

# ANSWER KEY

## Practice Test 1

### Section 1, Module 1: Reading and Writing

- |             |              |              |
|-------------|--------------|--------------|
| 1. <b>D</b> | 10. <b>B</b> | 19. <b>A</b> |
| 2. <b>C</b> | 11. <b>C</b> | 20. <b>B</b> |
| 3. <b>B</b> | 12. <b>D</b> | 21. <b>C</b> |
| 4. <b>C</b> | 13. <b>B</b> | 22. <b>C</b> |
| 5. <b>D</b> | 14. <b>D</b> | 23. <b>A</b> |
| 6. <b>C</b> | 15. <b>C</b> | 24. <b>D</b> |
| 7. <b>B</b> | 16. <b>A</b> | 25. <b>A</b> |
| 8. <b>B</b> | 17. <b>D</b> | 26. <b>C</b> |
| 9. <b>D</b> | 18. <b>D</b> | 27. <b>B</b> |

### Section 1, Module 2: Reading and Writing

- |             |              |              |
|-------------|--------------|--------------|
| 1. <b>D</b> | 10. <b>B</b> | 19. <b>C</b> |
| 2. <b>A</b> | 11. <b>C</b> | 20. <b>A</b> |
| 3. <b>C</b> | 12. <b>D</b> | 21. <b>C</b> |
| 4. <b>B</b> | 13. <b>C</b> | 22. <b>A</b> |
| 5. <b>A</b> | 14. <b>B</b> | 23. <b>C</b> |
| 6. <b>B</b> | 15. <b>D</b> | 24. <b>B</b> |
| 7. <b>A</b> | 16. <b>C</b> | 25. <b>B</b> |
| 8. <b>B</b> | 17. <b>B</b> | 26. <b>B</b> |
| 9. <b>A</b> | 18. <b>D</b> | 27. <b>A</b> |

**ANSWER KEY****Practice Test 1****Section 2, Module 1: Math**

- |              |  |
|--------------|--|
| 1. <b>C</b>  | 12. <b>C</b>                               |
| 2. <b>D</b>  | 13. <b>7</b>                               |
| 3. <b>B</b>  | 14. <b>A</b>                               |
| 4. <b>B</b>  | 15. <b>C</b>                               |
| 5. <b>B</b>  | 16. <b>D</b>                               |
| 6. <b>A</b>  | 17. <b>C</b>                               |
| 7. <b>A</b>  | 18. <b>2.5 or <math>\frac{5}{2}</math></b> |
| 8. <b>C</b>  | 19. <b>C</b>                               |
| 9. <b>14</b> | 20. <b>A</b>                               |
| 10. <b>A</b> | 21. <b>B</b>                               |
| 11. <b>6</b> | 22. <b>C</b>                               |

**Section 2, Module 2: Math**

- |  |               |
|--|---------------|
| 1. <b>A</b>  | 12. <b>A</b>  |
| 2. <b>D</b>  | 13. <b>B</b>  |
| 3. <b>1</b>  | 14. <b>3</b>  |
| 4. <b>A</b>  | 15. <b>C</b>  |
| 5. <b>D</b>  | 16. <b>A</b>  |
| 6. <b>44</b>   | 17. <b>D</b>  |
| 7. <b>B</b>  | 18. <b>C</b>  |
| 8. <b>B</b>  | 19. <b>B</b>  |
| 9. <b>B</b>  | 20. <b>C</b>  |
| 10. <b>D</b>   | 21. <b>7</b>  |
| 11. <b>1.666, 1.667, or <math>\frac{5}{3}</math></b> | 22. <b>15</b> |

## Answer Explanations

### Section 1, Module 1: Reading and Writing

1. **(D)** “To call it a day” means to give up working. The boss in this text acknowledges that work is too difficult under the conditions, so it would be logical for him to suggest that everyone give up working. It is not choice (A) or (B) because continuing the work under these circumstances would not be advisable. It is not (C) because the focus is on work not pleasure.
2. **(C)** In this context, “reservations” means “doubts.” This would be logical given that the two people had not gotten along very well the last time they hung out. It is not choice (A) because to detain someone is to hold them as a prisoner, which is not logical here. Choice (B) does not make sense because someone would not have land or “territories” when thinking about an invitation. It is not (D) because this is the opposite of the needed meaning.
3. **(B)** While all of the choices are in some way related to money or business, only “compensation” makes sense in terms of referring to the likely salaries that engineers could receive. “Expenditures” refers to general spending, “enterprises” refers to business activities, and “reimbursement” refers to receiving a refund for one’s paid expenses.
4. **(C)** Later in the sentence with the underlined portion, the narrator states that the crash test dummy only represents the “smallest 5 percent of women,” indicating that it is a smaller size. To say something is “scaled down” means that it is made to be smaller, making choice (C) the most logical option. It is not choice (A) or (B) because these would show that the model is increased in size. It is not (D) because this word means to shorten a non-physical object, like time or a word.
5. **(D)** The sentence is focused on scientific measurement, so “objectively” would be most appropriate. The other options would not be used to describe high-quality scientific measurement, but would instead apply to human emotions.
6. **(C)** This sentence provides a statistic and other context intended to show that advertising is pervasive, so choice (C) is correct. The other options don’t consider the context prior to the sentence in which the author tries to persuade the reader that advertising is effective despite common opinion that one is immune to influence.
7. **(B)** The final line makes the comparison made throughout the poem most clear in that just as the United States now spans toward the Western Sea, so will the narrator’s love. It is not choice (A) because the narrator does not indicate that he intends to lead the country. It is not (C) because the economic features of the states are not compared. It is not (D) because no direct allusion is made to the need for national harmony and a bloody conflict.
8. **(B)** Amory’s relationship with his mother can be best seen through their dialogue. Amory’s use of his mother’s first name indicates that their affiliation is familiar, while her anxiety over him rising too early shows that it is a kindly relationship. So, choice (B) works best here, in which “friendly” refers to “approachable and informal.” Using his mother’s first name is far from traditional, as in choice (A). Since the mother finds it agreeable, there is no evidence that Amory is disrespectful as in (C). Choice (D) can be tempting because Amory not only uses Beatrice’s first name in addressing her, but the narrator also tells us that Amory holds no illusions about his vain mother. However, “cold” and “distant” are too negative.

