

1. **Level:** Hard | **Domain:** CRAFT AND STRUCTURE

**Skill/Knowledge:** Words in Context

**Key Explanation:** Choice C is the best answer because it refers to something that is used as a standard of comparison. It fits the context of saying that 25 healthy people were used as comparisons for the 163 patients with major depressive disorder or bipolar disorder.

**Distractor Explanation:** None of the other choices describe the 25 healthy patients. Choice A refers to “experts,” but the experts on the subject were conducting the experiment, not taking placebos as part of the test. Choice B refers to limitations rather than comparisons. Choice D refers to orders.

2. **Level:** Easy | **Domain:** CRAFT AND STRUCTURE

**Skill/Knowledge:** Words in Context

**Key Explanation:** Choice B is the best answer because the text is describing a trend among parasites: almost none are mammals. The blank portion is a noun that describes the vampire bat, which is a parasitic mammal. Choice B refers to something that does not follow the general rule, so perfectly describes a parasite that does not fit the usual pattern.

**Distractor Explanations:** Choice A is incorrect because it refers to a strange or unusual habit or characteristic that stands out, not to an object that does not fit a rule. Choice C is incorrect because it refers to something that is not the same shape or quality, such as sound or appearance. Choice D is incorrect because it refers to an individual preference that is unusual.

3. **Level:** Easy | **Domain:** CRAFT AND STRUCTURE

**Skill/Knowledge:** Words in Context

**Key Explanation:** Choice C is the best answer because C refers to the gradual amassing or acquisition of something. It fits the context of describing what aspect of bioactive compounds—in this case, nutrients—in vegetables is affected by salt stress. The sentence can be paraphrased by saying that salt changes the rate that bioactive compounds amass.

**Distractor Explanation:** None of the other choices fits the context of describing what aspect of biological compounds is affected by salt. Choice A refers to how well one focuses one’s thoughts, so it does not apply to inanimate things. Choice B also does not refer to inanimate things, as it describes the emotion of being committed to a purpose. Choice D is incorrect because it refers to bringing activities, not things, into one place under one form of control or leadership.

4. **Level:** Hard | **Domain:** CRAFT AND STRUCTURE

**Skill/Knowledge:** Text Structure and Purpose

**Key Explanation:** Choice A is the best answer because the sentence says that HEPHL1 regulates an enzyme that needs copper. Later, the passage points out that copper is related to Menkes disease. Therefore, the second sentence shows how HEPHL1 might be related: a change in copper changes how lysyl oxidase functions, and that would appear as the copper absorption issues in Menkes disease.

**Distractor Explanation:** Choice B is incorrect because the sentence does not refer to hair abnormalities or Menkes disease, only to

HEPHL1. **Choice C** is incorrect because the sentence refers to copper intake, but not iron intake. There is no discussion of whether an “imbalance” or “too much of one compared to the other” causes Menkes disease either. It is possible the syndrome can occur when they are in balance but at too low or high a dose. **Choice D** is incorrect because the second sentence does not relate to mice. It is possible that other creatures are better for study of Menkes disease.

5. **Level:** Medium | **Domain:** CRAFT AND STRUCTURE

**Skill/Knowledge:** Text Structure and Purpose

**Key Explanation:** **Choice B** is the best answer because the paragraph is outlining various potential problems to underwater habitats. The author indicates that there are many different potential problems, so “deep ocean habitats may be negatively affected.” The quotations come after this discussion and are preceded with “however,” which shows that they are a contradiction to the previous idea. Therefore, they are included to show the opposite side of the argument. They indicate that as yet, despite the author’s concerns, there has been no “elevated levels of mortality” or “evidence...of harm.”

**Distractor Explanation:** **Choice A** is incorrect because the claims made in the quote support the same idea: very little damage occurs to ocean creatures. Therefore, the views are not different from each other. **Choice C** is incorrect because “undermine” refers to weakening an argument. However, the quotes strengthen rather than weaken the idea that systems are safe. **Choice D** is incorrect because the conclusions oppose rather than strengthen the paragraph’s main claim that there are risks from tidal energy systems to aquatic habitats and creatures.

6. **Level:** Hard | **Domain:** CRAFT AND STRUCTURE

**Skill/Knowledge:** Text Structure and Purpose

**Key Explanation:** **Choice D** is the best answer because the author follows the phrases about extraterrestrial life with a question that asks how such life has changed from “sci-fi fairytale to a serious scientific endeavor.” The author is emphasizing the transition in how people perceive extraterrestrial life. In the past, it was viewed as something “impossible” or “not real,” and the phrases highlight that image. The phrases provide a strong contrast to the “credible” or “believable” nature of extraterrestrial life today, which the author summarizes in the concept that the search for life is “modeled by macroeconomists, funded by fiscal conservatives, and discussed by theologians.”

**Distractor Explanation:** **Choice A** is incorrect because the author never describes the appearance of extraterrestrial life. The phrases may evoke images, but they do not act as a contrast for the current beliefs about what life outside Earth might look like. **Choice B** is incorrect because the images evoked by the phrases are all theatrical forms of aliens. They do not necessarily reflect what scientists think actual extraterrestrial life might look like, and do not “encourage” or “suggest” that the reader think about anything other than the stereotypes. **Choice C** is incorrect because, while the phrases may be “lighthearted,” the purpose is not to make the reader laugh. The purpose is to emphasize the important point that the new view of extraterrestrial life is very serious compared to views of such life in the past.

7. **Level:** Medium | **Domain:** CRAFT AND STRUCTURE

**Skill/Knowledge:** Cross-Text Connections

**Key Explanation:** Choice D is the best answer that both authors would agree upon. The author of Text 1 says that there was a mass extinction at the end of the Cretaceous period, indicating that most species did not survive past that time: they died before the next period. The author of Text 2 says that there was no mass extinction, but that the “last major representatives liv[ed] to approximately the end of the Cretaceous period.” In other words, they died off slowly over time until the end of the period, and most did not live into the next period.

**Distractor Explanations:** Choice A is incorrect because the author of Text 1 says that a meteorite “triggered” or “caused” a mass extinction. Choice B is incorrect because the author of Text 2 does not say whether the Earth cooled or not; in addition, the author of Text 1 says that the change was enough to cause a mass extinction. Choice C is incorrect because Text 1 refers to a mass extinction.

8. **Level:** Medium | **Domain:** INFORMATION AND IDEAS

**Skill/Knowledge:** Central Ideas and Details

**Key Explanation:** Choice D is the best answer because Mother Jones says that the average wage is \$500 a year, but that “before you get a thing to eat there is \$20 is taken out a month,” presumably by the mine owners. Then the “pluck-me” stores, which are owned by the mine owners, take the remaining money for rent. Therefore, the wages are “insufficient” or “not high enough” because the mine owners have the policies of deducting wages and unfairly charging too much.

**Distractor Explanation:** Choice A is incorrect because the passage says that the “average wages

you fellows get in this country is \$500 a year,” which indicates that the wages of the miners Mother Jones is addressing is typical of the rest in the country. Choice B is incorrect because there is no indication that the wages are “periodically” or “sometimes” lowered or reduced; the problem is that the amount of money is not enough for expenses. Choice C is incorrect because there is no reference to the amount of money people earn in other jobs; it could be that miners earn more, but that their expenses are too high to survive.

9. **Level:** Medium | **Domain:** INFORMATION AND IDEAS

**Skill/Knowledge:** Central Ideas and Details

**Key Explanation:** Choice A is the best answer because, according to Sweeney, “The critical element” or “important point” of the study was that the researchers “were able to sustain measurements in this harsh environment as long as [they] have—both in the summer and the winter, in every year over the last 13 years.” In other words, the results of the study were “unique” or “one of a kind” because they relied on “measurements” or “data” that did not lack large blocks of time. No previous study had such complete data to work with: the Drake Passage data “is the densest ongoing time series in the Southern Ocean.”

**Distractor Explanation:** Choice B is incorrect because there is no discussion of what equipment or methods the scientists used to collect their data. They could have used very common tools. Choice C is incorrect because there is no evidence that previous studies did not “incorporate” or “use” chemical measurements. The only difference brought up is that the period of collection in the Drake Passage study was unbroken for 13 years. Choice D is incorrect because it is implied that

there have been other studies of the region. If the data set is “the densest,” then there is an implied comparison that there were other studies that had data that was not as dense.

10. **Level:** Hard | **Domain:** INFORMATION AND IDEAS

**Skill/Knowledge:** Command of Evidence (Textual)

**Key Explanation:** **Choice A** is the best answer. The claim is that Dickenson “personifies books,” which means that she gives books the characteristics of living people. **Choice A** refers to “meeting” a book, like meeting a person, and that the book is “in the dress” or “wearing the clothes” of his time period, just like a person would.

**Distractor Explanation:** None of the other choices show books in a way that makes them seem like living creatures. **Choice B** only refers to what scholars are interested in, not the way books are. **Choice C** refers to time periods. **Choice D** is a weak choice because books are not mentioned; if “he” refers to a book, it could show that the book is familiar with facts from long ago. However, **Choice A** definitely refers to books having human qualities, so is a much better example of the claim.

11. **Level:** Medium | **Domain:** INFORMATION AND IDEAS

**Skill/Knowledge:** Command of Evidence (Textual)

**Key Explanation:** **Choice C** is the best answer because Sagan’s quote is a warning that before assuming that there is life, “we will need to work hard to think of any non-biological process” that could explain “some features in the light spectrum that might be indicative of life.” **Choice C** is a case that Sagan would warn against because it

assumes that oxygen is caused by living creatures rather than considering and eliminating all other possible reasons that there may be oxygen present.

**Distractor Explanation:** **Choice A** is incorrect because it offers tangible proof of an organism rather than just guessing that there is life based on secondary signs. **Choice B** is incorrect because it shows that the scientist does not rashly assume that oxygen means there is life. Sagan would approve because the scientist indicates there are other options to explain the oxygen. **Choice D** is incorrect because it does not show that anyone is jumping to the conclusion that there is life before enough facts exist to prove that there is life.

12. **Level:** Medium | **Domain:** INFORMATION AND IDEAS

**Skill/Knowledge:** Command of Evidence (Textual)

**Key Explanation:** **Choice D** is the best answer. The example should be one that shows that there are options for nurses other than working in hospitals; particularly, the example should relate to the aging population. **Choice D** focuses on a group of registered nurses who have such an occupation: they work in nursing homes or residential care facilities where seniors often live when their health declines.

