulton, Missouri got its name. The fourth bullet point tells us that it was named after Robert Fulton, and there is only one answer choice that contains the name "Robert Fulton".

Problem 26

Official Answer: C

What's the goal? To contrast the two styles of tiles. Searching the bullet points for differences between two styles of tiles, the only difference we can find is in how designs are attached to the tiles: in one style, they are painted on, and in the other, they are stamped on. The only answer choice that mentions this difference is C.

Answer D mentions painting but not stamping, and neither A nor C mention the styles of the tiles at all.

Problem 27

Official Answer: C

What's the goal? To use a quotation to challenge Thucydides's explanation of "the conflict between Athens and Sparta". (Which conflict? They don't tell us. They are presumably referring to the Peloponnesian War, but for the purposes of this question the conflict just has to float in the background of your mind as some vague undefined conflict.) Most of the bullet points explain the "Thucydides trap theory" and what Thucydides said about the conflict. We don't find any challenges to anything until we get to the last two bullet points, and the only quotation here is "clash of cultures". There is only one answer choice that includes the quotation "clash of cultures".

Upon reading the question prompt, one might assume that there would be a quotation from an expert providing evidence and reasoning that points out weaknesses in the previous theory. One might at least expect a complete sentence, rather than a mere noun phrase. But all of the quotations in the other answer choices are from the pro-Thucydides side of the argument, not the anti-Thucydides side. This is "using a quotation to challenge an explanation" in the broadest sense only.

Problem 1

Official Answer: B

What would someone want to do to a bad situation? Improve it? Remedy it? Repair it? Of the four choices, which is closest to "repair" or "make better"? If you don't know what "rectify" means, you can probably at least realize that none of the others make sense. You might also think of "rectangle" or even "correct". To "rectify" something means to straighten it out or to make it right.

Problem 2

Official Answer: D

We need pick the best adjective to describe the creation process. The second sentence tells us that it was "painstaking", involved hundreds of thousands of "hand-cut" paper figures, and that it required the invention of "entirely new methods and tools". That doesn't sound easy. Which of the four choices is closest to "really difficult"?

If you know the meanings of all four words, the answer should be obvious. If not, you can probably at least rule out "ineffectual", but you might just have to make your best guess among the others. "Haphazard" means chaotic or disorganized, "contentious" means controversial or hotly debated, and "arduous" means "requires a lot of labor".

Problem 3

Official Answer: A

The technical jargon is annoying. Perhaps we can boil down the paragraph like this: It starts by talking about fish that live in both saltwater and freshwater. Then it compares them to fish that only live in saltwater. That's a significant biological difference, especially if you understand that "obligate nature" means that migrating back and forth from fresh to saltwater is not an option. They have to do it.

So the main topic seems to be the difference between fish that stay in one kind of water and fish that have to swim back and forth, and we need a word to describe the relationship between these two distinct lifestyles. Can the one be "demarcated from" the other? "Reconstituted as" the other? "Conflated with" the other? Or "derived from" the other?

"Demarcated" is an awkward jargon word. "Distinguished from" or "differentiated from" might have been clearer. But "demarcated" is the best of the four options. "Conflated" might make sense if we were talking about similarities, but the focus here is on the differences. "Derived from" might make sense if we were talking about evolution and how one behavior evolved from the other, but we aren't. And to "reconstitute" one lifestyle from another doesn't make any sense at all.

Problem 4

Official Answer: D

If you were to write your own word in the blank, what word would you use? Hypothetical? Speculative? Only a guess? We need to pick a word that means something like "only a guess".

Choosing among the four options is difficult, because they are all rare words. Perhaps you can rule out "veritable" because it sounds like "verifiable". Perhaps you can choose the correct answer "notional" because of the root word "notion". But you might just have to guess.

"Desultory" is the opposite of "committed", "driven", or "enthusiastic". It means "going about something in a half-hearted and random way". "Spurious" means illegitimate or invalid in some way. "Veritable" is like "really" or "truly". It means "in fact" or "in truth", and it is usually used as an intensifier rather than a meaningful adjective on its own. "Notional" is a weird new word meaning that something exists only in theory or imagination, and not in reality.

Problem 5

Official Answer: C

Blur your eyes a little and ask yourself what's going on in this excerpt. The word "I" appears three times, and "my thoughts" appears twice. This passage depicts someone in self-reflection. This author also seems displeased with her situation. She seems to be in a disturbed emotional state.

The underlined sentence comes at the beginning, and says something about nature, about the scene around her, and nothing about the author herself. It is giving an observation about nature, which the author then uses as the basis for some self-reflection.

A — Perhaps we could say that the sentence "illustrates" a change in the natural environment, though that wouldn't be the best word, and does the author imply that this wind is responsible for her disturbed feelings?

B — You can probably rule this one out easily. How are seed pods shaking in the wind an example of consistency?

C — This one is best. The sentence does present an observation of the nature around her, and she does then "expand on" this to convey her inner turmoil.

D — Meh. Maybe we could say that the observation "evokes ordinariness", but does the author suggest anywhere that her self-reflection is a "common pursuit"? She never mentions other people, nor even herself in the past or future, so how could this sentence about seed-pods be suggesting that self-evaluation is a common pursuit?

Problem 6

Official Answer: B

The sentence begins with "for example", so it clearly is providing an example of something. But none of the answer choices say "it provides an example". That would be too easy. We'll have to figure out what the example is an example of, and why the author is bothering to give this example.

Reading the passage, we see that the example is an example of workers refining their technique over time. Only answer B includes the word "workers", giving examples is a good way to "support an argument", and the "argument" could refer to the claim that workers refined their technique over time. So answer B is vague, but reasonably accurate.

You can probably rule out A and C easily. The underlined sentence says nothing about the contents of the tapestry, nor does it compare the tapestry with other tapestries. It also doesn't describe researchers doing anything, so D is also clearly wrong.

Problem 7

Official Answer: D

This entire passage is one long sentence, with seven commas, half a dozen conjunctions, and multiple parenthetical comments, two of which are embedded inside of another parenthetical. One wonders what the editors at Alfred A. Knopf thought about this. One also wonders why the SAT is testing our ability to digest translations of 19th century German prose.

This is a fact-finding question, but they don't give us anything specific to search for. We'll just have to read the passage, looking for any suggestions about the story of Hans Castorp. We learn that Hans himself wasn't very interesting, but his story is. We also learn in the final bloated verb phrases that the story happened long ago, and the verbiage seems to be trying to tell us that the story must be a little vague or distorted because it is so old.

Now we'll have to study the answer choices carefully.

A — This one sounds reasonable upon first reading, but it's bloated and almost as hard to understand as the passage itself, so let's keep this one in consideration while we examine the other choices.

B — This one starts out ok, but then falls apart. It refers to the age of the story and the manner in which it must be told, and it mentions that the story is important, but it also says that the former are indicators of the latter, which is not a connection that is supported by the prose.

C — This one seems a bit thin. It refers to the story needing to be related in a particular way, but the passage said that this was because of its age, not its subject matter. This one is probably wrong.

D — This one doesn't say anything about the age of the story, but the rest is perfectly reasonable. The passage does say that it is a remarkable story involving an unremarkable person, and one of the buried parentheticals does try to give some credit to the person in the story.

At this point, D seems like the best answer. Giving A a closer inspection again, we could say that it seems to mix up the different portions of the haystack of words. It starts by referencing the second embedded parenthetical, and then contrasts this with the age mentioned in the final phrases, which doesn't seem quite right. It also says that the *reason the story is interesting* is muddled by time, not the story itself, which also doesn't seem quite right. Let's go with D, which is the SAT's officially correct answer.

