

Options A, B, C, and D are not supported by the diagram. For example, Option A, “All snobbles are silver,” is not correct. The diagram shows that some snobbles are silver, but does not show that they are all silver. Option E is correct. A gold snobble cannot be heavy and slow, because every snobble that is heavy and slow is silver.

**20. (F)** This question requires you to solve two relationships: matching each troll with a colorful characteristic, and putting the trolls in order. Start by matching the trolls and their characteristics. According to Statement 1, Snowflake has white hair. According to Statement 3, Gretchen has purple ears. Statement 2 states that Banto did not have green eyes, so Holly must have the green eyes. This leaves Banto with the red teeth.

Troll	Green Eyes	Purple Ears	Red Teeth	White Hair
Banto	no		yes	
Gretchen		yes		
Snowflake				yes
Holly	yes			

Now, put the trolls in order. From Statements 1 and 2, we can conclude that Banto was in front of Snowflake and behind Gretchen. The question says that Holly (“green eyes”) was behind Gretchen. Thus, every troll is behind Gretchen, which is Option F.

▶▶▶ Reading

▶ Beavers

**21. (A)** The passage gives examples of how beavers affect their environment by cutting down trees and building dams, which in turn changes the landscape and the plants and animals that live there. Option A summarizes this point. Options B, C, D, and E are true statements, but they are details, not the theme of the passage.

**22. (G)** This complex question asks how changes in insect and plant life in a beaver pond result from something else, or, in other words, what causes the changes in insect and plant life in a beaver pond. Lines 24-31 explain that the changes in insect and plant life are the result of changes in the water temperature (warmer) and flow of

water (slower) in the pond. Thus, the correct answer is Option G. Options F and J might sound logical but are not mentioned in the passage. Option H is related to the question, but it incorrectly attributes the changes in the kinds of animals as the cause, not the result, of changes in insect and plant life. Option K refers to an abandoned dam, not an intact dam in a pond, so it cannot be correct.

**23. (E)** The beaver trapping in Wyoming is mentioned only in the final paragraph. The purpose for trapping and moving beavers is to encourage beavers to build dams that will halt soil erosion (lines 58-59), which is Option E. Options A and D are not mentioned in the passage. Option B might seem correct at first, but it refers to beavers causing soil erosion, not halting it. Option C is mentioned (lines 48-50) but not as the purpose of beaver trapping in Wyoming.

**24. (G)** This is an inference question. The correct answer is supported by the passage but is not directly stated. The question asks about the appearance of a recently abandoned beaver pond. Abandoned ponds are mentioned in lines 40-43, which say that beavers abandon a pond when the supply of desirable trees has run out. Notice that the description of these abandoned ponds (collapse of dams, transformation of landscape) is “long after the beavers have left” (lines 45-46), not recently abandoned. Option F, “the effects of severe erosion,” is incorrect because a recently abandoned pond would still have a dam, which would slow erosion, not cause it. Option K can be ruled out because the passage says nothing about the building of new beaver dams near abandoned beaver ponds. Regarding Option J, lines 21-23 state that several beavers at work can soon open up the forest area around a pond to sunlight. This fact rules out the possibility of dark, dimly lit forest land around a recently abandoned dam. The first sentence of the fourth paragraph says that beavers selectively cut the deciduous trees on stream banks, allowing evergreens to take over the area. Thus, Option H is ruled out; the mature deciduous trees must all be gone, or the beavers would not have left. Option G is correct. The evergreen trees around the pond are left undisturbed, and they gradually take over the area (lines 39-40).

**25. (E)** A comeback is a recovery or a return to a former condition. “This remarkable comeback” in line 13 must refer to a previously mentioned recovery of some kind. The first paragraph describes the beaver’s near-extermination, followed by a greatly increased population. The “comeback” must refer to a recovery in the beaver population, which is Option E. Options A, B, C, and D are mentioned in the passage, but not in reference to a comeback.



**26. (H)** The amount of wood that a beaver can cut down in a year is mentioned in lines 18-20. This sentence is followed by examples of how beavers change their environment (the formation of a pond, shift in water nutrients, and so on), including the amount of wood they cut down. The correct answer is Option H. None of the other options relates to the amount of wood cut down.

► **Old Man of the Mountain**

**27. (E)** Look at the theme of each paragraph. The first paragraph describes what the Old Man of the Mountain looked like. The second paragraph discusses its history. The third, fourth, and fifth paragraphs describe attempts to stabilize the monument, and the sixth paragraph discusses its collapse in 2003. The final paragraph describes memorials to the Old Man. Now look at the answer choices. Options A and B can be ruled out because each refers to only one of the seven paragraphs in the passage. Option C is mentioned in only three of the seven paragraphs, and Option D is impossible because the Old Man no longer exists. Option E is correct. It summarizes the main points of the passage—the history of the monument, attempts to stabilize it, its eventual collapse, and how it is remembered.