**Distractor Explanation:** **Choice A** is incorrect because it refers to employment other than working in a hospital, but it does not address the question of an aging population. Nurses in education most likely work with younger people starting out in their careers. **Choice B** is incorrect because it is too vague. It lists two different careers, but does not say what percentage of nurses work in them or how they relate to an aging population. **Choice D** is incorrect because it does not convey the information from

the graph correctly. It refers to the percentage change in employment, but the graph refers to the percentage of the registered nurses employed at the time.

13. **Level:** Medium | **Domain:** INFORMATION AND IDEAS

**Skill/Knowledge:** Command of Evidence (Quantitative)

**Key Explanation:** Choice C is the best answer because it uses data from the graph to accurately complete the text. The graph shows Gender-interest stereotypes were stronger than gender-ability stereotypes hence those who believed the stereotypes would be less interested in participating in any courses related to computer science or engineering.

**Distractor Explanation:** Choice A is incorrect because it doesn't accurately reflect the data from the graph. The graph indicates that girls who believed in the stereotypes would believe that they are less skilled but would also not be interested in participating in any courses related to computer science or engineering. The word "than" suggests that they more interested than skilled however the graph shows that gender-interest stereotypes were stronger than gender-ability stereotypes, meaning that they would be less interested than skilled and not less skilled than interested. Choice B is incorrect because it doesn't accurately reflect the data from the graph. The graph indicates that girls who believed in the stereotypes would believe that they are less skilled and not be interested in participating in any courses related to computer science or engineering. The word "equally" suggests that they interested and skilled at the same level however the graph shows that gender-interest stereotypes were stronger than gender-ability stereotypes, meaning that they would be less interested than skilled and not equally

interested and skilled. Choice D is incorrect because it doesn't accurately reflect the data from the graph. The graph indicates that gender-interest stereotypes were stronger than gender-ability stereotypes. Hence, girls who believed in the stereotypes would be less interested in participating in any courses related to computer science or engineering.

14. **Level:** Hard | **Domain:** INFORMATION AND IDEAS

**Skill/Knowledge:** Inferences

**Key Explanation:** Choice B is the best answer because Keel complains in the last sentence, "this decision will create two classes of Indian tribes: those who will benefit from Federal trust responsibility and those who will not." In other words, he feels that the decision has problems because some Native Americans qualify and some do not, so the "classes" or "groups" will be unequal in how they are treated.

**Distractor Explanation:** Choice A is incorrect because Keel does not explain how he felt about the original wording or how the policy varied from the original intent. Choice C is incorrect because the decision did not make any "new" methods or laws. It only restricted which groups of people the law applied to. Choice D is incorrect because "precedents" are legal cases that act as a guide for deciding future cases. The Carcieri decision, however, did not "facilitate" or "make easier" the process of "establishing" or "creating" tribal governments.

15. **Level:** Easy | **Domain:** INFORMATION AND IDEAS

**Skill/Knowledge:** Inferences

**Key Explanation:** Choice B is the best answer because the process of behavioral activation is described as beginning with simple activities to boost one's mood, such as taking a shower. As the patient improves, more advanced steps can be taken, such as improving in poor school subjects. "Incremental" refers to a series of additions, so accurately describes additional steps taken to alter behavior and feel better using new patterns or routines.

**Distractor Explanation:** Choice A is incorrect because patients are encouraged to do something positive even when they do not feel comfortable about doing it: "rather than waiting to feel better, the patient does things that align with personal values and that will lead to feeling better." Choice C is incorrect because the passage does not refer to solving the problems, only to doing positive steps to get out of a spiral of depression. Choice D is incorrect because behavioral activation focuses on a series of short-term goals, such as getting out of pajamas or taking a shower. The short-term goals may be aligned with a larger, long-term goal, but such a process is not discussed in the text.

16. **Level:** Easy | **Domain:** STANDARD ENGLISH CONVENTIONS

**Skill/Knowledge:** Form, Structure, and Sense

**Key Explanation:** Choice B is the best answer because it is a plural possessive form. It shows that the "use" is something of the "cowry shells."

**Distractor Explanation:** Choice A is incorrect because it is a singular possessive word, but "cowry shells" is plural. "Currency" is singular, but it is not the correct referent in the context because "cowry shells" are the subject of the sentence; "they" also give a clue to the proper pronoun.

Choice C is incorrect because it refers to a place rather than possession. Choice D is a contraction for "they are," which does not fit the grammatical structure preceding "use has declined."

17. **Level:** Easy | **Domain:** STANDARD ENGLISH CONVENTIONS

**Skill/Knowledge:** Form, Structure, and Sense

**Key Explanation:** Choice A is the best answer. "(or stratovolcano)" is another name for the composite formation of volcanoes, as shown by the "or." In other words, it is additional information describing the preceding item, "composite." Extra information in parentheses should be treated as part of the word it describes. In this case, there would be a comma after composite if there were no parentheses because it is part of a list joined by "and," so a comma should come after the parentheses.

**Distractor Explanation:** All of the other choices have incorrect punctuation for items in a list. For Choice B, items in parentheses are included as part of the word they describe, so they should not be divided into a separate item using a comma after "composite." Choices C and D are incorrect because items in a list should be followed by a comma, but "and" is not. Choice C is also missing a comma after "stratovolcano)" and Choice D erroneously places the first comma after "composite" rather than after "stratovolcano)".

18. **Level:** Easy | **Domain:** STANDARD ENGLISH CONVENTIONS

**Skill/Knowledge:** Form, Structure, and Sense

**Key Explanation:** Choice B is the best answer. The subject is the singular "Professor David Neumark," so a singular verb is needed for agreement.

**Distractor Explanation: Choices A and D** are incorrect because “in conjunction with Dr. William Wascher of the Federal Reserve Board” modifies “Professor David Neumark” rather than creates a verb with two people in it. Although it appears that a plural verb is needed, that is not the case. **Choice C** is incorrect because it is only a gerund rather than an active verb (such as “is dissenting,”) so the result is a fragment.

19. **Level:** Easy | **Domain:** STANDARD ENGLISH CONVENTIONS

**Skill/Knowledge:** Boundaries

**Key Explanation:** **Choice C** is the best answer. “People...granted” is the main idea, and “over...water” is another complete idea with a noun and verb. That idea is made secondary by the word “but.” A clause that is secondary needs to be separated from the main idea using a comma.

**Distractor Explanation:** It may appear that a semicolon is needed to separate ideas in a list, as there is a semicolon before “670 million.” However, **Choices A and B** are incorrect because a semicolon must be preceded and followed by complete ideas that can stand on their own. In **Choice A**, “but” is left hanging at the end of the preceding idea, and in **Choice B**, “but” creates a subordinate clause that can not stand alone. **Choice D** is incorrect because there should be a comma separating clauses from each other.

20. **Level:** Medium | **Domain:** STANDARD ENGLISH CONVENTIONS

**Skill/Knowledge:** Boundaries

**Key Explanation:** **Choice A** is the best answer. A pair of dashes can be used to add interesting but not essential information to a sentence. In

this case, the names of the crops are not required, but could help the reader know what other cereal crops there are.

**Distractor Explanation: Choice B** is incorrect because, while commas after “crops” and “sorghum” would also create an aside that describes “cereal crops,” there should be no comma after “rye.” That punctuation is because “rye and sorghum” forms a list of two items joined by “and,” and such a list should not have a comma before the “and.” **Choices C and D** are incorrect because “that” is the start of a relative clause that should not be divided from its noun with any punctuation. However, a single dash could otherwise be used after a main clause to add more information such as the names of the grains.

21. **Level:** Easy | **Domain:** STANDARD ENGLISH CONVENTIONS

**Skill/Knowledge:** Boundaries

**Key Explanation:** **Choice A** is the best answer. A series of nouns joined by “and” should have a comma following each noun. Since “Greenland” is one place on the list where Inuit people live, it should be followed by a comma. No other punctuation is needed.

**Distractor Explanation: Choices B and C** are incorrect because a colon should follow a complete clause, but the part preceding the colon cannot stand on its own as a sentence. “In” is left dangling. **Choice C** is also incorrect because there should be a comma after “Greenland.” **Choice D** is incorrect because the part before and after a semicolon should both be complete clauses, but the following portion has no subject or verb.

22. **Level:** Easy | **Domain:** STANDARD ENGLISH CONVENTIONS  
**Skill/Knowledge:** Boundaries

**Key Explanation:** Choice B is the best answer because “According to Clark” is a modifier that refers to the main clause, “the neutral model... over time.” A modifier should be separated from the main clause with a comma. No other punctuation is needed in the underlined portion.

**Distractor Explanation:** Choices A and C are incorrect because a colon should follow a complete idea, but the portion preceding the colon cannot stand on its own as a sentence. Choices A and D are incorrect because “according to Clark” needs to be followed by a comma to separate it from the main clause. Choice D is also incorrect because there should not be a comma separating “predict” from its object, “that the variation would increase.”

23. **Level:** Easy | **Domain:** EXPRESSION OF IDEAS  
**Skill/Knowledge:** Transitions

**Key Explanation:** Choice C is the best answer. The first sentence explains that some scientific fields overlap, and the following sentence gives a specific example of two fields that have points in common. Choice C is used to introduce an example or specific case of a general idea, so fits the context well.

**Distractor Explanation:** None of the other choices effectively shows that the following information is a particular case that is used to clarify the previous sentence. Choice A introduces an alternate possibility, not the same thing. Choice B shows that something happens despite something else, so provides an exception rather than a classic example. Choice D is used to introduce a summary or preference regarding the previous idea.

24. **Level:** Easy | **Domain:** EXPRESSION OF IDEAS  
**Skill/Knowledge:** Transitions

**Key Explanation:** Choice A is the best answer. The previous sentence explains that echolocation is highly developed in some species. The following sentence says that other species have echolocation, but it is in a “limited form” or “not developed much at all.” Choice A is used to qualify an earlier claim, so it fits the context of qualifying the idea that only a few animals have developed echolocation by saying that in reality, others also have it, albeit in a modified form.

**Distractor Explanation:** Choices B and C are used to show the logical result of an argument, so they do not effectively establish the relationship between ideas. A few species having limited echolocation is not necessarily a logical result of some species having echolocation. Choice D is used to introduce an idea that the reader might assume; in other words, the author feels it is obvious. However, it is probably not common knowledge that shrews and two bird species have modified echolocation.