Problem 8

Official Answer: D

The writing in this question is awful. If you are a curious person with a critical mind, especially if you have an interest in the potentially fascinating field of geology, there are many questions that might occur to you as you try to digest this passage and the attached answer choices. But you don't have time for that during the test. You need to turn on your "reality blinders" and just try to figure out what the SAT-writer is attempting to say, and which answer he thinks you should choose.

Let's start with the prompt. What's the conclusion that we need to support? The writer didn't give us any help in focusing our attention, because the words "conclusion" or "concluded" are nowhere to be found in the paragraph. Starting at the beginning and scanning the paragraph for the essentials, we see that the Earth used to have a "stagnant lid mode", and then the crust broke up into pieces and entered "tectonic plate mode", and when this happened is the issue in question. The "conclusion" that we need to support is that this transition happened 3.2 billion years ago.

What evidence do we have to work with? The first sentence tells us that there was "no interaction" before the transition, and that after the transition, material was allowed to mix. The key difference between "before" and "after" — the only difference we have to work with, in fact — is this mixing. The layers didn't mix before the transition, but they mixed after. So finding young rocks in the wrong place is probably going to be an important part of the correct answer.

But how do we know how old the rocks are, and how do we know if they are in the wrong place or not? At this point, it is probably best to stop worrying about questions like this, and just examine the answer choices to see which one has to do with finding rocks in the wrong place.

A — This has to do with how many rocks we find, not with finding rocks in the wrong place.

B — This has to do with how many kinds of minerals we find in the rocks, not with finding rocks in the wrong place.

C — Huh?

D — This is the only answer that has to do with finding rocks, or at least rock ingredients, in the wrong place.

If you have the fortitude to continue wrestling with this hot mess, you can try looking for any additional information that might be helpful. There isn't much. The SAT-writer did give us a few extremely vague words in the participial phrase at the beginning of the final sentence: the researchers "examined chemical data from lithospheric and mantle-derived rocks..." That's not very helpful, but it's probably important, since most of the answer choices have to do with the composition of the rocks. We'll have to use our own imaginations or knowledge of geology to figure out what that means.

"Chemical data" presumably means the elemental or mineral composition of the rocks, and we can reasonably assume that the lithosphere and the mantle each have their own distinctive chemical makeup.

"Mantle-derived" and "lithospheric" aren't clearly defined, but we can reasonably assume that this refers to where the rocks come from. *Where rocks are found* is fundamental in geology, but it is a completely neglected topic in this passage. For our purposes, we can assume that "mantle-derived" means that the rocks were obtained somehow from the mantle, and "lithospheric" means that they were obtained from the lithosphere. (In reality, there is no way for us to obtain "mantle-derived rocks" directly, since they are buried far beyond our reach beneath the Earth's surface. The only way we can study them is if volcanic activity brings them to the surface. So we might be able to find "mantle-derived rocks" in special places if we know what we are looking for, but the rest of the Earth beneath our feet is all "lithospheric".)

So, if we find a bunch of rocks that have been brought up intact and unaltered from the mantle, and if we can figure out their ages, and if all of the rocks older than 3.2 billion years have only "mantle minerals", but some of the rocks younger than 3.2 billion years also have "lithosphere minerals", then that would help support the idea that mixing started to happen about 3.2 billion years ago. And that is what answer D says, more or less.

By the way, the SAT-writer should have just said "crust" and "mantle". Geology textbooks draw a line where the mineral composition changes and call the upper part "crust" and the lower part "mantle". The "flowability" changes from solid and rocky to ductile and plastic at a deeper depth, and that dividing line marks the boundary between the "lithosphere" above and the "asthenosphere" below. The SAT-writer oversimplified the layers and mixed up the names. He did refer to the "upper lithosphere", but he should have just said "crust".

Problem 9

Official Answer: B

What's the conclusion we are supposed to support? It's a bit vague ("an observable pattern"? "a shift in human behavior"?), but the gist seems to be that we started talking about time of day differently after we had electric lighting, which the passage tells us happened in the "late nineteenth century". What would support such a conclusion? The researchers tallied up phrases in novels, so we need to find that old novels used different language than new novels.

The last sentence in the paragraph and several of the answer choices bring in the issue of clock-related phrases versus implied time references, and this muddies the waters. Mechanical clocks appeared hundreds of years before electric lighting, so paying attention to when clock-related phrases appeared just confuses the issue. As we scan through the answer choices, let's ignore the issue of whether the time references were implied or clock-related, and just focus on the time of day. We should find times or activities after dark appearing more often in later years, and less often in earlier years.

A — This presents a difference in language, but it notes a difference happening around 1800, which is the beginning of the 19th century, not the late 19th century. It also refers to 10:00 in the *morning*, which is not after dark.

B — This refers to a change happening in 1880, which is the late 19th century. It also refers to more activities after sunset, which makes sense if electric lighting became available at that time.

C — This compares the different kinds of time references to each other, not daytime to nighttime.

D — This makes no reference to any year or any changes through the centuries, so it can't possibly support the conclusion.

Problem 10

Official Answer: A

Sometimes the SAT Reading and Writing questions seem like a test of your ability to grasp garbled, inelo-quent, and poorly-written material. That might make sense if you were going to college to become a professional editor, but for most people, it's just maddening. In this question, not only are the answer choices long and the prose unclear, the graph is poorly designed as well. It takes five minutes just to figure out what in the world is going on. This is definitely a candidate for a "throw-away question". You might just want to guess on this one, and use the time saved to proofread your answers to other questions with better odds.

Now... *Once more unto the breach, dear friends, once more.*

The graph is too hard to understand at a quick glance, so after reading the prompt, let's begin by trying to understand the "statement" that we are supposed to complete. After wading through the unclear writing, we might summarize the second-to-last sentence like this: GDP vs Population growth? The balance will tip from population growth to GDP if governments can become more efficient. Population growth and GDP are the two variables presented in the legend of the graph, so (assuming Mahtta et al. are correct) higher black bars in the graph mean more efficient government, and higher light gray bars mean less efficient government.

Where in any of this mess do we have data on government efficiency? Nowhere. But it is mentioned in all four answer choices. So we are apparently supposed to draw conclusions about efficiency based on the data given in the graph.

So let's make a closer inspection of the graph. The gray bars always stand for the same measurement, but in two different regions and two different time periods. So do the black bars. There is no consistent color or position for either time period or geographical region. And you can't read time from left to right because you have to stop in the middle and start over. Getting any useful information from the graph requires constant back-and-forth checking of what stands for what. Do not design graphs like this.

Let's do what the graph designer should have done, and draw a vertical line between the two regions. (It will have to be an imaginary line, since this is a digital test and we can't draw on the screen.) We'll lump the left half of the graph together into a "Region 1" display, and the right half into a "Region 2" display. Now we see that, for Region 1, population growth is going up and GDP is going down. According to the proposition of Mahtta et al., this means that the governments are becoming less efficient. In Region 2, the reverse is happening, and quite dramatically, too, meaning that the governments are becoming *more* efficient. So we can summarize our inferences about efficiency this way: If Mahtta's proposition is correct, then Region 1 is getting worse, and Region 2 is getting much better.

Now let's work our way through the answer choices, looking for "Region 1 worse, Region 2 better".

Answer A doesn't mention Region 2, but it does say, effectively, "Region 1 got worse". Let's tentatively accept this as the correct answer.

The first half of answer B, if you assume that "economic growth" means "GDP" and if you can identify the correct two bars to compare, is accurate. But answer B also says that Region 1 is getting more efficient, which contradicts our inferences. Answer C compares individual countries within Region 2, and we have no information about countries and no way to evaluate the accuracy of this answer. Answer D says that both regions became

more efficient, which contradicts our inferences, and also tries to compare the rates, about which we have no information.

Answer A could have been better, but it's the best of the four options.