**28. (G)** The correct answer is found in lines 5-9, which explain that the Old Man looked like a random heap of stones from most viewpoints. The most likely reason that European-Americans had not seen the Old Man was that they had not yet stood at the correct viewpoint (Option G). Option F is ruled out because Europeans had lived in the area since the early 1600s (lines 17-19). Option H is incorrect; the Old Man was formed about 10,000 years ago (lines 12-14) and was the subject of Native American legends since the early 1600s (lines 17-20). Option J has nothing to do with the question, and Option K cannot be correct because the existence of the rock formation was never in doubt.

**29. (C)** The cause of the collapse is given in lines 56-60, and the correct answer is Option C, “water freezing and thawing in the cracks over centuries.” Option A might seem true, given the harshness of New Hampshire winters, but the passage is clear that “centuries of weathering and temperature extremes” (lines 54-55), were the cause, *not* the weight of ice and snow. Options B, D, and E are not mentioned in the passage.

**30. (F)** The hidden cave is mentioned in the fifth paragraph. An engineering study had shown that the rock formation consisted of five granite layers balanced atop one another. The paragraph concludes, “Surprisingly, the Old Man had balanced on its chin for many years.” One would not expect a rock formation balancing on its “chin” to remain in place for centuries, suggesting that the formation was not as stable as it appeared, which is Option F. The writer did not mention the cave to demonstrate how ice enlarges cracks (which is the subject of the next paragraph). Nor is the cave mentioned to explain why turnbuckles were installed (to close the cracks) or explain how the profile was formed (mentioned in the second paragraph). Option J contradicts information in the fifth paragraph.

**31. (A)** The importance of the Old Man as a symbol of New Hampshire, the Granite State, is discussed in the fourth paragraph. Lines 36-38 state, “Its [New Hampshire’s] people have always taken pride in their state’s rocky geography and their own strength and independence.” Option A, referring to the ruggedness of the land and people, restates that idea. None of the other options is supported by the passage. Option D might be attractive since the rock formation existed for centuries, but the passage is clear that it was not “well-balanced,” nor does it describe the state in those terms.

**32. (J)** The Old Man used to be at the top of Cannon Mountain (lines 14-15). The mountaintop is now a nondescript rock slope (lines 60-61), the word “nondescript” implying that no hint of the Old Man formation remains. The best answer is Option J, “Only random-looking rock formations remain.” There is no evidence in the passage to support Options F or G. Option H is incorrect because the museum was built at the base, not the top, of the mountain (lines 72-73). The proposed replica of the face was not implemented (lines 69-72), ruling out Option K.

► **Van Meegeren**

**33. (C)** The main theme of the passage is the career of Han van Meegeren. Options A and E are important details, but not main ideas. Option B is not mentioned at all. Option D is too broad; the passage is about Vermeer forgeries, not forgeries of Dutch paintings in general. Option C is best: “how a skilled art forger nearly got away with fraud.” It neatly sums up van Meegeren’s career, including his success and his downfall.



**34. (H)** This is an inference question. The correct answer is based on information in the passage but not directly stated. Van Meegeren’s beliefs about art critics are discussed in lines 3-9. Option F might sound promising, but it does not answer the question. The question asks about van Meegeren’s beliefs about art critics, not art critics’ opinions of the artistic merit of Vermeer’s paintings. Option G is incorrect; the critics did not seem worried about art forgery. Option H is best supported by the passage. Van Meegeren was angered by the critics’ rejection of his work, believing that they did not appreciate his talent. Option J is appealing at first, but the passage never compared the quality of van Meegeren’s fakes with real Vermeers. Option K cannot be true because the art critics considered Vermeer, a Dutch artist, to be a great master painter.

**35. (E)** Read each option before deciding which is best supported by the passage. Options A and B are false, since Vermeer was considered a master painter before van Meegeren’s hoax, and there was never any doubt of Vermeer’s existence. Options C and D are true about van Meegeren, not Vermeer. The passage suggests that Vermeer may have created paintings that have since been lost (line 13), which is Option E.

**36. (K)** The question asks you to compare van Meegeren with other art forgers. Option F was not discussed in the passage. Option G misstates the information in lines 18-20. Van Meegeren was eventually prosecuted for forgery, ruling out Option H. He profited from his forgeries (Option J), but that did not distinguish him from other art forgers. Option K is best. According to the passage, van Meegeren created a series of paintings that mimicked Vermeer’s style without duplicating specific details (lines 24-26).

**37. (D)** Option A is ruled out because the chemical tests and x-rays were conducted *after* his admission, and they were conducted by Dutch, not German, investigators. Option B is a true statement but it does not answer the question. Art critics insisted that the fake Vermeer was authentic, ruling out Option C. Option D is correct because lines 52-54 say, “selling a national treasure to the enemy [was] a far more serious crime than art forgery.” Finally, Option E cannot be correct because the passage never states or hints that Vermeer himself was a forger.