9. **(D)** This option most directly shows that the narrator wishes to reunify with her departed husband, since she states that if he is coming, he should be sure to let her know ahead of time so that she can meet him. Choice (A) focuses on the narrator's appearance and outdoor actions. Choice (B) would show that the narrator was not especially eager for a reunification. Choice (C) does not express emotion about missing the husband, but just states information about his journey.
10. **(B)** The final sentence of the text is providing an example to elaborate on the claim made in the previous sentence, which is that crops can aid the crop rotation process by either fixing or removing nitrogen. Since the text indicates that a legume is a nitrogen-fixing plant, the example would be completed by presenting a crop that would remove nitrogen from the soil—choice (B) is the best option since corn silage has the highest rate of nitrogen removal of any of the crops in the table. It is not choice (A) because barley has the lowest rate of nitrogen removal. It is not choice (C) or (D) since these incorrectly suggest that something with a low rate of nitrogen removal would be needed.
11. **(C)** The author makes an anecdotal argument in favor of lawsuit reform in this paragraph—the argument would be bolstered by using concrete statistics in support. Choice (C) would provide direct statistical support to make the case that implementing tort reform would result in businesses relocating to more tort-friendly locations. It is not choice (A) because this does not connect to tort reform. It is not choice (B) because this would undermine the author's argument, showing that having a greater possibility of lawsuit payouts would lead to greater social happiness. It is not choice (D) because this gives a reason unrelated to tort reform for business relocation.
12. **(D)** In these lines, our narrator voices his discontent with the requirements of school and his attention toward other “wild sensations,” supporting the idea that his interest toward his studies is only half-hearted. Choices (A), (B), and (C) are incorrect because they do not provide evidence of the character’s attitude toward following and participating in school requirements.
13. **(B)** The final sentence of the text starts by giving information that would seem to indicate that polar bears may be at risk for heart problems given their high bodily fat content and cholesterol levels. The transition “even so” shows that what follows in the sentence should contrast with what comes before. Choice (B) is the most logical option since it states that polar bears are in fact not at risk for heart attacks. Choice (A) does not provide a contrast, and choices (C) and (D) would be in agreement with the first part of the sentence instead of showing a contrast with it.
14. **(D)** Since the text states that Mendeleev’s predictions cause the popularity of his theory to skyrocket, it makes sense that the periodic table would become extremely popular, making choice (D) the most logical option. It is not choice (A) because it would not make sense to state that Mendeleev received only a limited degree of credit because his theory skyrocketed in popularity. It is not choice (B) because these fields would not directly relate to chemistry. It is not choice (C) because Mendeleev had outlets in chemistry years before the periodic table became quite popular.
15. **(C)** Choice (C) properly uses parentheses to set aside the parenthetical phrase that describes what a baffle is. Choice (A) does not have an independent clause after the semi-colon. Choice (B) incorrectly inserts a dash, which provides an unnecessary interruption. Choice (D) is too choppy with an unnecessary comma after “device.”

16. **(A)** “Someone else” is a singular subject that agrees with the singular verb “has.” All the other verbs are plural.
17. **(D)** Choice (D) puts the words in the most logical order, starting with a verb and then using the idiom “a bit out of style.” The other options have illogical word order.
18. **(D)** “Help” would match both the plural subject of “professionals” and the present tense of the sentence as indicated by the verb “allow.” Choice (A) is a singular verb, and (B) and (C) are not present tense plural verbs.
19. **(A)** Choice (A) uses the apostrophe to show that the singular serval possesses its diet. “Serval” must be singular since the word “a” precedes it. Choice (B) does not show possession, and (C) and (D) inappropriately use plural apostrophes on servals’ and diets’ respectively.
20. **(B)** The verb refers to the plural “states” and so requires a plural verb—“become.” Also, the tense of the other verbs in the sentence is present, so “become” makes sense because it is also in the present tense. Choice (A) is singular, and (C) and (D) use incorrect verb tense.
21. **(C)** No punctuation is needed to break up this sentence. Choice (A) is incorrect since there is not a complete sentence after the semicolon. Choice (B) incorrectly breaks up a two-part list with a comma. Choice (D) incorrectly inserts a parenthetical phrase.
22. **(C)** Choice (C) appropriately uses dashes to set aside the parenthetical phrase that clarifies what the two things are. Choice (A) has an unnecessary comma after the parentheses—the parentheses would be sufficient by themselves to set this phrase off to the side. Choice (B) does not have a comma before the parenthetical phrase, and (D) uses inconsistent punctuation around the parenthetical phrase.
23. **(A)** “Whereas” is the only option that provides a contrast within the sentence between the ideas that a resume should be concise and that an online profile can be more thorough.
24. **(D)** “Hence” is the only option to indicate a cause-and-effect relationship between the fact that the housing market is challenging with its cost and unpredictability and the fact that as a result, many working-class families will face further financial instability.
25. **(A)** Choice (A) best emphasizes the physical demands of being a Gyoja monk since it states that they walk an incredible 52 miles a day with very little food and sleep. While choice (B) also refers to the physical demands, 25 miles a day is not as rigorous as 52 miles a day. Choices (C) and (D) do not focus on the physical demands of becoming Gyoja monks, instead focusing on the time and spiritual commitment involved.
26. **(C)** Choice (C) succeeds in making a generalization about the makeup of typical furniture since it states that the springs in the everyday furniture are more likely to be sinuous than coil, which is consistent with the notes. It is not choice (A) because this is the opposite of what the notes indicate. It is not choice (B) because the labor-intensive process only applies to coil springs as described in the notes. It is not choice (D) because the notes indicate that sinuous springs are more common, not that the springs are equally likely to be found.
27. **(B)** According to the notes, the wind speeds offshore “tend to be higher than on land,” making choice (B) a logical reason why having an offshore wind farm could be better than a land-based one. It is not choice (A) because both offshore and land-based wind farms would provide renewable energy. It is not choice (C) because this is an argument in favor of land-based wind farms. It is not choice (D) because it points out a cost drawback of offshore wind farms.