Problem 11

Official Answer: B

This graph is marginally clearer than the previous one, though they probably should have swapped the variables on the horizontal axis and in the legend, and it would be helpful if we could highlight the key words *ordinary*, *assembly*, and *inputs* to help clarify the ridiculous jargon. Since the answer choices all contain quantitative comparisons, let's start by reading the graph and checking the answer choices for accuracy. We discover that answer A is false, but we still have the other three to chew on.

After reading the prompt, let's try to figure out what the student is trying to assert. It's a challenge, because we have to wade through "trade liberalization", "limited capital", and what it means for the "situation" to be "resolved". "Trade liberalization" sounds like a good thing, "limited capital" sounds like a bad thing, and "resolved" makes it sound like the situation got better. So we need to show something getting better during the 2000s. Now we just need to figure out how the bars in the graph are showing anything getting better.

The meaning behind the graph may be obscure, but the progression in time is fairly clear. There are three categories or clusters in the graph, and all three of them climb steadily every three years. The vertical axis is "imports", which seems like a good thing. So the correct answer will probably point out that everything is increasing in time.

Besides being factually false, answer A only looks at one year, so that can't show any changes in time. Answer D compares apples and oranges. It picks two bars from the graph, seemingly at random, and says that one is higher than the other. If any SAT answer choice compares two bars in a graph with *two or more differences*, that almost certainly isn't the correct answer. You don't learn anything by comparing situations in which everything is different. Answers B and C both start with "from 2000 to 2006", so they both look like they might be indicating a trend. But answer C merely states that one sector was always greater than the other sectors, which doesn't help illustrate a situation getting better.

This leaves answer B. Answer B does indicate a trend of growth, so it sounds good, but it emphasizes *relative* growth between the two types of "processing". Furthermore, it isn't immediately clear that the "inputs" (third cluster) grew "much more sharply" than "assembly" (middle cluster). The third cluster clearly grew *more* than the second in number of dollars, but it also started much lower. On a *percentage basis* the growth looks somewhat similar from start to finish. They both grew by a factor of three or four over the six years. One didn't grow "much more sharply" than the other.

Don't bother trying to figure out why answer B is "correct". It's possible the SAT writer didn't understand it himself. Let's look at what "capital" means. In a nutshell, "capital" refers to savings that you have available to spend on things that you need to grow. If you don't have capital, you can't grow. The first half of the student's claim says that Chinese firms didn't have much capital to start with, and this limited their growth at first. If you read the very long middle sentence in this paragraph more closely, you see a relevant distinction between the two kinds of "processing" industries. "Processing with inputs" requires capital, and "processing with assembly" does not. (The companies who are doing "processing with assembly" do not need capital to buy the raw materials. They simply provide the service of assembling someone else's raw materials.) So if the student is correct that liberalization was constrained by lack of capital at first, but this situation was "resolved" during the 2000s, then both "processing" sectors should grow, but "processing with inputs" should grow slowly at first, then faster later, while "processing with assembly" should grow quickly the whole time. This is not clearly reflected by either the graph or by answer B.

Problem 12

Official Answer: D

Ugh. Here we go again.

What's going on in this paragraph? We have a North-American "language family", divided into a northern branch and a southern one. They're a "family" because they share common elements or "lexical similarities". But something's weird. They all grew maize, but they used different words for it. Why do they grow the same crop but call it by different names? We have reason to believe that maize migrated northward over time, which suggests ... what? The southern people developed their maize-related vocabulary first, and the northern people developed theirs later?

That's not an answer choice, but answers A-C are all non sequiturs. Answer A refers to other tribes outside of this "language family", and we have no information about any such tribes. Answer B brings in methods of cultivation, which was never an issue. Answer C says that northern and southern tribes started cultivating maize at the same time, which contradicts our evidence that maize migrated northward.

Answer D brings in the issue of *when* the tribes split into northern and southern branches, but it is a perfectly logical conclusion. If they all started farming maize before the split, and then split into halves, both halves would presumably retain the same maize vocabulary. If they split first and then acquired maize later, both halves would have to invent their own new vocabulary separately, and their words would likely be different.

Problem 13

Official Answer: C

What's going on in this paragraph? Somebody decided to tape people to walls and call it art. The idea was to symbolize "restraint", but people were confused about whether the complaint was that women were constrained or someone else was, since one of the people taped to the wall was female and one was male. But since both of them were were Chicano, and Chicano artists were largely unrecognized ... the idea behind the work must have been to symbolize restraint of Chicano artists?

Searching the answer choices for one that refers to "Chicano artists" rather than male vs female issues, we find that answer C fits our expectations adequately.

Answer A says that there were *two* comments, one on the constraint of women, and one on the constraint of Chicano artists. Answer B says that the issue is constraint of women, but that there were two constraints. Answer D shifts the emphasis from women to Chicano culture, but says that the message is a critique of the depiction of Chicano culture, not the constraints on Chicano artists.

Problem 14

Official Answer: B

What's going on? Somebody studied ancient Sidonian coins and discovered that over about 100 years, they went from almost pure silver to less than 75% silver. The low-silver coins probably had a noticeable yellow color, and were probably "considered unsuitable for trade". So people probably complained. And apparently the ruler of Sidon at the time did something to fix the situation. What might he have done?

A — This makes sense. If the problem is low-silver coins, then let's not have any more low-silver coins.

B — How is this going to help? If we just make the coins smaller, they'll still have the yellow color and will still be below the 80% threshold of silver content.

C — Ditto. Now we're just making the coins bigger instead of smaller.

D — How is increasing the supply of *copper* going to help increase the amount of *silver* in the coins?

Problem 15

Official Answer: C

The answer with no punctuation is often the correct one, especially when the sentence is relatively brief. We only have one clause here, with no parentheticals or supplementary stuff. The gist of the sentence is "her portrait of someone is displayed in the gallery." "Of novelist Zadie Smith" is simply a modifying prepositional phrase describing the portrait. It does not need and should not have any punctuation. To place any mark after "Smith" would be to separate the subject "portrait" from the verb "is displayed" and would be a flagrant punctuation fault.

Problem 16

Official Answer: B

The eight given words constitute an introductory descriptive phrase. The four answer choices give four different (and valid) independent clauses. The issue is matching the descriptive phrase with the appropriate clause. If we pick the wrong clause, then the introductory descriptive phrase will be describing the wrong thing. Whichever clause we pick, the subject must be the thing being described in the introduction, which in this case is a particular government body.

The subjects of the four clauses, in order, are...

A — a group of parliaments
B — Iceland's parliament
C — a meeting, and
D — a year.

A meeting and a year cannot be a government body. Neither can a *group* of parliaments. Answers A, C,

and D all create a mismatch between the introductory description and the subject of the sentence.

Problem 17

Official Answer: C

You might guess right away that a list is going to be involved. "She has many responsibilties. These include ..." Another clue is the fact that the paragraph contains one semicolon that we aren't allowed to change, and one of the answer choices has a semicolon as well. If you're in a hurry, just assume that it's a list, and pick the only answer choice with another semicolon.

There is in fact a list: "These include (1) overseeing collections, (2) managing the Copyright Office, and (3) appointing the poet laureate." The reason we need semicolons to separate the list items instead of commas is because the first two list items have supplementary information: "which boast more than 162 million items", and "which registers copyright claims etc." When the items that we are listing are long and messy, we need to use *commas within list items* and *semicolons between list items.*

Problem 18

Official Answer: D

This entire thing is one long sentence. It might be tempting to try splitting it at the blank with a semicolon or a period, but look at the words after the blank. "A finding that would overturn current theories" cannot stand on its own as a complete sentence. This rules out choices A and B, since semicolons and periods require complete independent clauses on both sides. Instead, we have the "Independent Clause, Supplementary Stuff" or "Main Idea, Followup" pattern, and this requires a comma to separate the main clause from the supplementary information.