25. **Level:** Easy | **Domain:** EXPRESSION OF IDEAS  
**Skill/Knowledge:** Transitions

**Key Explanation:** Choice A is the best answer because it is used to establish a contrast between clauses in a sentence. In this case, it contrasts what “seems” or “appears” to be a large percentage with the much larger worldwide population. In other words, Choice A establishes that the percentage of bilingual speakers in the US is relatively small, as it is half that of the global average.

**Distractor Explanation:** None of the other choices effectively show the relationship between the first and second halves of the sentence.

**Choices B and D** are used to show a reason, but there is no reason given for why different populations are bilingual or not. **Choice C** is grammatically incorrect. Its meaning of “even though” fits the context, but “despite” should be followed by a noun or noun phrase rather than a clause starting with “that.”

26. **Level:** Medium | **Domain:** EXPRESSION OF IDEAS

**Skill/Knowledge:** Rhetorical Synthesis

**Key Explanation:** **Choice B** is the best answer. The question asks for an “underlying theme” in some of Maya Angelou’s books. In other words, it is asking for something that is similar to books that she wrote. The description of *I Know Why the Caged Bird Sings* says that it “reveals details about her private life up to the age of 17,” or “tells about her youth,” and the notes say that *Mom & Me & Mom* is about her relationship with her mother. In other words, both books tell about her personal life, which makes them “autobiographies.”

**Distractor Explanation:** **Choice A** is incorrect because, while it is true, it does not refer to a theme in books. Instead, it refers to a movie, *Down the Delta*. **Choice C** is incorrect because it also does not refer to a theme in books, only a theme in her life. There is no evidence that she actually wrote more than one unfinished book about world leaders. **Choice D** is incorrect because, while *I Know Why the Caged Bird Sings* was received well, there is no indication that her other books were received poorly or were not read by many people.

27. **Level:** Medium | **Domain:** EXPRESSION OF IDEAS

**Skill/Knowledge:** Rhetorical Synthesis

**Key Explanation:** **Choice A** is the best answer. The final bullet point refers to the fact that nimbo-form clouds “are the type that bring rain.” Therefore, they produce rain, but the others do not.

**Distractor Explanation:** **Choice B** is incorrect because there is no indication that nimbo-forms are larger than the other types. While they combine shapes, they could do so on a small scale. **Choice C** is incorrect because the notes state that nimbo-form combines the shapes of other clouds; therefore, they must have recognizable shapes that can be matched to other forms. **Choice D** is incorrect because the location of nimbo-form clouds is not given. In addition, cirro-forms are described as high.

1. **Level:** Medium | **Domain:** CRAFT AND STRUCTURE

**Skill/Knowledge:** Words in Context

**Key Explanation:** Choice D is the best answer because the blank shows the cane toad's relationship to South America. Choice D means "native to" a specific place, so fits the context of saying that the toad came from South America but was "transported" or "moved" to Australia.

**Distractor Explanations:** None of the other choices establishes the toad's relationship to South America. Choices A and B refer to an inborn or natural trait or characteristic, not a species. Choice C refers to an epidemic or wide-spread disease.

2. **Level:** Medium | **Domain:** CRAFT AND STRUCTURE

**Skill/Knowledge:** Words in Context

**Key Explanation:** Choice B is the best answer because the blank is used to describe the business opportunity promoters who get people to make "glowing—but bogus—recommendations." In other words, the sellers who find people to give fake good reviews. If the reviews are fake, they are dishonest. Choice B refers to something which is potentially dishonest or not completely legal, so accurately describes the sellers that do dishonest things.

**Distractor Explanation:** None of the other choices fits the context of describing a promoter who uses fraudulent methods to convince someone to buy a product. Choice A refers to something that does not have a clear answer. Choice C refers to something that is unlikely. Choice D refers to something that has not been decided or settled.

3. **Level:** Easy | **Domain:** CRAFT AND STRUCTURE

**Skill/Knowledge:** Words in Context

**Key Explanation:** Choice B is the best answer because "recognize" is what "we," the Union, could do to the new government of Louisiana that would make true the "converse" or "opposite" of the previous discussion of "discouraging and paralyzing" all the people. The previous discussion is about what happens if the Union does not support Louisiana. Choice B refers to welcoming or integrating something, in this case, Louisiana, so it fits the context of showing the opposite of rejecting Louisiana.

**Distractor Explanation:** None of the other choices show the opposite of rejection. Choice A refers to indicating what something is or naming it. Choice C refers to either fully understanding something or achieving a goal. Choice D refers to knowing the value of something.

4. **Level:** Medium | **Domain:** CRAFT AND STRUCTURE

**Skill/Knowledge:** Text Structure and Purpose

**Key Explanation:** Choice A is the best answer because the reference to the seven-day period is followed by, "Use that time to check out the information in the disclosure document, including contacting references." Therefore, the information about the length of time is given to show that buyers have a full week to research the purchase before agreeing to it.

**Distractor Explanation:** Choice B is incorrect because the author does not give any indication that the amount of time is too short. The time is mentioned to show that one even has leeway to contact references. Choice C is incorrect because

the author suggests using the time to check all the information, not just the references. There is no indication that finding honest references is more time-consuming than any of the other portions.

**Choice D** is incorrect because sellers “secure” or “get” bogus recommendations because they want their company to sound good. They do not do it only because of a seven-day period before signing.

5. **Level:** Easy | **Domain:** CRAFT AND STRUCTURE

**Skill/Knowledge:** Text Structure and Purpose

**Key Explanation:** **Choice C** is the best answer because the result of the experiment is that “flames can ignite at extremely low temperatures.” More specifically, the flames “can burn at 900 degrees in the International Space Station.” That piece of information is not very helpful to the average reader, so the author gives a reference that the reader most likely knows, the temperature of something in a house on Earth. The reader can then see that the flame can burn at a third the temperature as one on Earth.

**Distractor Explanations:** **Choice A** is incorrect because “motivation” is a “reason” or “goal.” The goal is not a fact about gas stoves on Earth; the goal is described in the second sentence, “to gain valuable insight into the mechanisms of fire.” **Choice B** is incorrect because “methodology” is the series of steps taken to perform an experiment. However, there is no indication of how the scientists lit flames in space. **Choice D** is incorrect because the underlined portion shows what happens on Earth, not in the experiments on the International Space Station.

6. **Level:** Hard | **Domain:** CRAFT AND STRUCTURE

**Skill/Knowledge:** Text Structure and Purpose

**Key Explanation:** **Choice A** is the best answer because the text “contrasts” or “shows the difference” between two different things: the busy street below and the bright star above.

**Distractor Explanations:** **Choice B** is incorrect because the passage does not say that any actions are “futile” or “useless.” The busy street image is hectic, but there is no claim that it has no point. **Choice C** is incorrect because there is no “problem” or “concern to be solved,” and hence, there is also no solution or remedy in the text. **Choice D** is incorrect because while a star or street could be a metaphor, there is no hint about what they might represent in the text.

7. **Level:** Easy | **Domain:** INFORMATION AND IDEAS

**Skill/Knowledge:** Central Ideas and Details

**Key Explanation:** **Choice B** is the best answer because the text describes the photograph of Anthony’s family, explaining their “appearance” or “how they looked.”

**Distractor Explanations:** **Choice A** is incorrect because the passage is written from the point of view of a third-person narrator. Anthony does not “reminisce” or “nostalgically talk about” the people in the picture. **Choice C** is incorrect because, while the characters might be “aristocrats” or “upper class,” the passage does not focus on the “achievements” or “successes” of the characters. **Choice D** is incorrect because, while the mother’s death might be called “tragic” or “sad,” the cause of her death is not “revealed” or “shown.”

8. **Level:** Easy | **Domain:** INFORMATION AND IDEAS

**Skill/Knowledge:** Central Ideas and Details

**Key Explanation:** Choice C is the best answer. The next-to-the-last sentence explains that Gorgas “tirelessly” or “did not stop,” in other words, was zealous about his “duties” or “tasks,” which involved overseeing “the efforts to keep the work crews healthy.”

**Distractor Explanation:** Choice A is incorrect because Stevens, not Gorgas, invented new equipment. Choice B is incorrect because there is no indication that Gorgas was a doctor, only a sanitation engineer. Choice D is incorrect because the passage does not say the details of building cities for the workers; someone else might have done any necessary surveying.

**9. Level:** Medium | **Domain:** INFORMATION AND IDEAS

**Skill/Knowledge:** Central Ideas and Details

**Key Explanation:** Choice B is the best answer because the passage says he was “fortunate in that respect,” meaning that he was lucky in becoming “a household name” or “really famous” because “fans celebrated his triumphs against the background of news from World War I and the 1918 influenza pandemic.” In other words, fans liked his “triumphs” or “successes” as a contrast to the “grim” or “bad” times of a war and pandemic.

**Distractor Explanations:** Choice A is incorrect because the passage says that he started as a pitcher, but became famous when he was “an outfielder and powerful batter.” Therefore, his fame was not because of his pitching. Choices C and D are incorrect because the passage only refers to these events as the “background” of Ruth’s “triumphs” or “successes.” There is no discussion whether he participated in them or not.

**10. Level:** Hard | **Domain:** INFORMATION AND IDEAS

**Skill/Knowledge:** Command of Evidence (Textual)

**Key Explanation:** Choice D is the best answer because the text is discussing the extreme temperatures on Mercury. The transition “in fact” is used to emphasize a point, and in this case, the blank portion needs to emphasize the previous idea of nights being cold. Choice D effectively does that by showing that despite the hot days, there may still be ice on the planet.

**Distractor Explanations:** All of the other choices can be eliminated because they offer a point that is off the topic of temperature and cold. Choice A refers to the orbit, Choice B to the speed, and Choice C to the size and appearance

**11. Level:** Easy | **Domain:** INFORMATION AND IDEAS

**Skill/Knowledge:** Command of Evidence (Textual)

**Key Explanation:** Choice A is the best answer because the graph shows that the median income for state government employees is slightly under the \$80,000 mark, at about \$75,000. The median income for local government employees is closer to \$70,000, which is halfway between the \$60,000 and \$80,000 lines. Therefore, the median income for state government employees is “higher” or “larger” than that for local government employees.

**Distractor Explanations:** All of the other choices can be eliminated because they are not supported by the data from the graph. Choices B and C are incorrect because “architectural, engineering, and related fields” at just under \$80,000 is lower, not

greater, than for “federal government employees” at just under \$100,000. **Choice D** is incorrect because “management, scientific, and technical consulting service” is slightly higher than for “local government,” though both are between \$60,000 and \$80,000.