**Section 1, Module 2: Reading and Writing**

1. **(D)** The author uses an idiom in an ironic way, stating that despite a lack of common understanding, chemistry is extremely applicable to cooking, implying that this is something to think about. Choice (A) incorrectly understands it as stimulating one's appetite. Choices (B) and (C) inaccurately assume action rather than contemplation.
2. **(A)** “Drawback” is another way of stating that something is a shortcoming or problem. The narrator is discussing the problems with the ABC-X model, so “drawback” would make sense to introduce a sentence that describes another problem with this theory. It is not “assessment” or “rumination” as the narrator already has a negative opinion on the theory. It is not “trauma” because this is too negative.
3. **(C)** To “assure” is to remove doubt, and it is generally done to another person. I assured my father that I would be home by curfew. To “ensure” means to make sure a thing will or won’t happen. I studied last night to ensure that I wouldn’t fail the test. To “insure” refers to car insurance, life insurance, health insurance, etc. To “reassure” is simply to “assure” someone multiple times. In this sentence, the classrooms are ensuring that something will happen—students will be prepared for the next grade. Choice (C) is the correct answer.
4. **(B)** The narrator is drawing a contrast between something that may appear to be “trivial” while in actuality turning out to be significant—therefore, “substantive” makes the most sense because it means that whatever is being evaluated has substance. Choices (A) and (C) are overly negative, while “exuberant” does not draw a logical contrast with “trivial.”
5. **(A)** The text asserts that certain things help cause the spread of bedbugs, making “agent” an appropriate word since in one of the less common definitions of “agent,” it can mean something that helps bring about a specific effect. It is not “excursions” or “meanderings” since these buildings do not travel anywhere. It is not “hygienics” because the buildings are not sanitary.
6. **(B)** The text begins by stating that since young children are better suited to learning multiple languages, they can benefit from a wide range of positive effects. The text goes on to highlight some of these effects, such as increased cultural awareness and overall improvement in academic skill. Thus, choice (B) makes the most sense because the text provides evidence in favor of early learning of multiple languages. It is not choice (A) because the narrator does not argue that a specific language should be learned; rather, the narrator argues that multiple language learning in general is beneficial. It is not (C) because no specific curriculum is suggested. It is not (D) because the narrator argues that biological obstacles to early language learning are minimized if the language is learned earlier in life.
7. **(A)** The second text suggests that some emotional responses that Spielberg tries to evoke in his films may not always be “earned” because they are prompted by watching the character reactions instead of considering the content of what happened. The example in Text 1 has quite a bit of intellectual activity behind it, implying that an emotional response to this speech is based on something substantive instead of something manipulative. It is not choice (B) because the author of Text 2 does not express a concern with political activism. It is not choice (C) because the author of Text 2 clearly believes that emotion can be prompted by the expressions that actors have on the screen. It is not (D) because the author of Text 2 implies that some emotional responses can be earned.

8. **(B)** The text tells us that Jim was struggling to make it in New York. Then, he had a “brilliant marriage.” The connection to “the daughter of a distinguished man” helped Jim advance in life. The implication, then, is that Jim married his wife for her connections. Additionally, the marriage between them prompted “sharp comment” at the time, suggesting that the motives for the marriage were considered suspicious. This makes choice (B) the best answer—the narrator believes Jim married his wife to advance his career. Choices (A) and (C) are incorrect as there is no evidence that Jim and his wife share any love. (D) is incorrect as we have no evidence that his wife sympathized with his poverty.
9. **(A)** In the second paragraph, the author describes the tremendous impact that printing has had on human history, saying that it “changed the destiny of Europe,” and that it has “governed opinion,” reigning over the mind of man. So, this influence can best be described as “extremely significant.” It is not choice (B) because the influence of printing is relevant, not irrelevant. It is not (C) because the author suggests that printing has had a widespread influence, not that it has had a serious negative impact on society. It is not (D) because the impact of printing is more cultural, not militaristic.
10. **(B)** This option shows that the speaker believes that the “fiend of gambling” has made his father’s “good resolutions transient, his promises vain,” showing that he has an inability to follow through on his commitments. This is a great obstacle to the narrator’s father since it has “fully possessed him.” Choice (A) describes the father’s early adulthood but does not indicate that it is a great obstacle. Choices (C) and (D) show a single obstacle his father faced (the declining favor of the king) but do not indicate that this was a large overall issue in his life.
11. **(C)** We can see in Figure 1 that the evening hours have the highest normalized occurrence rates of any time of day. We also see that in Figure 2, the Northern Hemispheric spring months of April, May, and June have the highest rate of tornado formation. Combined, this makes the evening hours in the spring the most likely time for a tornado to form. Choice (C) is the best option. The other options all have a lower likelihood of spawning a tornado.
12. **(D)** To give oneself entirely to the state means that someone would give up their personal ambitions and desires so that the society as a whole can benefit. Choice (D) most directly illustrates this since the individual would “alienate” himself to the whole community, giving up his rights. Choices (A) and (B) do not address the individual sacrifice of rights. It is not (C) because this suggests an opportunity for individuals to recover their rights should the social contract be violated.
13. **(C)** The economists hypothesize that if we look at the months after 2020, interest rates should decrease. Choice (C) correctly points out that mortgage rates generally decreased during this time period, providing an example in support of the claim. Choice (A) would not show a decrease. Choices (B) and (D) would show the opposite of what would support the hypothesis.
14. **(B)** Group 2 argues that the reason why Species X has been growing in population despite a loss of habitat is that the landscape has become more suitable for the bird. Choice (B) would directly support this idea because if there is more construction taking place, it stands to reason that there might be more fragmentation of land creating more edges along tree lines that the birds might prefer. It is not choice (A) because this does not show why south Ohio would be a good choice for the birds. It is not (B) because an increase in predators would likely kill