**38. (F)** Carefully read the sentences surrounding the quoted word (lines 9-14). “Discovered” is in quotation marks because the discovery was part of the hoax. Option F best restates that idea. Vermeer was already

considered a great artist, ruling out Options G and J, and Vermeer lived in the seventeenth century, long before van Meegeren’s lifetime, eliminating Option H. Option K doesn’t answer the question.

► **Pueblo**

**39. (D)** Option A cannot be the theme of the reading passage because only the first paragraph discusses how weather conditions affect tree growth. Option B, Indian cultures, is too broad to be the theme of the passage, which focuses on Pueblo and Hopi villages. The reason for the abandonment of the Pueblo villages (Option C) is mentioned only in the last paragraph, so it is not the theme of the entire passage. Option D, “how tree-ring dating can establish the age of archaeological findings,” offers a good summary of the entire passage, which explains the science of tree-ring dating, followed by several examples. Option E cannot be correct. The passage does not mention any other dating methods, nor does it claim that tree-ring dating is the best method for determining dates.

**40. (K)** The “key” beam is discussed in lines 47-55. This question requires you to understand the established chronology (line 50) and “floating” chronology (line 53) and to draw an inference about the “key” beam, based on information in the passage. Option F is a true statement, but it does not explain the importance of the “key” beam. The passage does not mention earlier theories about the abandonment of the villages, or why they had been built at certain times or at particular locations, ruling out Options G, H, and J. Option K is correct. The “key” beam, with its overlapping ring patterns of the established and “floating” chronologies, allowed archaeologists to connect the two chronologies.

**41. (B)** The two trees in the question share an identical pattern of a very wide band followed by two narrow bands, showing that both trees were alive during that three-year period, although they were planted and cut at different times. Options A and B can be evaluated by assigning arbitrary years to the three shaded rings—for example, 10, 11, and 12. (It does not matter what numbers you choose, as long as they are used consistently.) Counting out from the shaded rings, Log 1 was cut in the year 16, while Log 2 was cut in the year 13. Thus, Log 2 was cut before Log 1 (Option B). Option C contradicts the reasoning behind tree-ring dating and cannot be correct.

There is no way to determine which log came from the faster-growing tree, since the trees were different ages and cut at different times, ruling out Options D and E.

**42. (G)** This inference question requires you to choose the correct answer based on information that is not directly stated. Evaluate each option to determine whether tree-ring dating would be useful for that purpose. The passage gives no information whether types of trees can be identified using tree-ring dating, so Option F is not correct. Lines 10-12 indicate that “tracking the historical sequence of weather cycles in a region” (Option G) is both possible and useful using tree-ring dating. Lines 62-65 also support Option G. Read the remaining options to make sure that Option G is the best answer. The reasons why Indians lived in specific areas, or why they built their villages, cannot be answered by tree-ring dating, ruling out Options H and K. Comparing growing seasons around the world is not possible (Option J), since only one part of the world, the southwestern United States, is discussed with relation to tree-ring dating.

**43. (A)** The quotation is from lines 45-46, but we must refer to several parts of the passage to answer the question. The second paragraph states that archaeologists had established a continuous tree-ring chronology going back to A.D. 1260, based on ring patterns of trees with overlapping lifetimes (the “established” chronology). The third paragraph, where the quotation appears, describes the development of a “floating” chronology that indicated which logs were older and which were more recent, but did not overlap the established chronology. The fact that they did not overlap implies that the floating chronology preceded the established chronology, which is Option A. Option B cannot be true because the logs used in Oraibi went as far back as A.D. 1260, but no further. The remaining options do not explain the archaeologists’ conclusion.

**44. (H)** The abandonment of the Pueblo villages is mentioned in lines 24-25 and line 36, but only in the context of determining when the villages were occupied. The reason for their abandonment is not brought up until the last paragraph, which suggests that the villagers left their homes to find a more hospitable climate (lines 63-65). This is restated in Option H, the correct answer. Options F, G, J, and K might sound reasonable, but there is no evidence in the passage that suggests they are true.

### ► Foams

**45. (E)** Options A and C are important details, but they are not the main themes of the passage. Option B is not discussed, and Option D does not make sense—the terms “surfactants” and “foaming agents” are synonymous. Option E is the best answer. “How aqueous foams are formed, and some of their uses” provides a good summary of the passage from beginning to end.

**46. (H)** The characteristic life cycle of an aqueous foam is outlined in the third paragraph. The foam disappears when “outside forces—usually evaporation or vibration” cause the bubbles to collapse (lines 36-39). Check the options to see which one best describes such a situation. The only option that involves movement, which causes vibration, is Option H. The other options describe stationary situations.