Problem 19

Official Answer: A

Let's start by checking for independent clauses. "To manifest the atmospheres" cannot stand on its own and is not an independent clause. (Boy, the SAT really seems to like the word "manifest".) So we have the "Intro, Main Idea" pattern, and just like the last question, we need a comma to separate the introductory material from the main clause and avoid a run-on sentence. A semicolon is inappropriate, because semicolons require independent clauses on both sides, ruling out answers C and D.

But how many commas do we need? "Though" is always punctuated as "optional extra" or "parenthetical" material. If it is at the beginning of a sentence, it is followed by a comma, if it is at the end, it is preceded by a comma, and if it occurs in the middle of a sentence, it needs a comma on both sides. In this case, it's in the middle, so it needs a comma on both sides.

Problem 20

Official Answer: B

Start by finding the independent clauses in this sentence. There are two: "They are hardly pristine" and "many of them experience alteration." This requires a "strong joint" like a semicolon. A comma is insufficient, ruling out A and D.

But should the "though" go before or after the semicolon? It depends what is being contrasted. In this case, the contrast is between the previous sentence ("they are undifferentiated") and the first clause of this sentence ("they are hardly pristine"). Therefore the "though" needs to go with the first clause, before the semicolon. If the contrast were between the two clauses in the compound sentence, then the "though" would need to go with the second clause, after the semicolon.

Problem 21

Official Answer: D

All involved...with what? There's some missing context here, which might be a little disorienting, but it doesn't affect the punctuation of this sentence. When taking the SAT, you may frequently feel a desire for more information, which reflects well on you, but you'll often have to ignore this desire for the purposes of the test.

We have two independent clauses here. "This idea was conceded by all involved" and "establishing its coordinates was more divisive" can both stand on their own and form independent clauses. This requires a "strong joint", ruling out B and C.

This is a rare problem in which the SAT makes you discriminate between a colon and a semicolon. A semicolon works to link two closely related ideas. It's a very eloquent way of comparing or contrasting two parallel things, and that is what is happening in this case. A colon always works as a mark of introduction. The words before introduce the words after, in one way or

another. If the two ideas *contrast* with each other, as they do in this case, the colon is inappropriate.

Problem 22

Official Answer: A

Don't be thrown off by the fact that the blank is in the middle of the sentence. This is still a "transition" question, and the issue at hand is still how the sentence containing the blank is related to the previous sentence.

The two sentences say very similar things, but if you focus on the end of the first sentence and the beginning of the second, you'll notice that the first sentence refers to "grains" in general, and the second refers to "maize and wheat" in particular. (If you don't know what maize is, hopefully you'll at least realize that wheat is a grain.) Maize and wheat are specific examples of grains, and this makes "in particular" a perfectly appropriate transition.

The two sentences do not contrast with each other, so choices B and C are inappropriate, and there is no "first of all" or any kind of sequence here, so answer D is clearly wrong.

Problem 23

Official Answer: D

The previous sentence has already mentioned specific details (blue threads and muscovite), so "specifically" isn't an appropriate transition between the two sentences. The second sentence provides additional details, making "moreover" appropriate.

The two sentences do not contrast with each other, so "that said" is not appropriate, and the latter does not give an example of a prior generalization, so "for example" is not appropriate.

Problem 24

Official Answer: D

What's the goal? To identify what type of scientist Chaudhuri is. Only one answer choice includes the name "Chaudhuri".

If you want to confirm the accuracy of the statement, you can find the relevant information in the two middle bullet points. Chaudhuri is a sedimentologist.

Problem 25

Official Answer: C

What's the goal? To indicate the year Yosemite Falls was completed. Only one answer choice includes the name "Yosemite Falls".

If you want to confirm the accuracy of the statement, you can find it in the last bullet point. It was completed in 1930.

Problem 26

Official Answer: D

What's the goal? To present an overview of the study's findings. Answer choices that present the goals or the methodology will be incorrect. The findings are in the third, fifth, and sixth bullet points, but we can probably ignore the parenthetical details, since the goal was merely to present an "overview". To summarize the findings, we can say that the information rate was pretty consistent, but the syllable rate varied, with Spanish being fast and Vietnamese being slow. That's answer D, more or less.

This one is classified as "hard", probably because all four answer choices could be interpreted to be telling us something about the study's findings. The issue is which one presents the best *overview*. Answer A only tells us about one thing that the researchers calculated, and it doesn't give us the results of those calculations. Answer B mixes up the information rate and the syllable rate. And answer C makes a claim that isn't supported by the bullet points. We have no idea whether Spanish has a lower information rate or not.

Problem 27

Official Answer: A

What's the goal? To place Einstein's argument within its historical context. The only "historical context" given in the bullet points is that the argument happened at the fifth Solvay Conference in 1927. This makes answer B look very tempting, but if we do a little fact-checking, we find that it reverses the arguments. It puts Einstein's words in Bohr's mouth. Answer C also mentions the 1927 Solvay conference, but it says nothing about Einstein's argument.

This leaves A and D. Answer A doesn't mention the Solvay conference, but it does give Einstein's argument, and it says that this was "during the dawn of quantum theory", which does "set the stage" so to speak. It does make us aware of the position within the history

of quantum theory, and we can count this as placing the argument "within its historical context". Answer D gives only the year, and it does not tell us about either person's argument.

Problem 1

Official Answer: A

If he bought p pounds of strawberries at \$1.90 per pound, then he must have paid $1.90p$ for the strawberries. If we add this to the \$2 that he paid for the box of cereal, then we are up to a total of $1.90p + 2$, and we are told that this must equal \$9.60. Expressing this as a mathematical sentence gives us $1.90p + 2 = 9.60$, which is answer A.

Problem 2

Official Answer: C

This is a simple substitution problem:

$$\begin{aligned} f(x) &= 25x + 30 \\ f(2) &= 25(2) + 30 \\ &= 50 + 30 = 80 \end{aligned}$$

Problem 3

Official Answer: A

When you plot something versus time in the coordinate plane, the y-intercept is just the starting value. In this case, we can read the value from the graph as being approximately \$225, and we conclude that the tablet cost \$225 when it was new, which is answer A.

Problem 4

Official Answer: B

$$\begin{aligned} |p| + 61 &= 65 \\ |p| &= 65 - 61 = 4 \\ p &= \pm 4 \end{aligned}$$

They don't offer -4 (or any negative number) as an option, so we have to choose the positive solution $p = 4$, which is answer B.

Problem 5

Official Answer: B

Sketching things often helps you to organize a mess of information, but in this case the mess isn't that bad, and a sketch isn't really necessary. Half of the time, when they give you two similar triangles, the answer is just one of the numbers that they have already given you.

In this case, they ask for angle J, which corresponds to angle E, which they tell us is 45°.

Problem 6

Official Answer: B

If the ball was launched at the same angle and with the same speed as before, but from a platform 2 feet shorter, then it will follow the same trajectory, but 2 feet lower. We need to pick the graph that is the same as the given graph, but shifted 2 units down. Instead of starting at 7 and peaking at a little over 8, it needs to start at 5 and peak at a little over 6. This corresponds to answer B.

Problem 7

Official Answer: 90

$$\begin{aligned} \frac{x}{y} &= \frac{9}{5} \\ \frac{162}{y} &= \frac{9}{5} \\ \frac{y}{162} &= \frac{5}{9} \\ y &= 162 \cdot \frac{5}{9} = 90 \end{aligned}$$

Problem 8

Official Answer: D

The given equation totals up the number of points, and S and C represent numbers of tokens, so 80 and 90 must represent the number of points per token: 80 for each square token and 90 for each circular token. They ask us for the difference, which is 10.