some of the birds, making the habitat less desirable. Also, choice (D) is incorrect because having more pollution in southern Ohio would be likely be detrimental to the birds.

15. **(D)** The text states that the bees cannot see into the capped cell, so they do not know if mites are growing inside the cells. Thus, choice (D) makes the most sense because it underscores how there are mites breeding that the treatments may not reach because they are inside the capped cells. It is not choice (A) or (C) because these options would instead show that the mites could be gotten rid of. It is not (B) because this would not be directly relevant to the claim made in the final sentence of the text.
16. **(C)** “Became” is consistent with the past tense seen in surrounding verbs, like “wasn’t,” “used,” and “called.” The other options are not in the proper conjugation for past tense.
17. **(B)** “Which” is used to set aside a nonessential description, while “that” is used at the beginning of an essential description. In this case, the clarification about the constancy of interest rates could be removed from the sentence and the sentence would still be logical. Therefore, surrounding the description of the fixed interest rates with commas make sense. It is not choice (A) because this is a nonessential description, and commas typically do not precede the word “that”. It is not (C) because there is no pause before “which.” It is not (D) because there is not a complete sentence after the semicolon.
18. **(D)** The surrounding sentences use verbs that are in the present tense, like “can” and “have.” So, “allows” is both consistent with the present tense and the singular subject of “method.” The other options are not in the present tense.
19. **(C)** This option uses the correct form of “they’re,” which means “they are.” Also, it puts a comma after the dependent clause that introduces the sentence. Choices (B) and (D) use “their” and “there,” which are incorrect in this context. Choice (A) incorrectly uses a semicolon to provide a break after a dependent clause—there needs to be an independent clause on either side of the semicolon when it is used to break up sentences.
20. **(A)** This needs a possessive to match the idea: the contribution of either scientist. As possession and an apostrophe are required, eliminate choice (C). Eliminate choices (B) and (D) for using the plural word “scientists” since the initial idea was the contribution of either scientist, not the contribution of both scientists.
21. **(C)** Choice (C) is the only option that correctly uses the comma and semicolon to indicate that this is part of a list—the items within the list have commas within them (separating each city name and country name/description), so semicolons are logically used to separate items in this list.
22. **(A)** The text begins by stating that Sweden had to spend quite a bit of money during the Great Depression, which would make it understandable if Sweden had not been able to repay its debts. The text goes on to state that Sweden quickly paid back its creditors, making a contrast to introduce the second sentence necessary. “Despite” is the only option that expresses a contrast.
23. **(C)** “Further” correctly indicates that what follows in this sentence will build upon the argument already presented. Choice (A) does not make a strong tie to the argument, (B) shows contrast, and (D) shows cause and effect.
24. **(B)** “Even” in this context is used to emphasize that severe market downturns should not incite panic. (A) causal link is already established with the “if” at the beginning of the sentence, making “thus” and “so” unnecessary. It is not “while” because there is not a contrast.

25. **(B)** If an audience is already familiar with the concept of IQ, they will know that IQ is associated with intelligence. Choice (B) builds off this understanding by drawing a contrast between AQ and IQ. It is not choice (A) because the notes indicate that AQ is an important component to success but does not indicate that it is the most important component. It is not choice (C) because the text does not suggest that IQ is totally unimportant to success. It is not (D) because the last bullet point implies that AQ is not necessarily key to academic prowess.
26. **(B)** While there are many ways that sustainable agriculture could be implemented, the student wishes to suggest a way of doing so that does not involve much technology. The last bullet point suggests that simply planting crops close to each other will increase their success, making (B) the most logical answer. The other options all involve more high-tech ways of implementing sustainable agricultural practices.
27. **(A)** According to the notes, a utilitarian looks at the outcomes of an action to determine if it is ethical, while a deontologist looks at whether the action was carried out in a rule-based way. Choice (A) is a good example of something that would be approved of by a utilitarian but not a deontologist: the politician is violating a rule against lying, but while in office the politician carries out policies that serve the greater good. It is not choice (B) because a utilitarian would not like the resulting lack of collaboration among the students. It is not choice (C) because a utilitarian would not appreciate the outcome of a collapsed bridge. It is not choice (D) because it is not clear whether any ethical rules would be violated in this action, making it uncertain as to whether a deontologist would disapprove.