12. **Level:** Medium | **Domain:** INFORMATION AND IDEAS

**Skill/Knowledge:** Command of Evidence (Quantitative)

**Key Explanation:** **Choice D** is the best answer because the total average of the bar chart values across the 5 species of frogs equates to approximately  $90\% \left( 15 \times 94 + 3 \times 64 + 4 \times 70 + 8 \times 88 + 10 \times 100 \right) / (15 + 3 + 4 + 8 + 10)$ . The total average can be estimated by looking at the graph without doing the math.

**Distractor Explanation:** **Choice A** is incorrect because More than 65% of the swallowed beetles survived. **Choice B** is incorrect because more than 50% of the swallowed beetles survived. **Choice C** is incorrect because the results of study was does not use time as variable.

13. **Level:** Medium | **Domain:** INFORMATION AND IDEAS

**Skill/Knowledge:** Inferences

**Key Explanation:** **Choice D** is the best answer because the narrator says that the simple sailors breathe the fresh air first, and that the captain “thinks he breathes it first; but not so.” The comparison is expanded to say that “In much the same way do the commonalty lead their leaders in many other things, at the same time that the leaders little suspect it.” In other words, he is implying that the captain feels he has power, but

really the sailors have influence and can lead or have control about many things in a quiet way.

**Distractor Explanation:** All of the other choices can be eliminated because they are not supported by any evidence from the passage. For **Choice A**, there is no reference to how captains get appointed. For **Choice B**, the comment that they breathe second-hand air implies that captains do not deserve as much respect as they think they do. For **Choice C**, there is no evidence that captains do not understand the needs of sailors. They order sailors about, but they still could take care of sailors well.

14. **Level:** Hard | **Domain:** INFORMATION AND IDEAS

**Skill/Knowledge:** Inferences

**Key Explanation:** **Choice C** is the best answer. The text points out that Venus is warm because it has a “giant blanket” of an atmosphere with so much carbon dioxide holding in the heat. If Mercury had such a blanket, then it would also hold in heat due to the greenhouse effect. Therefore, Mercury probably has less carbon dioxide, which is why it is less hot in general than Venus is, even though Mercury is closer to the Sun.

**Distractor Explanations:** **Choice A** is incorrect because Mercury could have some sulfuric acid in the atmosphere, though it presumably does not have as much as Venus, which is reflective and brighter because of the acid. **Choice B** is incorrect because “never” is too absolute. The passage only says that Venus is “generally hotter,” which means that it can sometimes be less hot than Mercury. Plus, the “average” or “middle” temperature is 462 degrees Celsius, so it is possible that Mercury is sometimes hotter than that. **Choice D** is not

discussed in the passage; it could be possible to locate Mercury easily. The passage only says that Venus is brighter.

15. **Level:** Medium | **Domain:** STANDARD

ENGLISH CONVENTIONS

**Skill/Knowledge:** Form, Structure, and Sense

**Key Explanation:** Choice B is the best answer. “Where” is used to start a clause that describes a place, so it fits the context of adding detail about coffee being the leading cash crop in the place of Uganda.

**Distractor Explanation:** Choices A and D are incorrect because they create run-on sentences that join two independent clauses that can stand on their own as sentences. Choice C is incorrect because “which” starts a clause that refers to the preceding noun. However, the place of “Uganda” is not a leading cash crop. Instead, coffee is a cash crop in Uganda.

16. **Level:** Medium | **Domain:** STANDARD

ENGLISH CONVENTIONS

**Skill/Knowledge:** Form, Structure, and Sense

**Key Explanation:** Choice D is the best answer. “A classic image of colonial cooperation” is a modifier that needs to describe the noun that follows it. Choice D accurately shows that the image of cooperation refers to quilting bees.

**Distractor Explanation:** All of the other choices can be eliminated because the modifier “A classic image of colonial cooperation” refers to something illogical. In Choice A, it refers to a diary, but a diary is a personal account rather than a classic example of cooperating with other people.

Choices B and C are incorrect because the subject

is Martha Ballard, who is an individual person rather than an image of cooperation.

17. **Level:** Medium | **Domain:** STANDARD

ENGLISH CONVENTIONS

**Skill/Knowledge:** Form, Structure, and Sense

**Key Explanation:** Choice D is the best answer. When a quote is used as part of a sentence rather than a complete clause, it is only identified with quotation marks. While “said” is followed by a comma and the first word of the quotes is capitalized, in this case, “that” makes the quote part of the sentence itself.

**Distractor Explanation:** Choice A is incorrect because a comma and capitalization are used after a reporting verb such as “said,” not as part of a clause starting with “that.” Choice B is incorrect because a colon should come after a complete clause, but “that” is left dangling. Choice C is incorrect because “is attributed as” is followed by a noun or gerund (the -ing form of a verb) rather than a complete clause with subject or verb.

18. **Level:** Medium | **Domain:** STANDARD

ENGLISH CONVENTIONS

**Skill/Knowledge:** Form, Structure, and Sense

**Key Explanation:** Choice C is the best answer. An s followed by an apostrophe is the correct way to indicate a plural possessive. It correctly shows that the efforts were made by more than one volunteer.

**Distractor Explanation:** Choice A is incorrect because “volunteers” is a plural noun that does not show any possession. Choices A and D are incorrect because “efforts” does not possess anything in the sentence, so should not have an apostrophe. Choice B is incorrect because an apostrophe followed by an s is the way to show

possession of a singular thing, but the efforts span 125 years, so were done by more than one volunteer.

19. **Level:** Medium | **Domain:** STANDARD ENGLISH CONVENTIONS  
**Skill/Knowledge:** Boundaries

**Key Explanation:** Choice A is the best answer. “Sacrificed XX for YY” is a standard idiom that refers to doing something at the expense of something else. No punctuation is needed.

**Distractor Explanation:** Choices B and D are incorrect because “accuracy” is the object of “sacrificed;” “for eloquence” is the reason that accuracy was given up. However, dashes and parentheses are used to indicate additional information that is not part of the main clause, so they erroneously divide the object from its verb. Choice C is incorrect because a colon should not divide essential parts of the sentence from the main clause. In this case, the portion after the colon is necessary for correct understanding of what Longfellow did.

20. **Level:** Easy | **Domain:** STANDARD ENGLISH CONVENTIONS  
**Skill/Knowledge:** Boundaries

**Key Explanation:** Choice D is the best answer. The ideas in the preceding and following portions are complete clauses that can stand on their own as sentences, so should be divided by a period and a capital letter “t.”

**Distractor Explanation:** Choice A is incorrect because a semicolon should be preceded and followed by a complete clause that can stand on

its own, but “and” subordinates the following portion. The second part cannot stand on its own. Choice B is incorrect because “because” subordinates the following portion, which cannot stand on its own as a sentence. Choice C is incorrect because it is a comma splice between two clauses that can each stand on their own.

21. **Level:** Medium | **Domain:** STANDARD ENGLISH CONVENTIONS  
**Skill/Knowledge:** Boundaries

**Key Explanation:** Choice B is the best answer. The portions before and after the punctuation are both independent clauses, meaning that they could both stand on their own as sentences. Therefore, they should be joined by a semicolon or a period, which is not a given choice.

**Distractor Explanation:** Choice A is incorrect because it creates a comma splice. Choice C is incorrect because a colon is used to add more information clarifying the clause before the colon. In this case, the preceding portion is about low levels of inflation, but the following portion introduces a different topic, high levels of inflation. Choice D is incorrect because it is a run-on.

22. **Level:** Easy | **Domain:** EXPRESSION OF IDEAS  
**Skill/Knowledge:** Transitions

**Key Explanation:** Choice B is the best answer. The first sentence explains that Tingatinga’s career was very short. The second sentence offers a contrast: he was one of the most important painters in modern Africa. Choice B is used to show that despite one thing happening, another is true. It therefore fits the context of saying that despite the short career, Tingatinga made a great impact.

**Distractor Explanation:** None of the other choices establishes a contrast between the preceding and following ideas. **Choice A** is used to introduce a logical result of the previous claim, but it is more logical to expect little impact from a short career. **Choices C and D** are both used to add more detail to clarify the same topic rather than change tone to something unexpected.

23. **Level:** Easy | **Domain:** EXPRESSION OF IDEAS  
**Skill/Knowledge:** Transitions

**Key Explanation:** **Choice D** is the best answer. The passage describes two types of search and rescue dog, and the blank is the point at which the topic changes from one type to the other, from air scent to tracking. **Choice D** is used to show that the following method is an “alternate” or “different” case, so it fits the context of introducing a second method.

**Distractor Explanation:** None of the other choices shows that the following information is the second of two possible methods. **Choice A** is used to add another point to continue an argument. **Choice B** is used to add specific detail clarifying a general statement. **Choice C** is used to add a qualification or restriction to a previous claim.

24. **Level:** Easy | **Domain:** EXPRESSION OF IDEAS  
**Skill/Knowledge:** Transitions

**Key Explanation:** **Choice D** is the best answer. The previous sentence describes the price of “monthly expenses” as being over \$35. The following sentence describes the “upkeep” or “ongoing expenses,” which are the same thing, but uses a different way to express the money: it discusses what alternate things a person could buy, lattes. **Choice D** is used to rephrase or introduce

an idea in different words, so effectively shows that the following is a different way of looking at the figures in the previous sentence.

**Distractor Explanation:** **Choice A** is incorrect because it is used to show a contrasting or opposite idea, not rephrase the same point. **Choice B** is used to show that something happens in spite of something else, which does not fit the discussion of equivalent concepts. **Choice C** is used to add more to the same argument, so in the context, would be used to add a new type of expense in caring for tropical fish.

25. **Level:** Medium | **Domain:** EXPRESSION OF IDEAS

**Skill/Knowledge:** Rhetorical Synthesis

**Key Explanation:** **Choice D** is the best answer. It gives three valuable contributions that Lovelace made to the field of mathematics: she explained the computer, created programs, and devised uses for it. Therefore, she added to the field in specific and important ways. Creating programs and devising uses, in particular, show the need to manipulate math in order to accomplish certain goals.

**Distractor Explanation:** **Choice A** is incorrect because it only says that Lovelace “explained” or “talked about” the machine. Though that was one valuable addition to help spread information about what it was, on its own that does not show she made mathematical contributions. **Choice B** is incorrect because, while Lovelace wrote a program, the notes do not say that Babbage could not write them himself. It is possible that his computer would have worked without her help, but that she expanded on what it could do. **Choice C** is incorrect because Babbage was not Lovelace’s tutor, he was introduced by her tutor. Furthermore, the notes do not say that she

exceeded his abilities using it, only that she came up with different uses for it.