Problem 9

Official Answer: C

You will probably notice that the factors of $(x+9)$ cancel, leaving a simple linear equation.

$$\begin{aligned} \frac{(x+9)(x-9)}{x+9} &= 7 \\ x - 9 &= 7 \\ x &= 9 + 7 = 16 \end{aligned}$$

Problem 10

Official Answer: D

They are asking you to solve for $c - b$. This is a weird thing to solve for, but notice that you do it simply by subtracting b from both sides of the equation.

$$12t + b = c \quad (1)$$
$$12t = c - b \quad (2)$$

The answer is $12t$.

Problem 11

Official Answer: 14,-5,-4

Most of the time, when they give you a cubic or higher-order polynomial, it will be in factored form, and the zeros will probably be important. In this case, you can easily see that 14, -5, and -4 are the three zeros of this function, meaning the three values of x that cause $y = 0$, and also meaning the three x-intercepts of the graph of $y(x)$. Any of these three values will be accepted as a correct answer.

Problem 12

Official Answer: 11/4,2.75

This is a straightforward evaluation problem. It looks messy, but if you try substituting 1/4 into the given function, you will quickly notice that it makes the first term zero, leaving only the constant term of 11/4, so that's the answer. You can also enter the decimal equivalent of 11/4, or 2.75, and it will be counted as correct.

Problem 13

Official Answer: A

If you are familiar with the equation of a circle in the coordinate plane, this one should be easy. The equation $(x - h)^2 + (y - k)^2 = r^2$ will produce a circle in the coordinate plane, with a center at (h, k), and a radius of r. They give us the equation $(x-13)^2+(y-k)^2 = 64$, so this must be a circle with a center at $(13, k)$ and a radius of $\sqrt{64} = 8$.

If you aren't familiar with the equation of a circle, you could try using Desmos to graph the given equation, although you'll have to make up some number for k. Whatever number you pick for k, you should notice that the radius of the circle is definitely not 64. This narrows the choices to A and B, and unless you picked 13 for k, distinguishing between C and D should be pretty easy.

Problem 14

Official Answer: 4.41,441/100

If you know the radius of a circle, can you calculate the area? If the radius is 2.1, then the area must be $\pi r^2 = \pi \cdot 2.1^2 = 4.41\pi$. Comparing this to the requested pattern of $b\pi$, we see that $b = 4.41$.

The official explanation states that 441/100 is also an acceptable answer, which is strange, since you can only enter five characters into the answer box.

Problem 15

Official Answer: 5

In the two minutes from $x = 5$ to $x = 7$, the temperature went up by 10 degrees, from 14 to 24, so the average rate of change is simply the quotient of these two numbers: 10 degrees in 2 minutes gives 10/2=5 degrees per minute. The correct answer is "5".

If you are comfortable working from memorized formulas, you could also write down the slope formula and then plug in the points (5,14) and (7,24).

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{24 - 14}{7 - 5} = \frac{10}{2} = 5$$

Problem 16

Official Answer: D

You will probably notice that the two y-terms are equal and opposite, and they will cancel out if you simply add the two equations together. Doing so will give $13x$ as the x-term, and then you can simply triple this to get the requested quantity of $39x$:

$$3y - 3y = 4x + 9x + 17 - 23$$
$$0 = 13x - 6$$
$$13x = 6$$
$$39x = 6 \cdot 3 = 18$$

Thus $39x = 18$.

Problem 17

Official Answer: B

If you are familiar with exponential functions, you can just read the relevant number directly from the equation. Which number? The multiplication factor is 2,

meaning the population will double every time the exponent increases by 1. The exponent will increase by 1 every time t increases by 790.

If you're a little unsure about the timescale in situations with messy exponents, just try setting the exponent equal to 1 and solving for t. At *exponent* $= 0$, the population is at the starting value of 40,000. At *exponent* $= 1$, it has doubled for the first time. So in this case, setting the exponent equal to one looks like this:

$$\frac{t}{790} = 1$$
$$t = 790$$

Problem 18

Official Answer: 11

This is messy, but you might notice that there are two terms in parentheses, and the parenthetical terms are equal to each other and to the requested expression. So we can just treat the parenthetical expression as a variable in its own right, and solve for that:

$$5 - 7(\text{stuff}) = 16 - 8(\text{stuff})$$
$$8(\text{stuff}) - 7(\text{stuff}) = 16 - 5$$
$$\text{stuff} = 11$$

The correct answer is 11.

Problem 19

Official Answer: A

Be careful not to start from 99. That's the ending value, not the starting value. (When you are near the end of a math module, always be on the lookout for sneaky tricks. If you are within the last few questions of the end and the problem does not seem obnoxious, be extra wary.)

An increase of 12.5% corresponds to a multiplication factor of 0.125 (if you want the amount of the change) or 1.125 (if you want the final result), so we can write the situation like this:

$$99 = x + 0.125x = 1.125x$$
$$x = \frac{99}{1.125} = 88$$

There were 88 dragonflies on January 1, and the population increased by 12.5% to give a population of 99 on February 15.

Problem 20

Official Answer: 120

We could try factoring the given quadratic, but they are giving us an expression with a radical in it, and that's a clue that this expression is probably not factorable. We'll have to use the "always works" fallback of the quadratic formula. At least they didn't give us fractional coefficients.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$= \frac{8 \pm \sqrt{8^2 - 4(2)(-7)}}{2(2)}$$
$$= \frac{8 \pm \sqrt{64 + 56}}{4}$$
$$= \frac{8 \pm \sqrt{120}}{4}$$

This looks exactly like the pattern they gave us, so all we have to do is match k to the argument of the square root and conclude that $k = 120$.

Problem 21

Official Answer: A

You might be able to guess that A is the correct answer simply from the fact that they ask for the x-intercept, the x-intercept is where $f(x) = 0$, and only answer A includes "$f(x) = 0$". Answer B mixes up the x-intercept with the y-intercept, and answers C and D both have to do with rates of increase rather than with intercepts.

To tackle this in a more direct way, let's start by translating the first sentence into symbols and writing the expression for $f(x)$.

$$f(x) = 19 + 4x$$

Now, since they ask for the $x-$intercept, and the x-intercept is where $f(x) = 0$, let's set this expression equal to 0 and solve for x.

$$0 = 19 + 4x$$
$$4x = -19$$
$$x = \frac{-19}{4}$$

When $x = -19/4$, $f(x) = 0$, so the x-intercept is $-19/4$, and answer A is the least objectionable statement of this fact.

Problem 22

Official Answer: C

If you've studied fancy trigonometry, you might think that this looks like an angle sum or difference identity, which is not a standard topic on the SAT. There are no trigonometric identities on the SAT. If you encounter any messy trigonometry problems on the SAT, you can probably solve them using complementary angles, for which the sine and cosine are equal to each other. (The sine of an angle is equal to the cosine of its complement, and vice versa...and this *does* come up sometimes on the SAT.)

In this case, you'll notice that 24+66=90, so the two angles in question are complements of each other. So $\sin 24^\circ = \cos 66^\circ$ and $\cos 24^\circ = \sin 66^\circ$, and we can therefore rewrite the given expression like this:

$$(\sin 24^\circ)(\cos 66^\circ) + (\cos 24^\circ)(\sin 66^\circ)$$
$$(\cos 66^\circ)(\cos 66^\circ) + (\sin 66^\circ)(\sin 66^\circ)$$
$$(\cos 66^\circ)^2 + (\sin 66^\circ)^2$$
$$(\cos 66^\circ)^2 + (\cos 24^\circ)^2$$

If you are familiar with the Pythagorean identity, you might realize that $\cos^2\theta + \sin^2\theta = 1$, and the given expression is therefore simply 1, but 1 is far too simple an answer for the SAT.

Problem 1

Official Answer: A

If there are 130 donors and 165 people altogether, how many are left over? 165-130 = 35.

Problem 2

Official Answer: B

The only bar to come anywhere close to the 70 mark is the one labeled "green".