## Section 2, Module 1: Math

1. **(C)** Plug 5 in for  $x$  into the expression to find its value:

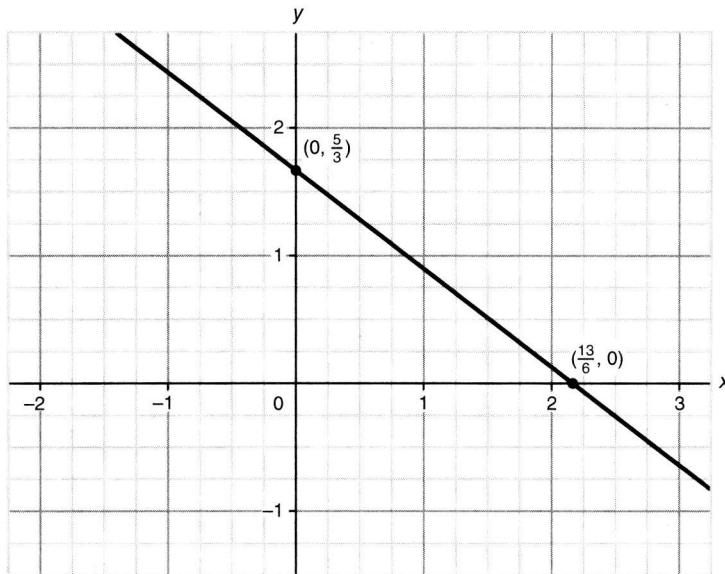
$$\begin{aligned}3(x + 2) - 2x &\rightarrow \\3(5 + 2) - 2(5) &\rightarrow \\3(7) - 10 = 21 - 10 &= 11\end{aligned}$$

2. **(D)**

$$\begin{aligned}-3(x^2 - 2x + 4) &\rightarrow \\ \text{Distribute the } -3 &\rightarrow \\ -3x^2 + 6x - 12\end{aligned}$$

3. **(B)** The total number of students in the class is  $26 + 33 + 21 + 13 + 7 = 100$ . So, the median grade will be the average of the 50th and 51st term. The 50th and 51st terms, when the grades are put in order from least to greatest, are both (B). So, the median grade for the class is (B).

4. (B)



Take the change in  $y$  divided by the change in  $x$  to find the slope of the line. Use the points  $(0, \frac{5}{3})$  and  $(\frac{13}{6}, 0)$ , and the formula  $slope = \frac{y_2 - y_1}{x_2 - x_1}$ :

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{\frac{5}{3} - 0}{0 - \frac{13}{6}} = \frac{\frac{5}{3}}{-\frac{13}{6}} = \frac{5}{3} \times -\frac{6}{13} = -\frac{5 \times 2}{13} = -\frac{10}{13}$$

5. (B) The equation is already in a factored form that allows you to identify the solutions. If  $x$  is  $-\frac{1}{4}$  or  $\frac{2}{3}$ , the value of the right-hand side of the equation would be zero. Therefore, these two numbers are solutions. So, multiply them together to find the product:

$$-\frac{1}{4} \times \frac{2}{3} = -\frac{2}{12} = -\frac{1}{6}$$

6. (A) Find 27% of 4,000 to see how many of the students would have a science or math major. Move the decimal point of 27 to the left two spots, then multiply this by 4,000 to find the number of students:

$$0.27 \times 4,000 = 1,080$$

7. (A) There are 7 days in one week, so multiply the 8 hours Mark sleeps per day by 7 to find out the total number of hours he sleeps in a week:  $7 \times 8 = 56$ . Then, multiply 56 by the number of weeks,  $W$ , to find the number of hours that Mark would sleep in  $W$  weeks:  $56 \times W$ .

8. (C) Take the cube root of both sides of the equation to solve for  $x$ :

$$x^3 = \frac{27}{8} \rightarrow$$

$$\sqrt[3]{x^3} = \sqrt[3]{\frac{27}{8}} \rightarrow$$

$$x = \frac{3}{2}$$

If  $x^3 = \frac{27}{8}$ , what is the value of  $x$ ?

9. **(14)** Plug 40 in for  $B$  and 4 in for  $E$ . Then solve for  $P$ :

$$\begin{aligned}B &= 2P + 3E \rightarrow \\40 &= 2P + 3(4) \rightarrow \\40 &= 2P + 12 \rightarrow \\40 - 12 &= 2P \rightarrow \\28 &= 2P \rightarrow \\P &= 14\end{aligned}$$

10. **(A)** Multiply  $16\pi$  by 1.5625 to find what the area of a circle that is 56.25% greater in area would be. (This would represent 156.25% of the original circle—that is why we multiply by 1.5625 instead of just 0.5625.)

$$16\pi \times 1.5625 = 25\pi$$

Note that we only multiplied the 16 by the 1.5625 so that we can identify the radius more easily. So, the new circle will have a radius of 5, since the area of a circle is  $\pi r^2$  and the square root of 25 is 5.