26. **Level:** Medium | **Domain:** EXPRESSION OF IDEAS

**Skill/Knowledge:** Rhetorical Synthesis

**Key Explanation:** **Choice B** is the best answer. The notes state that Tingatinga started painting in 1968 and died in 1972, a period of four years. However, his art was “appealing” or “attractive” enough that “an art movement was named after his unique style” and students “continue to paint using his style” even now.

**Distractor Explanation:** **Choice A** is incorrect because, while Tingatinga used recycled materials and started a movement, there is no indication that his followers also use recycled materials. His students paint in his style, but they do not represent a “wide range” of other artists, which would include artists in different media or styles. **Choice C** is incorrect because the notes say his artwork, which was of animals and landscapes, was popular among tourists, but not necessarily the “most” popular. The notes also say that his gallery sells works by the students, but not that “his original” or “his own” artworks are still being sold. **Choice D** is incorrect because the passage says that students made pictures “in his style,” but not that they “copied” or “made exact replicas” of the works that Tingatinga did.

27. **Level:** Hard | **Domain:** EXPRESSION OF IDEAS

**Skill/Knowledge:** Rhetorical Synthesis

**Key Explanation:** **Choice C** is the best answer. The assertion in the passage is that Yellowstone is a supervolcano. The reader might question that claim by saying that there is no peak, but the passage addresses that question by explaining why

none can be seen: the space where the magma had been collapsed, so the ground dropped down into a caldera or crater.

**Distractor Explanation:** None of the other choices addresses a counter argument about the park being a supervolcano. **Choices A** and **B** provide more detail about the eruptions, but does not show that the author recognizes that the reader might doubt the claim that there is a supervolcano. **Choice C** expands the discussion to a different area than the park rather than answer a question about the park.

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1. **Level:** Medium | **Domain:** GEOMETRY AND TRIGONOMETRY  
**Skill/Knowledge:** Circles | **Testing point:** Working with transformations and the equation of a circle

**Key Explanation:** Choice C is correct. The equation of a circle is given by  $(x - h)^2 + (y - k)^2 = r^2$ , where  $(h, k)$  is the center of the circle. In the initial equation, the center of the circle is  $(3, -6)$  and in the transformed equation, the center of the circle is  $(2, -4)$ . To compare the equations, the equation of the second circle must be put into standard form by completing the square as shown below.

$$\begin{aligned}(x - 2)^2 + y^2 + 8y &= 33 \\(x - 2)^2 + y^2 + 8y + 16 &= 33 + 16 \\(x - 2)^2 + (y + 4)^2 &= 33 + 16 \\(x - 2)^2 + (y + 4)^2 &= 49,\end{aligned}$$

This yields  $(2, -4)$  as the center of the transformed circle.

Therefore, the transformation will be 1 to the left as the  $x$  coordinate moves from 3 to 2 and 2 up as the  $y$  coordinate moves from -6 to -4.

**Distractor Explanation:** Choice A is incorrect because the  $x$  coordinate moves to the left rather than to the right. This answer may have been incorrectly selected if the student misinterpreted the standard form for the equation of a circle and thought that the  $x$ -coordinates of the centers of the circles are -3 and -2. Choice B is incorrect. This answer may have been incorrectly selected if the student assumed that the centers were  $(-3, 6)$  and  $(-2, 4)$  through misinterpretation of the standard form of the equation of a circle and/or through completing the square incorrectly. Choice D is incorrect and may have been incorrectly selected by not completing the square correctly or incorrectly interpreting the center values in the standard equation for a circle

2. **Level:** Hard | **Domain:** ADVANCED MATH  
**Skill/Knowledge:** Nonlinear equations in one variable and systems of equations in two variables  
**Testing point:** How many solutions does an equation have

**Key Explanation:** Choice B is correct. To solve this equation, first, use the foiling method to expand the left side of the equation and use the distributive property to expand the right side of the equation. Then combine like terms and solve the resulting linear equation as follows:

$$\begin{aligned}(x - 1)(x + 2) &= x(x - 3) \\x^2 - x + 2x - 2 &= x^2 - 3x \\x - 2 &= -3x \\4x &= 2 \\x &= \frac{1}{2} \text{ or } 0.5\end{aligned}$$

This shows that the equation has only one solution.

**Distractor Explanation:** Choices A and C are incorrect. These answers may be arrived at due to math miscalculations or conceptual errors. Choice D is incorrect. This answer may be arrived at if the student chooses to simply equate each parentheses to zero and finds 1, -2, 0, and 3 as the solutions.

3. **Level:** Easy | **Domain:** Algebra  
**Skill/Knowledge:** Linear equations in one variable  
**Testing point:** Solving equations of one variable

**Key Explanation:** For a system of equations to have an infinite number of solutions, it means that the equations are identical and have the same slope and  $y$ -intercept.

The first step is to use the distributive property to multiply out the terms on the left side of the equation, resulting in:

$$3x - 18 - 2x - 4 = px - 5x - 22a$$

Combining like terms yields:

$$x - 22 = px - 5x - 22$$

Adding  $5x$  to both sides yields:

$$6x - 22 = px - 22p$$

Therefore  $p$  is equal to 6.

4. **Level:** Easy | **Domain:** ADVANCED MATH

**Skill/Knowledge:** Nonlinear functions | **Testing point:** Determining the meaning in context with exponential equations

**Key Explanation:** Choice C is correct. The format for an exponential growth equation is:

$$\text{Initial value} \times (1 + \text{growth rate as a decimal})^x$$

The growth factor of the weeds on the farm is defined by  $1 +$  the growth rate  $r$ .

Therefore,

$$1 + r = 1.995$$

$$r = 0.995 \text{ or } 99.5\%,$$

which would then make choice C correct.

**Distractor Explanation:** Choice A is incorrect.

The number of weeds on the farm, at the beginning, known as the initial value, was 1,300. Choice B is incorrect. This choice implies that the model is linear. However, the model is exponential. Choice D is incorrect because it implies that the model is linear and that 1,300 is the increase in weeds every  $x$  weeks, however, it is the initial number of weeds on the farm.

5. **Level:** Easy | **Domain:** ADVANCED MATH

**Skill/Knowledge:** Equivalent expressions |

**Testing point:** Binomial expressions

**Key Explanation:** Choice A is correct. To solve this problem, first, use the exponent rules to combine both binomials in parentheses with one exponent.  $((x - 2)(x + 2))^2$  using the identity  $(a + b)(a - b) = a^2 - b^2$ ,  $(x - 2)(x + 2)$  can be simplified to  $(x^2 - 4)$  and that would simplify to

$$(x^2 - 4)^2.$$

Using the identity  $(a - b)^2 = a^2 - 2ab + b^2$  the problem can be simplified to  $(x^2 - 4)^2 = x^4 - 8x^2 + 16$ , making Choice A the right option.

**Distractor Explanation:** Choice B is incorrect.

This answer choice may be arrived at due to a common exponent conceptual error. Choice C is incorrect as this answer choice may be due to a miscalculation of  $8x$  as positive. Choice D is incorrect due to both exponent conceptual and miscalculation errors.

6. **Level:** Easy | **Domain:** PROBLEM-SOLVING AND DATA ANALYSIS

**Skill/Knowledge:** One-variable data: distributions and measures of center and spread |

**Testing point:** Finding mean and median of grouped data

**Key Explanation:** To calculate the median of the 27 foods, look for the middle number frequency wise of the data. If there are 27 items then the middle number is the 14<sup>th</sup> food which, based on the frequency table, has 180 calories. To find the mean number of calories, use the mean formula which can be found by taking the total number of calories divided by the number of food items. To find the total number of calories multiply each calorie content number in the table by its frequency, as follows:

$$(100 \times 6) + (180 \times 9) + (280 \times 11) + (350 \times 1) = 5,650 / 27 = 209.3.$$

Therefore the difference of the mean and median of the calorie content of the 27 foods would be  $209.3 - 180 = 29.3$ .

7. **Level:** Medium | **Domain:** ADVANCED MATH  
**Skill/Knowledge:** Nonlinear functions | **Testing point:** Finding the  $x$ -*intercept*

**Key Explanation:** Choice C is correct. The  $x$ -*intercept* is found when  $y = 0$ , therefore:

$$x = 3^{0-1} + \frac{5}{3}$$

$$x = 3^{-1} + \frac{5}{3}$$

$$x = \frac{1}{3} + \frac{5}{3}, \text{ which makes } x = 2 \text{ making Choice C}$$

correct.

**Distractor Explanation:** Choice A is incorrect. The student might incorrectly think this equation is linear and therefore the  $\frac{5}{3}$  represents the  $y$ -*intercept*. However, this is not the case. Also, the question has asked for the  $x$ -*intercept*. Choices B and D are incorrect and would be due to a conceptual or miscalculation error.

8. **Level:** Hard | **Domain:** PROBLEM-SOLVING AND DATA ANALYSIS  
**Skill/Knowledge:** Inferences from sample statistics and margin of error |  
**Testing point:** Generalization of data from surveys

**Key Explanation:** Choice D is correct.  $100\% - 80\%$  (who think statistics is the hardest subject) =  $20\%$  (who chose Physics as the hardest subject). Since only 11<sup>th</sup> graders in the math summer class were surveyed the data can only be generalized to the 11<sup>th</sup> graders in the math summer class. This then makes option D, the best option.

**Distractor Explanation:** Choice A is incorrect. It generalizes the survey to all students in the summer math class. Choices B and C are incorrect. They contradict the given information.

9. **Level:** Easy | **Domain:** ADVANCED MATH  
**Skill/Knowledge:** Equivalent expressions |  
**Testing point:** Manipulating quadratic equations

**Key Explanation:** First, expand out  $(x + 3)^2$  to  $(x + 3) \times (x + 3)$ . Using the foiling method, multiply out the two binomial terms to get the following:

$$-3(x^2 + 6x + 9) + 9 + x = ax^2 + bx + c$$

Use the distributive property to expand out the left side of the equation and then combine like terms to get the following:  $-3x^2 - 17x - 18 = ax^2 + bx + c$   
Therefore  $a = -3$ ,  $b = -17$  and  $c = -18$ ;  $a + b + c = -3 + -17 + -18 = -38$

10. **Level:** Hard | **Domain:** ADVANCED MATH  
**Skill/Knowledge:** Nonlinear functions | **Testing point:** Vertex form of a quadratic equation

**Key Explanation:** Choice B is correct. The maximum point of a quadratic equation is the vertex. Therefore, (3, 2) is the vertex of the parabola. The vertex form of a parabola is given by  $a(x - h)^2 + k$ , where  $(h, k)$  is the vertex of the parabola. This equation can be used to find the equation for a parabola. Therefore,  $y = a(x - 3)^2 + 2$ . The quadratic equation passes through the point (2, 0). Plugging this point into the vertex form equation for  $x$  and  $y$  yields

$$0 = a(2 - 3)^2 + 2$$

$$0 = a + 2$$

$$a = -2$$

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

If  $x$  is a solution to the quadratic equation,  $y$  must equal zero. Plugging in the answer choices into the

vertex form equation is the fastest method. **Choice B** is the only answer that works.  $0 = -2(4 - 3)^2 + 2$  and thus  $0 = 0$  results.