Problem 3

Official Answer: B

You could get out your calculator and just test each answer to see if $2p + 275$ gives you 325. If you want to solve the equation using the tools of algebra, it should look something like this:

$$\begin{aligned} 2p + 275 &= 325 \\ 2p &= 325 - 275 = 50 \\ p &= 50/2 = 25 \end{aligned}$$

Problem 4

Official Answer: B

Find 4000 on the x-axis, go up to the line, then left to the y-axis. You should hit the y-axis at a value of approximately 35.

Problem 5

Official Answer: D

72 take away 20 leaves 52.

Problem 6

Official Answer: C

Draw (or imagine) a dot on the vertex of the parabola, and then read the coordinates of the dot.

Alternately, you might also notice that the answer choices all have an x-coordinate of 0, and the first two choices have a negative y-value, while the graph clearly lies above the x-axis, so you can rule out A and B and focus your attention on deciding whether the y-intercept lies at $y = 2$ or $y = 3$. The graph clearly crosses the y-axis at $y = 2$, so the vertex and the y-intercept both lie at (0,2).

Problem 7

Official Answer: A

2358 raccoons divided by 131 square miles gives 18 raccoons per square mile.

Problem 8

Official Answer: C

You could solve for x and then substitute this value into the expression $72x$, but this would involve fraction math. You might also notice that you can turn $8x$ into $72x$ simply by multiplying by 9.

$$\begin{aligned} 8x &= 6 \\ 9 \cdot 8x &= 9 \cdot 6 \\ 72x &= 54 \end{aligned}$$

Problem 9

Official Answer: B

There are three numbers, and only one is positive, so the probability is one out of three, or 1/3.

Problem 10

Official Answer: 162

If you don't know what's going on here, your guess will probably be correct. The two angles look the same, and there's no other information given, so the answer is probably 162.

More formally, the two angles are technically known as "corresponding angles", formed when a transversal crosses two parallel lines, and they are in fact equal. Any given line crosses two parallel lines at the same angle.

Problem 11

Official Answer: C

They give us a polynomial, and all answer choices contain a monomial multiplied by a simpler polynomial. If you're a little rusty at factoring, you can just apply the distributive property to the answer choices and see which one brings you back to the starting point. To do it more directly, notice that the numerical coefficients have no common factors, but the variable parts share a common factor of x. Factoring the x out of the given polynomial leaves behind $23x^2 + 2x + 9$, so the correct factored form is this:

$$23x^3 + 2x^2 + 9x = x(23x^2 + 2x + 9)$$

Problem 12

Official Answer: D

The answer choices are all polynomials in standard form, so let's follow our instincts and just simplify what we're given. Always be careful when *subtracting* parentheses, but these are simply being added, so we can just delete the parentheses with no further concerns.

$$\begin{aligned}&(9x^3 + 5x + 7) + (6x^3 + 5x^2 - 5)\\ =&9x^3 + 5x + 7 + 6x^3 + 5x^2 - 5\\ =&15x^3 + 5x^2 + 5x + 2\end{aligned}$$

Problem 13

Official Answer: 2850

$$\begin{aligned}f(x) &= 45x + 600\\ f(50) &= 45 \cdot 50 + 600\\ &= 2250 + 600 = 2850\end{aligned}$$

Problem 14

Official Answer: 27

If you like decimals, six percent of 450 is $0.06 \cdot 450 = 27$. If you like fractions or you don't have a calculator,

$$\frac{6}{100} \cdot 450 = \frac{6 \cdot 45}{10} = \frac{6 \cdot 9}{2} = 3 \cdot 9 = 27$$

.

Problem 15

Official Answer: C

The coefficient of an exponential function represents the starting value, but all four answer choices correctly give this value as 890, so that doesn't help. If the value doubles every 10 years, then the growth factor must be 2, and only one answer choice contains a base of 2. The exponent needs to be divided by 10 because the amount doubles every 10 years. If the exponent were simply t, it would double every year.

Problem 16

Official Answer: A

We could try some fancy symbolic manipulation, but the inequalities are very simple and easy to check directly. Just substitute the numbers. Answers B and D fail to satisfy the first inequality, and C and D fail to satisfy the second, leaving only answer A.

Problem 17

Official Answer: 9

This is classified as "medium" difficulty, but the only difficulty lies in the bloated setup. In the equation $y = px + r$, the constant p corresponds to the slope of the line. The second sentence is just a long-winded way of asking us for the slope of the line, and the first sentence tells us directly that it's 9.

Problem 18

Official Answer: D

This one might seem suspiciously easy for a problem near the end of the module, but a careful reading doesn't reveal any tricks or traps, so we can just evaluate the function:

$$\begin{aligned}f(x) &= \frac{1}{2}(x + 6)\\ f(4) &= \frac{1}{2}(4 + 6)\\ &= \frac{10}{2} = 5\end{aligned}$$

Problem 19

Official Answer: D

You might be able to rearrange the terms and deduce the slope in your head. If you want to use a pencil to help avoid mistakes, casting the equation into slope-intercept form should look something like this:

$$\begin{aligned}10x - 5y &= -12\\ -5y &= -10x - 12\\ y &= 2x + ...\end{aligned}$$

The intercept is irrelevant, and the slope is 2.

Problem 20

Official Answer: D

To say that a system has "infinitely many solutions" is to say that your two equations are equivalent. You can obtain one from the other simply by multiplying the entire equation by a constant value. Answers A-C all double *portions* of the equation, and only answer D doubles *everything* in the equation.

Problem 21

Official Answer: C

This is messy and annoying, but relatively straightforward.

$$\begin{aligned} f(5) - f(a) &= -15 \\ |5 - 4 \cdot 5| - |a - 4a| &= -15 \\ 15 - |-3a| &= -15 \\ |-3a| &= 30 \\ -3a &= \pm 30 \\ a &= \mp 10 \end{aligned}$$

Negative 10 is not an option, so we'll have to choose answer C.

Problem 22

Official Answer: 87

$$\begin{aligned} \text{August} &= 3 \cdot \text{September} + 15 \\ \text{August} + \text{September} &= 363 \\ (3S + 15) + S &= 363 \\ 4S &= 363 - 15 = 348 \\ S &= 348/4 = 87 \end{aligned}$$

Problem 1

Official Answer: D

Just find the bar over "0", and count how high it is on the number line. The bar rises to 6.

Problem 2

Official Answer: D

You could notice that the line seems to go through the points (2,3) and (3,7) and conclude that the slope is (7-3)/(3-2)=2. Or you could notice that the answer choices don't require much finesse to discriminate among them, and just eyeball the slope from the endpoints. In going from 0 to 7, the line rises from 1 to 14, which is a slope of approximately 2.

The official "explanation" wants you to calculate the slope using the points (1,3.3) and (7,14.5), for some incomprehensible reason.

Problem 3

Official Answer: 110

Be careful when working percents backwards. This is not 80% of 88; 88 is 80% of a larger number.

$$\begin{aligned} 80\% \text{ of xis } 88 \\ 0.8x &= 88 \\ x &= 88/0.8 = 110 \end{aligned}$$

Problem 4

Official Answer: D

What do you notice about the values of $g(x)$? They go down by a factor of 25 every time x goes up by 1. The "base" or "growth factor" for this function must be 1/25, ruling out choices A and C. And the values for g are all positive, which rules out A and B and leaves only D.

Problem 5

Official Answer: C

You could solve for x and then substitute this value into the expression $72x$, but this would involve fraction math. You might also notice that you can turn $8x$ into $72x$ simply by multiplying by 9.

$$\begin{aligned} 8x &= 6 \\ 9 \cdot 8x &= 9 \cdot 6 \\ 72x &= 54 \end{aligned}$$

Problem 6

Official Answer: A

We can start by examining the h's. Combining the two powers of h gives $h^{15-5} = h^{10}$. This rules out B and D. Combining the powers of q gives $q^{7-21} = q^{-14}$ or $1/q^{14}$. This rules out answers B-D and leaves only answer A.