11. **(6)** You can use substitution to solve for  $x$ . Take the second equation and find the value of  $y$  in terms of  $x$ :

$$\begin{aligned}x + y &= 11 \rightarrow \\y &= 11 - x\end{aligned}$$

Then, substitute this in to the first equation to solve for  $x$ :

$$\begin{aligned}3x - 4y &= -2 \rightarrow \\3x - 4(11 - x) &= -2 \rightarrow \\3x - 44 + 4x &= -2 \rightarrow \\7x &= 42 \rightarrow \\x &= 6\end{aligned}$$

12. **(C)** Multiply the number of persons per square mile by the total number of square miles to find an approximation of the total population of the city:

$$4,900 \times 139 \approx 681,000$$

13. **(7)** Be sure to solve for “ $x + 2$ ” and not just for  $x$ . The expression  $x^2 - 4$  can be rewritten as  $(x + 2)(x - 2)$ , enabling you to plug in 3 for  $x - 2$  and solve for  $x + 2$ :

$$\begin{aligned}\frac{x^2 - 4}{3} &= 7 \rightarrow \\\frac{(x - 2)(x + 2)}{3} &= 7 \rightarrow \\\frac{3(x + 2)}{3} &= 7 \rightarrow \\x + 2 &= 7\end{aligned}$$

14. **(A)** As the height of the orangutans increases, their weight also increases. Choice (A), “The greater the height of the orangutan, the greater the weight,” correctly summarizes this trend.

15. **(C)** Use the volume formula for a cylinder,  $V = \pi r^2 h$ , in which  $r$  is the radius and  $h$  is the height. Note that this formula is provided in the formulas at the beginning of the section, so refer to it if you do not remember the formula. Since the tank has a base with a diameter of 10 feet, the radius will be 5. Plug in the volume and the radius into the formula to solve for height:

$$\begin{aligned}V &= \pi r^2 h \rightarrow \\300\pi &= \pi(5^2)h \rightarrow \\300\pi &= 25\pi h \rightarrow \\\frac{300\pi}{25\pi} &= h \rightarrow \\12 &= h\end{aligned}$$

16. **(D)** Plug 6 in for  $x$  to solve for the value of  $f(6)$ :

$$\begin{aligned}f(x) &= \frac{x^2 + 3}{2x} \rightarrow \\f(6) &= \frac{6^2 + 3}{2(6)} = \frac{36 + 3}{12} = \frac{39}{12} = \frac{13}{4}\end{aligned}$$

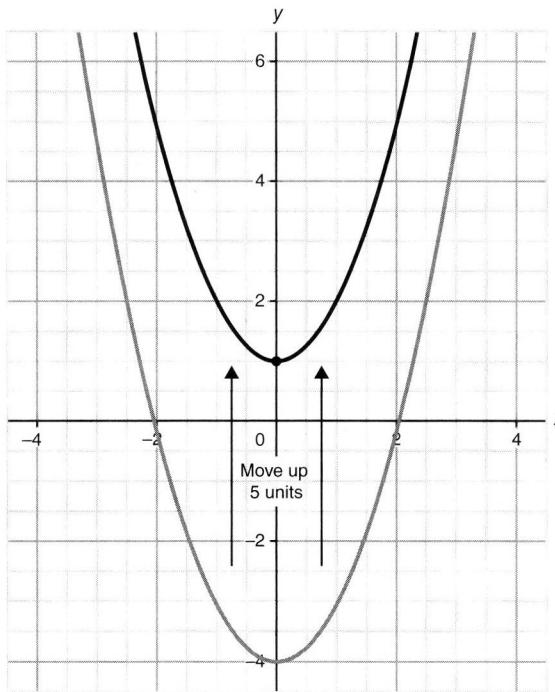
17. **(C)** The number of respondents is sufficient to generalize on the voter preferences. However, the respondents were not randomly selected—they all chose to go to an online poll to vote for a particular candidate. People who chose to respond to the online poll are more likely enthusiastic about their political preferences; this self-selected group would therefore not accurately represent a cross-section of voters. The survey would have been more accurate if the respondents had been randomly selected instead of self-selected.
18. **(2.5 or  $\frac{5}{2}$ )** Pick an ordered pair,  $(2, 5)$  would work, and plug it in to the equation  $y = kx$  to solve for the constant  $k$ :

$$\begin{aligned}y &= kx \rightarrow \\5 &= k(2) \rightarrow \\k &= 2.5\end{aligned}$$

19. **(C)** Add 5 to the equation to shift the equation upwards by 5 units:

$$y = x^2 - 4 \rightarrow y = x^2 - 4 + 5 \rightarrow y = x^2 + 1$$

You can see the effect of this translation in the following graph:



20. (A) Plug in 2 for  $x$  and 5 for  $y$ , since this ordered pair represents a solution to the inequality:

$$y \geq x + n \rightarrow$$

$$5 \geq 2 + n \rightarrow$$

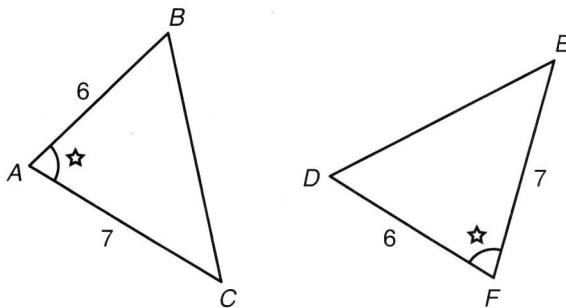
$$3 \geq n$$

Since  $n$  must be less than or equal to 3, the greatest possible value for  $n$  is 3.

21. (B) There are 25 patients who had a positive test result. Out of those 25 patients, 20 actually did not have the illness, meaning they had a false positive. So, divide 20 by 25 to find the probability that one of the positive test results was actually a false positive:

$$\frac{20}{25} = 0.8$$

22. (C)



If angle  $BAC$  equals angle  $DFE$ , as labelled above, the triangles would be congruent because of the Side-Angle-Side theorem. This theorem states that if two sides and the angle formed by these two sides are equal to two sides and the included angle in another triangle, the two triangles are congruent.