**Distractor Explanation:** **Choice A** is incorrect. This is the value of  $a$  in the vertex form of a parabola equation. However, this option can also be a miscalculation. **Choice C** is incorrect. This is the  $y$ -*intercept* of the equation. **Choice D** is incorrect. This can be the result of a conceptual or miscalculation error.

**11. Level:** Easy | **Domain:** ALGEBRA

**Skill/Knowledge:** Linear functions | **Testing point:** Finding the slope of a line given two points

**Key Explanation:** **Choice C** is correct. To find the slope of a line, the formula  $\frac{y_2 - y_1}{x_2 - x_1}$  is used.

Plugging in the  $x$  and  $y$  coordinates of the two given points  $(0, 0)$  and  $(3, 5)$  into the slope

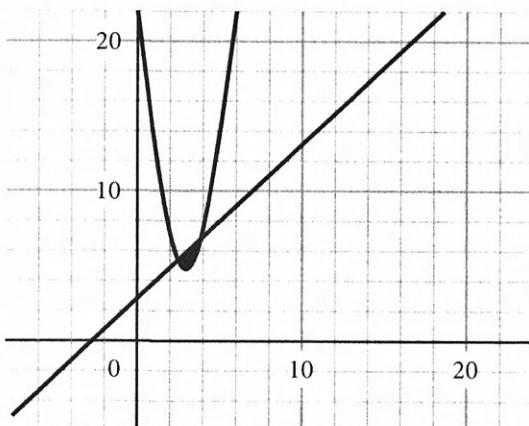
$$\text{equation yields } \frac{5-0}{3-0} = \frac{5}{3}$$

**Distractor Explanation:** **Choice A** is incorrect and was determined by finding the change in  $x$  over the change in  $y$  instead of the change in  $y$  over the change in  $x$ . **Choices B** and **D** are incorrect and were the result of either miscalculation or conceptual errors.

**12. Level:** Hard | **Domain:** ADVANCED MATH

**Skill/Knowledge:** Nonlinear equations in one variable and systems of equations in two variables  
**Testing point:** System of linear and quadratic inequalities

**Key Explanation:** **Choice D** is correct. To solve this problem, graph the system.



The solution for the system will be the region that is shaded. The minimum value of  $b$  can then be found by finding the vertex of the parabola  $y = 2(x - 3)^2 + 5$ . The vertex form of a parabola is given by  $y = a(x - h)^2 + k$ . Therefore, the vertex of the parabola is  $(3, 5)$ . The minimum  $y$  value of a concave up parabola can be found at the vertex. Therefore, the minimum value of  $b$  is 5.

**Distractor Explanation:** **Choice A** is incorrect. It is the minimum value of the system of inequalities. **Choices B** and **C** are incorrect. These answers would be the value of  $a$  and  $b$  if the vertex was incorrectly found to be  $(-3, -5)$ .

**13. Level:** Easy | **Domain:** GEOMETRY AND TRIGONOMETRY

**Skill/Knowledge:** Area and volume | **Testing point:** Volume of a sphere

**Key Explanation:** The volume of a sphere is found using the formula  $\frac{4}{3}\pi r^3 = \frac{4}{3}(3)^3\pi = 36\pi$

## 14. Level: Easy | Domain: ALGEBRA

**Skill/Knowledge:** Systems of two linear equations in two variables | **Testing point:** Systems of equations with no solution

**Key Explanation:** Choice A is correct. For a system of equations to have no solution, the system represents parallel lines with the same slope but different  $y$ -intercepts.

$$3x - 4y = 8$$

$$px + 8y = -6$$

To easily compare the slopes, the equations should be put into the slope-intercept form of a line  $y = mx + b$  where  $m$  is the slope. By mathematical manipulation, doing this yields the equations:

$$y = \frac{3}{4}x - 2$$

$$y = \frac{p}{8}x - \frac{3}{4}$$

Since parallel lines have the same slope, the

equation  $\frac{-p}{8} = \frac{3}{4}$  can be solved by  $p$ . Multiplying both sides of the equation by  $-8$  yields  $p = -6$ , **Choice A**.

**Distractor Explanation:** Choices B, C, and D are incorrect. They would make the system of equations incorrectly have 1 solution. These answer choices are determined by mathematical miscalculations or conceptual errors.

## 15. Level: Easy | Domain: GEOMETRY AND TRIGONOMETRY

**Skill/Knowledge:** Circles | **Testing point:** Equation of a circle

**Key Explanation:** Choice D is correct. To find the center of the circle, we have to write the equation of the circle in its standard form  $(x - h)^2 + (y - k)^2 = r^2$ . This is done by completing the square for the

$x$ 's and the  $y$ 's in the equation.

$$x^2 + 6x + 9 + y^2 - 6y + 9 = 63 + 9 + 9$$

$$(x + 3)^2 + (y - 3)^2 = 81$$

This then gives the center of the circle as  $(-3, 3)$ .

**Distractor Explanation:** Choice A is incorrect.

This is the negative of the center of the equation of the circle.

**Choices B and C** are incorrect. They can be determined by incorrectly picking the coefficients of  $x$  and  $y$  without writing the equation in standard form.

## 16. Level: Hard | Domain: ADVANCED MATH

**Skill/Knowledge:** Nonlinear equations in one variable and systems of equations in two variables

**Testing point:** Solving quadratic equations using the quadratic formula

**Key Explanation:** This quadratic equation can be solved using the quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}, \text{ where } a = 3 \text{ and } b = -6 \text{ and } c = -11.$$

Therefore:

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(3)(-11)}}{2(3)}$$

$$x = \frac{6 \pm \sqrt{36 + 132}}{6}$$

$$x = \frac{6 \pm \sqrt{168}}{6}$$

$$x = \frac{6 \pm \sqrt{42\sqrt{4}}}{6}$$

$$x = \frac{6 \pm 2\sqrt{42}}{6}$$

$$x = \frac{3 \pm \sqrt{42}}{3}$$

Therefore  $g = 42$ .

## 17. Level: Easy | Domain: ALGEBRA

**Skill/Knowledge:** Linear inequalities in one or two variables | **Testing point:** Solving linear inequalities

**Key Explanation:** Choice B is correct. To solve the inequality, add  $x$  to both sides of the inequality.

$$-2x + x \geq -4 - x + x$$

$-x \geq -4$ , Next, divide both sides of the equation by  $-1$  which flips the inequality sign.

$x \leq 4$ , Only 5 is not less than 4.

**Distractor Explanation:** Choice A is incorrect as it is a solution to the inequality.  $-4 = -4$ .

Choice C is incorrect as it is also a solution to the inequality  $3 \leq 4$ . Choice D is incorrect as  $2 \leq 4$  and is therefore also a solution to the above inequality.

## 18. Level: Easy | Domain: ADVANCED MATH

**Skill/Knowledge:** Nonlinear equations in one variable and systems of equations in two variables

**Testing point:** Solving square root equations

**Key Explanation:** Choice B is correct. The problem can be solved in 2 ways. The easiest and quickest way is to just substitute the answer choices and test to see which answer makes the equation true.

Substitute Choice A.

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

$$\sqrt{9} = -3,$$

This isn't true. Substitute Choice B.

$$\sqrt{2(10) + 5} = 10 - 5$$

$$\sqrt{20 + 5} = 10 - 5$$

$$\sqrt{25} = 5$$

This makes Choice B the only right option.

**Distractor Explanation:** Choice A is incorrect mathematically as shown above. Choice C is incorrect as it incorrectly states that 2 is one of the solutions. Choice D is incorrect. It can be due to a miscalculation error.

## 19. Level: Hard | Domain: ALGEBRA

**Skill/Knowledge:** Systems of two linear equations in two variables | **Testing point:** Solving simultaneous equations

**Key Explanation:** Cross multiplying  $\frac{5}{x} = \frac{2}{y}$  yields

$$5y = 2x$$

The next step is to get the two terms on the left side of the second equation of the same common denominator of  $xy$  as follows:

$$\frac{4}{x} \times \left(\frac{y}{y}\right) - \frac{2}{y} \times \left(\frac{x}{x}\right) = \frac{4y - 2x}{xy} = -\frac{1}{5}$$

Cross multiplying the condensed second equation yields

$$5(4y - 2x) = -xy = 20y - 10x = xy$$

Using the first equation,  $5y = 2x$ , multiply each side by 4, resulting in  $20y = 8x$

Substituting  $8x$  for  $20y$  in the second equation yields

$$8x - 10x = xy \text{ or } -2x = xy$$

Dividing both sides of the equation by  $x$  yields

$$y = -2$$

Substituting this value for  $y$  in the first equation yields

$$5(-2) = 2x$$

$$-10 = 2x$$

$$x = -5$$

$$\text{Therefore, } xy = (-2)(-5) = 10$$

## 20. Level: Easy | Domain: ADVANCED MATH

**Skill/Knowledge:** Equivalent expressions |

**Testing point:** Remainder theorem

**Key Explanation:** Choice C is correct. A is the remainder when the function  $3x^2 + 7x + 9$  is divided by  $x - 2$ . The remainder can be found when  $f(2)$  is calculated. Because  $-2 = 0$  yields  $x = 2$  as a solution, it can be plugged into the given quadratic function as follows to find A:

$$3(2)^2 + 7(2) + 9 = 12 + 14 + 9 = 35.$$

**Distractor Explanation:** Choice A is incorrect. This is the answer incorrectly found by adding coefficients together ( $3 + 7 + 9$ ) of the quadratic equation.

Choice B is incorrect. This is the answer incorrectly found by plugging in  $-2$  instead of  $2$  into the quadratic equation.

Choice D is incorrect. This is the answer incorrectly found through a conceptual or miscalculation error.