Problem 7

Official Answer: A

Whenever they give you a "margin of error" question, the answer is probably the one that includes the word "plausible" and states the range of numbers from "average minus margin" to "average plus margin". In this case, 23.1 ± 0.19 gives a range of plausible values from 22.91 to 23.29, which is answer choice A. (Answer choice B gives the correct range, but states that the plausible values are *outside* this range, rather than *inside*.)

Problem 8

Official Answer: 42

You can combine the two parenthetical expressions as "like terms", or you can expand first and then simplify. Either way, you'll have to subtract 1/2 from 1/3. If you combine like terms first, your work should look something like this:

$$\begin{aligned} \frac{1}{3}(x+6) - \frac{1}{2}(x+6) &= -8 \\ \left(\frac{1}{3} - \frac{1}{2}\right)(x+6) &= -8 \\ -\frac{1}{6}(x+6) &= -8 \\ x + 6 &= -8 \cdot -6 = 48 \\ x &= 48 - 6 = 42 \end{aligned}$$

Whichever way you work through it, you should find that $x = 42$.

Problem 9

Official Answer: C

We'll have to multiply the two given functions and then compare the result to the given product.

$$\begin{aligned} f(x) \cdot g(x) &= (x^2 + bx)(9x^2 - 27x) \\ &= 9x^4 + 9bx^3 - 27x^3 - 27bx^2 \\ &= 9x^4 + (9b - 27)x^3 - 27bx^2 \\ &= 9x^4 - 26x^3 - 3x^2 \end{aligned}$$

We can compare the trailing terms and deduce that $27b = 3$, and $b = 1/9$. For further confirmation, we could compare the middle terms and conclude that $9b - 27 = -26$, $9b = 1$, and $b = 1/9$. (On the other hand, with a little foresight and cleverness, we could have realized from the beginning that we only needed to compare the trailing terms, which would have saved us from calculating the full polynomial.)

Problem 10

Official Answer: C

The slope of the line $y = 18x + 2$ is easy to read directly from the equation. It's 18. Line s is parallel to this, so it must have the same slope. Now, if we start at the given point (0,0) and go 4 units to the right, the line must go $18 \cdot 4 = 72$ units up, to the point (4,72). Therefore $d = 72$, and C is the correct answer.

Problem 11

Official Answer: B

You could expand this product and then use the vertex formula to locate the x-coordinate of the axis of symmetry, i.e. the x-coordinate of the minimum value, of the corresponding parabola. You could also complete the square to convert the equation into vertex form so that you can read the vertex coordinates directly from the equation. But there's a much simpler way.

Symmetry can be a powerful ally. In this case, we can easily see from the given factored form of the equation that the two zeros are $x = 44$ and $x = 46$. The axis of symmetry, on which the minimum must lie, must fall halfway between these two values, at $x = 45$.

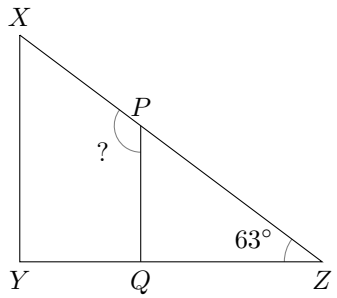
For reference, the standard and vertex forms of the given function are these:

$$\begin{aligned} f(x) &= x^2 - 90x + 2024 \\ &= (x - 45)^2 - 1 \end{aligned}$$

Problem 12

Official Answer: 153

This is a messy geometric problem with no figure. Let's sketch our own:



One way to look at this would be to imagine a horizontal line, or more precisely a line parallel to YZ, through point P. This divides the requested angle into a right angle and an angle equal to 63. So the angle in question must be 90+63=153.

You could also deduce the other acute angle in triangle XYZ using the triangle sum theorem (90-63=27), and then realize that the required angle and 27 forms "consecutive interior angles" between two parallel lines, so the required angle must equal 180-27=153.

Or, you could similarly deduce that the other acute angle in triangle PZQ equals 27, and then realize that the required angle and 27 form "adjacent angles", so the required angle must again equal 180-27=153.

Problem 13

Official Answer: A

What a weird question. They tell us that there are four consecutive odd integers, and they've named the first one x. So if we need them, the second one will be $x + 2$, the third will be $x+4$, and the fourth will be $x+6$. Then they place a weird limit on the relationship between a product and a sum involving these integers, and they ask us to express this in symbols as an inequality. Let's start with the product, which will need to go on one side of our inequality.

If x represents the first odd integer, then the fourth odd integer must be $x + 6$, and "the product of 12 and the fourth odd integer" in symbols is must be $12(x + 6)$. This rules out C and D, because they have the wrong expression on the left side of the inequality.

Now for the other side. If x represents the first odd integer, then the third odd integer must be $x + 4$, and "26 less than the sum of the first and third odd integers"

in symbols is $x+x+4-26 = 2x-22$. If your instincts led you to simplify this expression before comparing it to the answer choices, you'll have to back up now, because the SAT didn't simplify the answer choices. The right-hand side of the inequality needs to be $x+(x+4)-26$, which corresponds to answer A.

If the left side is "at most" the right side, then it must be less than or equal to, confirming that the arrow in answer A is pointing in the correct direction.

Problem 14

Official Answer: .2857,2/7

"The system has infinitely many solutions" is a jargon way of saying that the two equations express the same relationship, and one of them is in fact useless. More formally, they are "equivalent", and you can turn one into the other by multiplying the entire equation by something. This means that if we can write the two given equations in parallel form, with all of the corresponding terms lined up so that we can compare them, then all of the corresponding coefficients should be equal to each other. These two equations are almost in parallel form already, and we just have to make the two constant terms on the right side equal to each other.

There are a few ways we could do this. Let's multiply the upper equation by 35/4, which will allow us to read the values of g and k directly from the equation:

$$\frac{35}{4}\left(\frac{2}{5}x+\frac{7}{5}y\right)=\frac{35}{4}\left(\frac{2}{7}\right)$$

$$\frac{7}{2}x+\frac{49}{4}y=\frac{5}{2}$$

Comparing this to the equation with unknown parameters, we see that $g = 7/2$ and $k = 49/4$. Since they ask us for the quotient of the two, we can divide the first by the second to discover that the answer is 2/7.

$$\frac{\frac{7}{2}}{\frac{49}{4}}=\frac{7}{2}\cdot\frac{4}{49}=\frac{2}{7}$$

Problem 15

Official Answer: B

Oy. We have a table of data, but we don't know exactly what the data are, because there's an unknown parameter. And we have four linear equations as answer choices, but we don't know what any of the slopes or intercepts are, because they are all in standard form. We'll have to plow through the mess as best we can.

Let's start with the slope of the line. Assuming s to be positive, we see that as x increases by s from $-2s$ to $-s$, the value of y decreases by 3 from 24 to 21. Thus the slope is $-3/s$. (If s were negative, then x would *decrease* by $|s|$ as y decreased by 3, and the slope would be *positive*, but the expression $-3/s$ would still give the correct slope, since it now yields a positive number. The slope is $-3/s$, regardless of sign of s.) If we rewrite the four answer choices into slope-intercept form (or if you are able evaluate a slope directly from standard form by taking the correct ratio of coefficients), we discover that we can eliminate A and D, but we still have to choose between B and C, because they both give the correct slope.

We could try to deduce the correct value for the y-intercept, but a simpler approach would be to just plug in one coordinate pair from the table and see which equation gives the correct constant. If we choose $(s, 15)$, then $3x+sy$ gives $3s+15s = 18s$, which matches B but not C.