## Section 2, Module 2: Math

1. **(A)**

$$5x + 2 = 4(x - 3) \rightarrow$$

$$5x + 2 = 4x - 12 \rightarrow$$

$$x + 2 = -12 \rightarrow$$

$$x = -14$$

2. **(D)** The interval from 30–35 minutes has a decrease in distance of 0.45 miles. This is the greatest decrease in distance over any time period portrayed in the graph, so choice (D) is the correct answer.

3. **(1)** Plug in 5 for  $x$  to the equation to solve for the value of  $y$ :

$$\frac{1}{3}(x - 2) = y \rightarrow$$

$$\frac{1}{3}(5 - 2) = y \rightarrow$$

$$\frac{1}{3}(3) = 1 = y$$

4. **(A)** The equation can be written in slope-intercept form since it is a line. Use  $k$  as the  $y$ -intercept:

$$y = mx + b$$

$$y = 5x + k$$

Now, plug in a point—we can use  $(1, 8)$ —for  $x$  and  $y$  to solve for  $k$ :

$$y = 5x + k \rightarrow$$

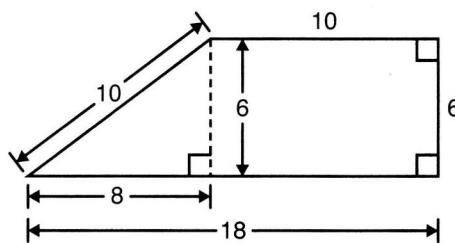
$$8 = 5(1) + k \rightarrow$$

$$3 = k$$

5. **(D)**

$$\frac{x^2 - 9}{x - 3} \rightarrow \frac{(x + 3)(x - 3)}{x - 3} = \frac{(x + 3)(\cancel{x - 3})}{\cancel{x - 3}} = x + 3$$

6. **(44)** Since this is a trapezoid, the top and bottom sides are parallel to one another. So, you can inscribe a right triangle within the trapezoid to find the length of the unknown side, as seen below.



Then, add up the lengths of the sides to find the perimeter of the figure:

$$10 + 6 + 18 + 10 = 44.$$

7. **(B)** The functions are all in slope-intercept form, and they all have different values for the slope. So, find the slope of the function by using the slope formula and plugging in two points. The cost corresponds to the  $y$  values and the pieces of fruit will be the  $x$  value. Use the points  $(6, 13.40)$  and  $(12, 25.40)$  in the slope formula:

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{25.40 - 13.40}{12 - 6} = \frac{12}{6} = 2$$

The only option that has 2 as its slope is choice (B). Alternatively, you could plug in values to the equations to see which one correctly models the numbers in the table.

8. **(B)** Manipulate the equation to isolate  $v$ :

$$\begin{aligned} K &= \frac{1}{2}mv^2 \rightarrow \\ \frac{2K}{m} &= v^2 \rightarrow \\ \sqrt{\frac{2K}{m}} &= v \end{aligned}$$

9. **(B)** The range of the set (difference between the least and greatest terms) will increase by 25, since the smallest member of the set has 5 subtracted from it and the largest member has 20 added to it. The standard deviation (the deviation from the mean) would increase slightly with these changes, but not nearly as much as the range would since the values of the other 13 members of the set will remain constant. So, choice (B) is the correct answer.
10. **(D)** Add the two functions together, combining like terms to put it in a simplified quadratic form:

$$\begin{array}{r} -x^2 + 4x - 3 \\ + 5x^2 - 2x + 8 \\ \hline 4x^2 + 2x + 5 \end{array}$$

In this combined equation, the number 5 corresponds to the constant  $k$ , making choice (D) correct.

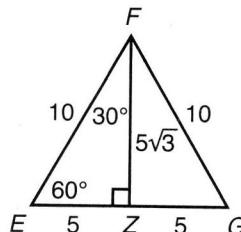
11. **( $\frac{5}{3}$ , 1.666, 1.667)** First, find the slope of the line comprised of the two points  $(5, 0)$  and  $(0, 3)$ .

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - 0}{0 - 5} = -\frac{3}{5}$$

Now, take the negative reciprocal of  $-\frac{3}{5}$  to find the slope of a line perpendicular to this one:

$$-\frac{3}{5} \rightarrow \text{Flip the fraction and multiply by } -1 \rightarrow \frac{5}{3}$$

12. **(A)**



Since triangle  $EFG$  is equilateral, you can label  $\angle FEZ$  as 60 degrees. This turns triangle  $FEZ$  into a special right triangle—a 30-60-90 triangle. The ratios of the sides in a 30-60-90 triangle are  $x, \sqrt{3}x, 2x$ . So, the length of  $\overline{FZ}$  will be  $5\sqrt{3}$  since the  $x$  in this case is 5.

13. **(B)** Since 23% of the recommended daily value of calcium for an adult is 300 mg, calculate the total recommended daily value of calcium for an adult,  $x$ , using this equation:

$$0.23x = 300 \rightarrow \\ x = \frac{300}{0.23} \approx 1,304$$

Now, find what percent of 1,304 that 210 is:

$$\frac{210}{1,304} \times 100 \approx 16\%$$

14. **(3)**  $2\pi$  radians and 360 degrees both represent an entire circle. To see how many angles of the measure of  $\frac{2}{3}\pi$  radians are in 360 degrees, divide  $2\pi$  by  $\frac{2}{3}\pi$ :

$$\frac{2\pi}{\left(\frac{2}{3}\pi\right)} = \frac{2}{\left(\frac{2}{3}\right)} = 2 \times \frac{3}{2} = 3$$

So, there are 3 angles of this measure within 360 degrees.