## 21. Level: Easy | Domain: PROBLEM-SOLVING AND DATA ANALYSIS

**Skill/Knowledge:** Inference from sample statistics and margin of error | **Testing point:** Margin of error

**Key Explanation:** Choice D is correct. Given that the sample mean mass is  $67.9$  kgs, the actual mean mass of the penguins in the zoo would lie between  $67.9$  kgs plus or minus  $4.5$  kgs, or  $63.4$  kgs and  $72$  kgs. This then makes Choice D correct.

**Distractor Explanation:** Choice A is incorrect as the mass of the penguins in the park cannot be found from the data available.

Choice B is incorrect as the mean mass does not state that the mass of all the penguins is  $67.9$  kgs.

Choice C is incorrect. Nothing can be concluded about the median mass of the penguins in the zoo.

## 22. Level: Hard | Domain: ALGEBRA

**Skill/Knowledge:** Linear equations in two variables | **Testing point:** Number of solutions in a linear system of two variables

**Key Explanation:** Choice B is correct. The first step is to use the distributive property to multiply out the terms on the left side of the equation as follows:

$$3x - 9 + 2x + 2y = 5x + 2y - 9$$

Combining like terms on the left side of the equation yields:

$$5x + 2y - 9 = 5x + 2y - 9$$

Since the equations on the left and the right are the same, they represent the same line and thus have infinitely many solutions.

**Distractor Explanation:** Choice A is incorrect. To have zero solutions the equations would need to be parallel lines and thus have the same slope and different y-intercepts. That would mean that the coefficients of  $x$  and  $y$  will be equal however the constants will not. This is not the case in this problem. Choice C is incorrect. That would mean there would be one  $(x, y)$  solution to the system above. That is not the case as they represent the same line. Choice D is incorrect. Linear equations with two variables do not have 2 solutions.

1. **Level:** Medium | **Domain:** ADVANCED MATH  
**Skill/Knowledge:** Equivalent expressions | **Testing point:** Foiling out binomials and combining like terms

**Key Explanation:** Choice D is correct. To solve the question, first, distribute out the two binomial expressions. The next step is to combine like terms and put the final expression in standard form.

$$3(x^2 + 10x + 25) - 2(x^2 - 10x + 25) + 2x$$

$$3x^2 + 30x + 75 - 2x^2 + 20x - 50 + 2x$$

$$x^2 + 52x + 25$$

**Distractor Explanation:** Choices A and C are incorrect. These answers can be arrived at if the foiling expansion is done incorrectly. Choice B is incorrect. This answer can be arrived at if a math miscalculation is done after the foiling out expansion is completed.

2. **Level:** Medium | **Domain:** ADVANCED MATH  
**Skill/Knowledge:** Equivalent expressions | **Testing point:** Finding the least common denominator with binomial terms and combining

**Key Explanation:** Choice A is correct. To solve this problem, the fractions need a common denominator to be added. The least common denominator is  $(x - 2)(5 - x)$ , which multiplies out to a denominator of  $-x^2 + 7x - 10$ . To get both terms of this expression over the same denominator, the numerator and denominator of the first term each must be multiplied by  $(5 - x)$  and the numerator and denominator of the second term each must be multiplied by  $(x - 2)$ . Since the two terms are now over the same denominator, the numerators can be added as follows:

$$\frac{5-x+2x(x-2)}{(x-2)(5-x)},$$

Using the foiling and distributive operations to multiply out and combine like terms, the final answer is:  $\frac{2x^2 - 5x + 5}{-x^2 + 7x - 10}$ .

**Distractor Explanation:** Choices B and C are incorrect. These answers can be arrived at wrongly by adding the two fractions directly, which is a common conceptual error. Choice D is incorrect. This answer may be arrived at by finding the common multiple for the denominator and then just adding the original numerators directly without multiplying them by the binomials needed to get the common multiple for the denominator.

3. **Level:** Easy | **Domain:** ALGEBRA  
**Skill/Knowledge:** Systems of two linear equations in two variables | **Testing point:** Solving simultaneous equations

**Key Explanation:** Solve for  $y$  by using the distributing property and the substitution method as follows:

$$3x - 6 + 5(-2(x - 5)) = 2$$

$$3x - 6 - 10(x - 5) = 2$$

$$3x - 6 - 10x + 50 = 2$$

$$-7x + 44 = 2$$

$$-7x = -42$$

$$x = 6$$

Substitute  $x = 6$  into the second equation to find  $y$ .

$$y = -2(6 - 5)$$

$$y = -2$$

4. **Level:** Easy | **Domain:** PROBLEM-SOLVING AND DATA ANALYSIS

**Skill/Knowledge:** Two-variable data: models and scatterplots | **Testing point:** Line of best fit

**Key Explanation:** Choice A is correct. This question can be solved in several ways. The

equation of the line of best fit can be determined by finding the slope and *y-intercept* from the graph directly and plugging those values into the *slope-intercept* equation of a line,  $y = mx + b$ . The elimination method can also be used. The slope and *y-intercept* of the line of best fit are both positive, which eliminates **Choices C** and **D**. The slope of the line of best fit is not steep so that eliminates **Choice B**.

**Distractor Explanation:** **Choice B** is incorrect because the slope of the line of best fit is  $\frac{1}{4}$  and not 4. **Choice C** is incorrect because the *y-intercept* of the line of best fit is positive, not negative. **Choice D** is incorrect because the line of best fit has a positive slope and not a negative one.

5. **Level:** Medium | **Domain:** GEOMETRY AND TRIGONOMETRY

**Skill/Knowledge:** Circles | **Testing point:** Arc length of a circle

**Key Explanation:** **Choice C** is correct. The arc length of the circle can be found by using the equation arc length =  $r\theta$ , where  $r$  is the radius of the circle and theta is the degree in radians of the central angle that subtends the arc length desired.

Therefore the arc length would be

$6\left(\frac{7}{12}\pi\right) = \frac{7}{2}\pi$ . The arc length can also be found by converting radians to degrees using the

formula  $\frac{\theta}{360}2\pi r$ . This would still give the answer

as  $\frac{7}{2}\pi$  cm.

**Distractor Explanation:** **Choice A** is incorrect.

This is the circumference of the whole circle.

**Choice B** is incorrect. This is the area of the whole

circle. **Choice D** is incorrect. This is the area of the sector that can be found using the formula  $\frac{1}{2}r^2\theta$ , where  $\theta$  is the measure of the central degree in radians.

6. **Level:** Easy | **Domain:** ADVANCED MATH

**Skill/Knowledge:** Nonlinear equations in one variable and systems of equations in two variables  
**Testing point:** Finding the sum of the roots in a quadratic equation

**Key Explanation:** **Choice B** is correct. The first step is to simplify the equation by dividing out 2, the greatest common factor out of the equation, leaving  $x^2 + 3x + 9 = 0$ . The equation does not factor so the quadratic equation can be used in simplified form. The sum of the roots of a quadratic equation is equal to  $\frac{-b}{a}$ , where  $a = 1$ ,

$b = 3$  and  $c = 9$ .

Therefore, the sum of the roots of the quadratic equation above would be  $\frac{-3}{1} = -3$ .

**Distractor Explanation:** **Choice A** is incorrect.

This gives the value of  $\frac{b}{a}$  or the negative of the sum of the roots. **Choice C** is incorrect. This is the product of the roots given by  $\frac{c}{a}$ .

**Choice D** is incorrect as this is the negative of the product of the roots and can be arrived at by using

$\frac{-c}{a}$ .

7. **Level:** Medium | **Domain:** GEOMETRY AND TRIGONOMETRY

**Skill/Knowledge:** Lines, angles, and triangles

**Testing point:** Finding the sum of angles in a polygon and converting degrees to radians

**Key Explanation:** The sum of the interior angles in a polygon is  $180 \times (n - 2)$ , where  $n$  is the number of sides in the polygon. A heptagon has 7 sides, so the sum of its interior angles will be  $180 \times (7 - 2) = 900^\circ$ .

A hexagon has 6 sides, so the sum of its interior angles will be  $180 \times (6 - 2) = 720^\circ$ . The difference between the total number of degrees of the interior angles of the two shapes is  $180^\circ$ . This number in radians would be  $\pi$  and  $a = 1$ .

8. **Level:** Medium | **Domain:** ALGEBRA

**Skill/Knowledge:** Linear functions | **Testing point:** Finding equations of functions

**Key Explanation:** Choice A is correct. The problem gives two points and asks what the function  $f(x)$  is that best describes the points. Using points  $(3, 2)$  and  $(6, -3)$ , the slope of the function, which is the change in the  $y$  coordinates over the change in the  $x$  coordinates,  $\frac{(y^2 - y^1)}{(x^2 - x^1)}$ , can

be found as follows:

$$\frac{2 - (-3)}{3 - 6} = \frac{5}{-3}$$

The answer choices are in slope–intercept form,  $y = mx + b$  where  $m$  represents the slope. The only answer choice that has a slope of  $\frac{-5}{3}$  is Choice A.

**Distractor Explanation:** Choice B is incorrect most likely due to a conceptual error. Choice C is incorrect and incorrectly states the slope formula as the change in  $x$  over the change in  $y$ . Choice D is incorrect as this is the equation of the line that is perpendicular to  $f(x)$ .

9. **Level:** Easy | **Domain:** ALGEBRA

**Skill/Knowledge:** Linear equations in one variable | **Testing point:** Solving for  $x$

**Key Explanation:** Choice D is correct. To solve this problem, first divide both sides of the equation by 2 to get:

$$\begin{aligned}(x + 4) &= \frac{18}{2} \\ (x + 4) &= 9 \\ x &= 5\end{aligned}$$

Therefore  $(x + 6) = 5 + 6 = 11$

**Distractor Explanation:** Choice A is incorrect. This is the value of  $(x + 4)$ . Choice B is incorrect. This is the value of  $x$  only. Choice C is incorrect. It can be the result of a miscalculation.

10. **Level:** Medium | **Domain:** PROBLEM-SOLVING AND DATA ANALYSIS

**Skill/Knowledge:** Ratios, rates, proportional relationships, and units | **Testing point:** Ratios

**Key Explanation:** To solve this problem, let  $x$  equal the total number of people at the fair. Every group of 5 students and 3.5 parents has a total of 8.5 total people in it. Set up a proportion of ratio students to ratio total people and set it equal to the ratio of the total number of students to the total number of people as follows:

$$\frac{5}{8.5} = \frac{2,000}{x}$$

Cross multiplying gives the equation

$5x = 2,000 \times 8.5$ . Dividing both sides of the equation by 5 gives  $x = 3,400$  students

11. **Level:** Medium | **Domain:** PROBLEM-SOLVING AND DATA ANALYSIS

**Skill/Knowledge:** Percentages | **Testing point:** Percent decrease

**Key Explanation:** Choice D is correct. The percent decrease can be found by using the formula:

((difference between actual and predicted values) / original value)  $\times 100$ .