(If you want to calculate the y-intercept, you could recognize that the y-intercept must lie halfway between $x = -s$ and $x = +s$, and that halfway between 15 and 21 is 18. The y-intercept must be 18, and only answer B gives this y-intercept.)

An alternative approach would be to pick the simplest coordinate pair, (s,15), and try plugging this pair into all four choices. If you try this, you might quickly realize that answers A and D will both give an expression involving s^2, which can't be right. And as before, if you plug this coordinate pair into answers B and C, you discover that only answer B yields a true equation.

Problem 16

Official Answer: 17.5,35/2

You might notice that it is easy to cancel the k's simply by adding the two equations together ... but that will produce a single quadratic equation in two variables, x and y, which doesn't help us to figure out what k is.

On the other hand, if we subtract instead of adding, we'll cancel out the y's, leaving a quadratic equation in a single variable x, with an unknown constant k. Then we can use the discriminant of the quadratic equation to determine the value of k. Let's try this and see what happens. Subtracting the second equation from the first gives this:

$$2k = x + 26 - x^2 + 5x$$
$$x^2 - 6x - 26 + 2k = 0$$

If the system has exactly one solution for (x, y), then this equation that we formed from the system must have exactly one solution for x. And for this quadratic equation to have exactly one solution for x, the discriminant of the equation must be exactly zero.

$$\begin{aligned} b^2 - 4ac &= 0 \\ 36 - 4(-26 + 2k) &= 0 \\ 36 + 104 - 8k &= 0 \\ 8k &= 140 \\ k &= 140/8 \\ &= 35/2 \end{aligned}$$

The decimal equivalent 17.5 is also an acceptable answer.

Problem 17

Official Answer: D

This one might seem suspiciously easy for a problem near the end of the module, but a careful reading doesn't reveal any tricks or traps, so we can just evaluate the function:

$$\begin{aligned} f(x) &= \frac{1}{2}(x + 6) \\ f(4) &= \frac{1}{2}(4 + 6) \\ &= \frac{10}{2} = 5 \end{aligned}$$

Problem 18

Official Answer: A

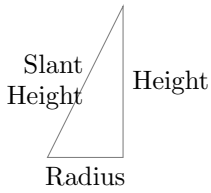
The length is x, and the length is 24 inches longer than the width, so the width must be 24 inches less than the length, or $Width = x - 24$. Knowing the length and width, we can express the area, and then rearrange it into a quadratic equation as if we wanted to solve for the length. But since they only ask us for the equation representing this situation, and not the actual solution, we can stop once we get to the quadratic equation.

$$\begin{aligned} \text{Area} &= \text{Length} \cdot \text{Width} \\ 2661 &= x(x - 24) \\ 2661 &= x^2 - 24x \\ 0 &= x^2 - 24x - 2661 \end{aligned}$$

Problem 19

Official Answer: D

You might have a panic attack over the "slant height", but if you don't know what it means, your guess will probably be correct. The normal "height" of a cone is the perpendicular height, measured straight up-and-down, or perpendicular to the base. The "slant height" is measured diagonally down the surface, from the tip down the side of the cone to a point on the outside of the base. And this slope distance is just the hypotenuse of a right triangle having the base radius and the perpendicular height as the legs. Once you realize that, the rest of the problem should be relatively straightforward.



They give us the volume and the base area, so calculating the perpendicular height is easy:

$$\begin{aligned} \text{Volume} &= \frac{1}{3} \cdot \text{Base Area} \cdot \text{Height} \\ 71,148\pi &= \frac{1}{3} \cdot 5929\pi \cdot h \\ h &= \frac{3 \cdot 71,148\pi}{5929\pi} = 36 \end{aligned}$$

(If you've forgotten the formula for the volume of a cone, it's on the reference page ... sort of. They give the formula in terms of the base radius rather than the base area, but if you realize that πr^2 is the same as the base area, perhaps that will jog your memory. If you had a great geometry teacher, perhaps you'll remember that the volume of *any prism or cylinder* is simply the product of its length or height with its cross-sectional area, and the volume of *any pyramid or cone* is simply one-third that of the prism or cylinder that contains it.)

Given the area of the (circular) base, the radius of the base is also easy to find:

$$\begin{aligned} \text{Area} &= \pi \text{Radius}^2 \\ 5929\pi &= \pi r^2 \\ r &= \sqrt{5929} = 77 \end{aligned}$$

Now that we know the height and the radius of the cone, we can find the slant height by a simple application of the Pythagorean Theorem:

$$\begin{aligned} \text{Slant Height} &= \sqrt{36^2 + 77^2} \\ &= \sqrt{7225} = 85 \end{aligned}$$

Problem 20

Official Answer: D

You might notice that the second equation is identical to the first equation multiplied by 4. The two equations are equivalent, and any ordered pair that satisfies one will also satisfy the other. So let's just ignore the second equation with the larger numbers, and focus our attention on the first equation.

One way to solve this problem would be to substitute each of the ordered pairs into the first equation and see which one produces an equation that is always true, regardless of the value of r. If you try this, you should find that the four choices reduce the first equation to the following equations:

$$\text{A: } r = \frac{5}{13}$$
$$\text{B: } r = 0$$
$$\text{C: } r = 600$$
$$\text{D: } 5 = 5$$

Three of these are true for only one value of r, and only one of them is true for all values of r.

Another strategy would be to notice that the first two answer choices are of the form $(x, f(x))$, so we could solve the given equation for y and see if it matches either of the y-coordinates in the first two answer choices. If it doesn't, we could try the reverse approach for answer D, since that one is of the form $(f(y), y)$, and if it still doesn't match, that would mean that C must be the correct answer.

Solving the first equation for y gives $y = -\frac{7}{6}x + \frac{5}{6}$, and this pattern doesn't match the y-coordinate in either answers A or B. Solving the equation for x gives $x = -\frac{6}{7}y + \frac{5}{7}$, and this does match the x-coordinate in answer D, so D must be the correct answer.

Problem 21

Official Answer: A

This might look very simple. There's an initial fee of \$52 and a daily fee of \$26, so $26d + 52$ seems like the obvious answer. But this is the second-to-last question on the test, and that should set off warning bells in your head. Be extra careful here.

The \$52 is *not* a one-time initial fee to which a daily rate is to be added. It is the cost for the entire *first day*, to which the cost for any *subsequent days* must be added. Try plugging $d = 1$ into the formula $52 + 26d$ and you find that the cost for the first day is \$78. That's too much. You have double-billed for the first day. If we want d to measure the number of days *including the first*, then we need to compensate for the extra-expensive first day by subtracting the difference in our formula. When constructing the formula, we need to start with a fee of \$52, and then add the additional charge for every day *after the first*, meaning we have to subtract one from d before multiplying it by \$26. Doing so gives this:

$$\begin{aligned} C(d) &= 52 + 26(d-1) \\ &= 52 + 26d - 26 \\ &= 26 + 26d \end{aligned}$$

Try plugging $d = 1$ into *this* formula, and you'll find it gives the correct first-day charge of \$52.

Problem 22

Official Answer: B

The method of unit multipliers is overkill for the majority of unit conversion problems. But this is a complicated unit conversion. This is the sort of problem for which the unit multiplier method was invented, and for which it can really be helpful to keep everything straight.

We have a compound unit, involving meters and seconds squared, and we need to convert the meters to miles, and the seconds squared to minutes squared. Setting this up as a unit multiplier problem might look something like this:

$$\begin{aligned} &\frac{7.3\text{meters}}{\text{seconds}^2}\left(\frac{1\text{ mile}}{1609\text{ meters}}\right)\left(\frac{60\text{ seconds}}{1\text{ minute}}\right)^2 \\ =&\frac{7.3 \cdot 60^2}{1609} \\ =&16.3331... \end{aligned}$$

There's only one answer choice that is even close to this.