15. **(C)** The greatest possible value for  $y$  occurs when  $y = x + 2$ , since that would maximize its value within the inequality. Set  $x + 2$  equal to  $-x + 4$ , since the value of  $y$  would be at its maximum in both inequalities, and then solve for  $x$ :

$$x + 2 = -x + 4 \rightarrow \\ 2x = 2 \rightarrow \\ x = 1$$

The correct answer is therefore choice (C).

16. **(A)** Try plugging in values from the table to determine which function correctly represents the relationship between the numbers. Before just plugging in numbers to every equation, think about the overall relationship of the numbers. As  $x$  increases,  $y$  decreases. So, choices (C) and (D) would not work because they would result in increasing functions. Then, you just need to try options (A) and (B). Use the ordered pair (1, 2) to see which of these would work:

$$y = \frac{2}{x^2} \rightarrow 2 = \frac{2}{1^2} \text{ which is true.} \\ y = \frac{4}{x^2} \rightarrow 2 \neq \frac{4}{1^2}, \text{ so choice (B) is incorrect.}$$

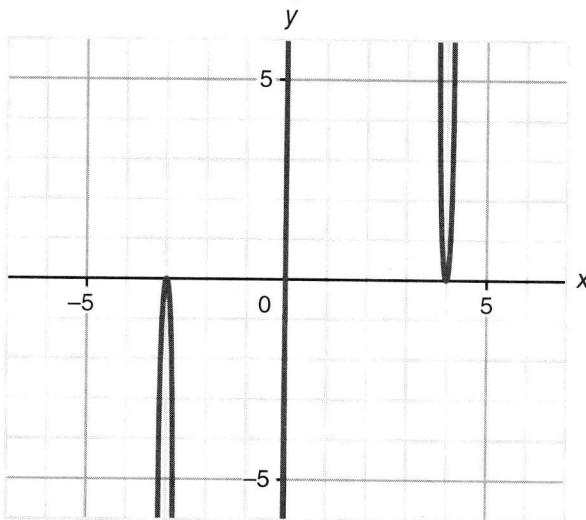
Therefore, the correct function is in choice (A).

17. **(D)** Use synthetic division to divide. Use 4, -3, and 2 as the values in the top of the synthetic division format and use +3 to go through the synthetic division steps.

$$\begin{array}{r} 3 | 4 & -3 & 2 \\ & 12 & 27 \\ \hline & 4 & 9 & 29 \end{array}$$

This results in  $4x + 9 + \frac{29}{(x - 3)}$ , in which  $\frac{29}{(x - 3)}$  is the remainder. You could also use long division to solve.

18. (C) A selection of the function is graphed below:



While the function has a high degree, it has only three unique  $x$  intercepts: 0, 4, and  $-3$ . You can see this by examining the equation to see what values of  $x$  would cause  $y$  to equal zero. If  $x = 0$ ,  $x = 4$ , or  $x = -3$ , the value of  $y$  will be equal to zero.

19. (B)

Since there are twice as many elementary school students as middle school students,  $c = 2f$  and  $f = \frac{c}{2}$ . The number of elementary school students and middle school students is 150, so find the value of  $c$ :

$$\begin{aligned} c + f &= 150 \rightarrow \\ c + \frac{c}{2} &= 150 \rightarrow \\ 1.5c &= 150 \rightarrow c = 100 \end{aligned}$$

So, we know that  $c$  is 100.

Since 60% of elementary school students take the bus, find 60% of 100 to find the value for  $a$ :  $0.6 \times 100 = 60$ . Since the number of elementary school students is 100 total, subtract 60 from 100 to find the number of elementary school students who walk:  $100 - 60 = 40$ .

The total number of students who walk to school is 70 based on the table. So, find the number of middle school students who walk by subtracting 40 from 70:

$$70 - 40 = 30$$

To more easily visualize this, all the solved values for the variables are plugged into the spots in the table below:

	<b>Bus</b>	<b>Walk</b>	<b>Total</b>
<b>Elementary</b>	60	40	100
<b>Middle</b>	20	30	50
<b>Total</b>	80	70	150

20. **(C)** The product of these two expressions will be undefined if the denominator on either expression is equal to zero. For  $\frac{2}{x}$ , if  $x = 0$ , the expression is undefined. For  $\frac{3}{(x - 1)}$ , if  $x = 1$ , the expression is undefined since the denominator  $x - 1$  would equal zero if  $x = 1$ . So, the correct answer is choice C.

21. **(7)** The equation will equal zero when  $x = 5$  and  $x = -2$ , as you can see below:

$$\begin{aligned}y &= 7(x - 5)(x + 2) \rightarrow \\y &= 7(5 - 5)(5 + 2) \rightarrow \\y &= 7(0)(7) = 0\end{aligned}$$

and

$$\begin{aligned}y &= 7(-2 - 5)(-2 + 2) \rightarrow \\y &= 7(-2 - 5)(-2 + 2) \rightarrow \\y &= 7(-7)(0) = 0\end{aligned}$$

So, the points  $(5, 0)$  and  $(-2, 0)$  are the  $x$  intercepts of the parabola. Since the  $y$  values do not change, simply find the difference between the  $x$  values to find the distance between the  $x$  intercepts:

$$5 - (-2) = 7$$

22. **(15)**

$$\begin{aligned}(x + 5)(x + 3) &= ax^2 + bx + c \rightarrow \\x^2 + 3x + 5x + 15 &= ax^2 + bx + c \rightarrow \\x^2 + 8x + 15 &= ax^2 + bx + c\end{aligned}$$

Since 15 is the only numerical constant, it will equal  $c$  because the  $c$  term on the right-hand side does not have an  $x$  in it. So, the value of  $c$  is 15.