Looking at the graph, the actual  $y$  values when  $x = 4$  are 6 and 11. The predicted  $y$  value at  $x = 4$  is 9. Since the question asked for the percent decrease from the actual value to the predicted value, the actual value needs to be higher and thus we would use the  $y$  value of 11 and not 6 at  $x = 4$ . Plugging in the  $y$  values of 11 and 9 into the equation yields  $(11 - 9 / 11) \times 100 = 18.18\%$

**Distractor Explanation:** Choice A is incorrect as this answer is the percent increase from 9 to 11.

Choice B is incorrect as this answer is the percent decrease from 9 to 6.

Choice C is incorrect as this describes the percent increase from 6 to 9.

12. **Level:** Easy | **Domain:** ALGEBRA

**Skill/Knowledge:** Linear inequalities in one or two variables | **Testing point:** Systems of linear inequalities

**Key Explanation:** Choice B is correct. To solve the question, the fastest method would be to substitute the  $x$  and  $y$  coordinates of the answer choices into the system of inequalities and see which coordinate pair satisfies both inequalities. Plugging in the  $x$  and  $y$  values for Choice B makes both inequalities valid as follows:

$$\begin{aligned} \text{Inequality 1: } & 4 > -3(1) + 5 \\ & 4 > -3 + 5 \\ & 4 > 2 \end{aligned}$$

$$\begin{aligned} \text{Inequality 2: } & 4 > 2(1) \\ & 4 > 2 \end{aligned}$$

**Distractor Explanation:** Choice A is incorrect. Plugging in this coordinate pair into the second inequality yields  $4 > 4$ , which is false. Choice C is incorrect. Plugging this coordinate pair into the second inequality yields  $4 > 2(3) = 4 > 6$ , which is false. Choice D is incorrect. Plugging this

coordinate pair into the second inequality yields  $1 > 2(2) = 1 > 4$ , which is false.

13. **Level:** Medium | **Domain:** ADVANCED MATH  
**Skill/Knowledge:** Nonlinear equations in one variable and systems of equations in two variables  
**Testing point:** Finding solutions for an absolute value equation

**Key Explanation:** To solve this absolute value equation, first divide both sides of the equation by 3 to get:  $|x - 4| = 2$ . Then remove the absolute value and set up and solve the following 2 equations:

$$\begin{aligned} x - 4 &= 2 \text{ and } x - 4 = -2 \\ x &= 6 \text{ and } x = 2 \end{aligned}$$

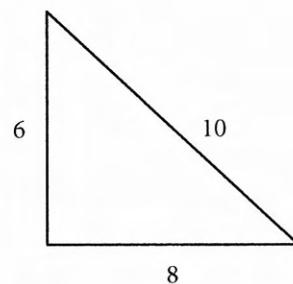
14. **Level:** Easy | **Domain:** GEOMETRY AND TRIGONOMETRY

**Skill/Knowledge:** Area and volume | **Testing point:** Area of a trapezoid

**Key Explanation:** Choice A is correct. Since segment AD is parallel to segment BC and  $AB = DC$  the shape is an isosceles trapezoid. To find the area of a trapezoid the formula

$\frac{h}{2}(a + b)$ , is used where  $h$  is the height of the trapezoid and  $a$  and  $b$  are the lengths of the two bases of the trapezoid.

The height of the trapezoid can be found by using the Pythagorean theorem  $a^2 + b^2 = c^2$ , where  $a$  and  $b$  are the legs of the right triangle and  $c$  is its hypotenuse.



Using the pythagorean theorem  $a^2 + 8^2 = 10^2$  or  $a^2 = 36$ , yielding  $a = 6$ . Thus the height of the trapezoid is 6. Plugging in the values for  $a$ ,  $b$ , and  $h$  into the area of a trapezoid formula, yields

$$\frac{6}{2}(12+28)=120$$

Therefore the area of the trapezoid would be 120.

**Distractor Explanation:** Choice B is incorrect. This answer is the perimeter of the trapezoid. Choice C is incorrect. This answer can be determined if the shape is divided into a rectangle and two triangles. This answer is the area of the rectangle plus one triangle. Choice D is incorrect. It is the value of the area of the two triangles alone.

15. **Level:** Easy | **Domain:** ADVANCED MATH

**Skill/Knowledge:** Nonlinear equations in one variable and systems of equations in two variables

**Testing point:** Absolute values

**Key Explanation:** Choice C is correct. The first step is to combine the two absolute value terms into  $|x + 3| = -2$ . The next step is to divide both sides by  $-1$  to get:  $|x + 3| = 2$ . The absolute value is equal to a positive number and therefore it has 2 solutions.

**Distractor Explanation:** Choice A is incorrect. To have 0 solutions in an absolute value equation, the absolute equation value has to be equal to a negative number. Choice B is incorrect. For an absolute value equation to have 1 solution it has to be equal to 0. Choice D is incorrect. There is sufficient information to answer the question.

16. **Level:** Medium | **Domain:** ALGEBRA

**Skill/Knowledge:** Linear equations in two variables | **Testing point:** Perpendicular lines

**Key Explanation:** The slope is found by putting the equation of the line into slope-intercept form of  $y = mx + b$  as follows:

$$5x - 6y + 30 = 0$$

$$-6y = -5x - 30$$

$$y = \frac{5}{6}x + 5. \text{ The slope is then } \frac{5}{6}, \text{ a line}$$

perpendicular to this will have the negative

$$\text{inverse of this slope which is } \frac{-6}{5}.$$

17. **Level:** Easy | **Domain:** GEOMETRY AND TRIGONOMETRY

**Skill/Knowledge:** Right triangles and trigonometry

**Testing point:** Trigonometric identities

**Key Explanation:** Choice C is correct.

$\sin x = \cos(90^\circ - x)$  and vice versa, therefore  $\cos 72^\circ = \sin(90^\circ - 72^\circ)$  This equates to  $\sin 18^\circ$ .

**Distractor Explanation:** Choice A is incorrect. This choice may be selected due to a conceptual error. Choice B is incorrect as  $\sin 72^\circ$  is equal to  $\cos 18^\circ$ . Choice D is incorrect.  $\cos 18^\circ$  is equal to  $\sin 72^\circ$ .

18. **Level:** Easy | **Domain:** PROBLEM-SOLVING AND DATA ANALYSIS

**Skill/Knowledge:** Probability and conditional probability | **Testing point:** Probability

Complement

**Key Explanation:** Choice B is correct. The sum of the probabilities of an event and its complement must add up to 1. Therefore, if the probability that it will rain is 0.26, the probability of no rain is  $1 - 0.26 = 0.74$ .

**Distractor Explanation:** Choices A and C are incorrect and can be due to a miscalculation or conceptual error. Choice D is incorrect as a probability of 1 means that it is certain that it will not rain.

## 19. Level: Easy | Domain: ADVANCED MATH

**Skill/Knowledge:** Nonlinear functions | **Testing point:** Vertex form of a quadratic and minimum/maximum point

**Key Explanation:** The maximum  $t$  value of a concave down parabola for the quadratic equation  $ax^2 + bx + c$  can be found using the formula  $t =$

$$t = \frac{-b}{2a}$$
, which finds the  $x$  coordinate of the vertex of the parabola. In the equation above,  $a$  is 3 and  $b = 9$  yielding,

$$t = \left( \frac{-9}{2(-3)} \right) = \frac{-9}{-6} = \frac{3}{2}$$

## 20. Level: Hard | Domain: GEOMETRY AND TRIGONOMETRY

**Skill/Knowledge:** Right triangles and trigonometry | **Testing point:** Special triangles

**Key Explanation:** The triangle  $PQR$  is a special triangle. **Choice D** is correct. Triangle  $PQR$  is inscribed in a semicircle where the hypotenuse of triangle  $PQR$  is the diameter of the circle. This makes angle  $P$  a right angle. A triangle has 180 degrees and that would make angle  $R$  equal to 30 degrees. Therefore triangle  $PQR$  is a special triangle, more specifically a 30 – 60 – 90 special triangle. Since the radius of the circle is 7 cm, this makes the diameter 14 cm. The hypotenuse of triangle  $PQR$  is the diameter of the circle. In a 30 – 60 – 90 special triangle, the length of the side opposite the right angle, the hypotenuse, is two times the length of the side opposite the 30-degree angle. This makes side  $PQ = 7\text{cm}$ . The side opposite the 60-degree angle in this special triangle is the length of the side opposite the 30-degree angle times  $\sqrt{3}$ . Therefore the length of PR is equal to  $7\sqrt{3}$ .

**Distractor Explanation:** Choice A is incorrect.

This is the diameter of the circle and the value of the length of  $RQ$ .

Choice B is incorrect as it is the length of  $PR$ .

Choice C is incorrect. This answer is due to a conceptual error confusing the ratios in sides of the 30 – 60 – 90 triangle with the 45 – 45 – 90 special triangle.

## 21. Level: Medium | Domain: ALGEBRA

**Skill/Knowledge:** Linear inequalities in one or two variables | **Testing point:** Absolute value linear inequalities

**Key Explanation:** Choice B is correct. For the above inequality either  $x + 3 > 4$  or  $x + 3 < -4$ . Solving  $x + 3 > 4$  yields  $x > 1$ . Solving  $x + 3 < -4$  yields  $x < -7$ . Choice B is the correct choice as it has the only value in the domain of the range of solutions to the inequality.

**Distractor Explanation:** Choices A, C, and D are incorrect as they are not part of the range of solutions to the inequality.

## 22. Level: Easy | Domain: ALGEBRA

**Skill/Knowledge:** Systems of two linear equations in two variables | **Testing point:** Systems of equations

**Key Explanation:** Choice A is correct. To solve this problem, subtract the two equations.

$$3x + 4y = 31 - (2x + 3y = 22)$$

$$= x + y = 9, \text{ which is Choice A.}$$

**Distractor Explanation:** Choice B is incorrect.

This answer is the value of  $x$ . Choice C is incorrect. This answer is the value of  $y$ . Choice D is incorrect. It is due to conceptual or miscalculation errors.

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