**47. (B)** The role of the surfactant in the formation of aqueous foam is discussed in the second paragraph. Surfactants are necessary to stabilize an aqueous foam. They work by lowering the surface tension of a liquid (lines 19-21), which is Option B. Option A is not mentioned in the passage (although dispersal of a gas in the liquid is an important point). Options C and D are stages in the life cycle of a foam, not the results of a surfactant. Option E might look appealing because it refers to the formation of foam, but it incorrectly states that soap, a surfactant, is converted into foam.

**48. (F)** The “life cycle” of aqueous foam is outlined in the third paragraph. A “young” foam occurs early in the life cycle, in which foam is characterized by “spherical bubbles of nearly uniform size, each with a relatively thick outer film of liquid” (lines 30-32). Only Option F, “spherical bubbles,” is characteristic of a “young” foam. Options G, H, and J are characteristics of later stages. Option K is not part of the foam life cycle.

**49. (A)** The use of foam-based extinguishers to put out oil or gasoline fires is described in the fourth paragraph. The paragraph concludes, “these extinguishers have the advantage of minimizing the extensive water damage caused by more traditional fire-fighting methods.” Option A restates this information.

**50. (F)** Read all five options to choose the one that is **not** an ingredient of dishpan suds. Dishpan suds are mentioned as one of several examples of soap foams in lines 40-41. The second paragraph explains that soap foams consist of soap (Option H), which is a surfactant (Option K), added to an aqueous foam formed of water (Option G) and air (Option J). Option F, “protein,” is an ingredient of whipped cream and marshmallows (lines 42-44), but not of dishpan suds.



- 51. (B)** Convert the mixed number 3.6 to its fractional equivalent,  $3\frac{6}{10}$ . Then change it to an improper fraction, which is  $\frac{36}{10}$ . When dividing by a fraction, multiply the dividend by the reciprocal of the divisor.

$$\left(\frac{36}{10}\right)\left(\frac{3}{2}\right) = \frac{(36)(3)}{(10)(2)} = \frac{54}{10} = 5\frac{4}{10} = 5.4$$

- 52. (G)**  $-2x(3y - 4z) = (-2x)(3y) - (-2x)(4z)$   
 $= -6xy + 8xz$

- 53. (A)** If Maria is 16 now, in 6 years she will be 22. Since she will then (in 6 years) be twice as old as her brother, he will be 11 (in 6 years). To find his present age, subtract 6 from 11. Thus, he is now 5 years old.

- 54. (H)** Method I: 6.44 rounds to 6.4 because the digit in the hundredths place (4) is less than 5. 6.46 rounds to 6.5 because the digit in the hundredths place (6) is 5 or greater.

$$6.4 + 6.5 = 12.9$$

Method II: Both 6.44 and 6.46 round to 6 because the number in the tenths place (4) is less than 5 for each of them.

$$6 + 6 = 12$$

To calculate by how much the results from Method I are greater than the results for Method II, you subtract:

$$12.9 - 12 = 0.9$$

- 55. (E)** In these types of questions, it is sometimes easiest to assign values to the variables to test each possibility. We know that M and T are both odd, and M is a multiple of T. So, let's assign  $T = 3$  and  $M = 5 \cdot T = 15$ .

Option A says "M + T is odd."  $15 + 3 = 18$ , which is even, so A is not true.

Option B says "MT is even."  $15 \times 3 = 45$ , which is odd, so B is not true.

Option C says "M - T is odd."  $15 - 3 = 12$ , which is even, so C is not true.

Option D says "M ÷ T is even," and Option E says "M ÷ T is odd." Because these statements are opposites, one of them must be true.  $15 \div 3 = 5$ , which is odd, so E is the correct answer.

As a shortcut, because options D and E are both division with opposite results, and only one can be true, you could test only these two options to determine which is correct.

- 56. (F)** To solve this, let  $x$  = the number of inches between the towns on the map.

First, set up a proportion, and then solve for  $x$ :

$$\frac{x \text{ inches}}{m \text{ miles}} = \frac{1 \text{ inch}}{10 \text{ miles}}$$

$$\frac{x}{m} = \frac{1}{10}$$

$$x = m \cdot \frac{1}{10} = \frac{m}{10}$$

- 57. (E)** We know that  $\frac{1}{3}$  of the 1,650 voters were born between 1950 and 1979, inclusive; therefore,  $\frac{2}{3}$  of the voters were born either before 1950 or after 1979.

$$\frac{2}{3} \times 1,650 = 1,100$$

Alternatively, you could calculate the number of voters who were born between 1950 and 1979, inclusive, and then subtract that number from the total:

$$\frac{1}{3} \times 1,650 = 550$$

$$1,650 - 550 = 1,100$$



- 58. (J)** The first letter in the code could be any of the 5 letter choices. Then the second letter in the code could be any of the 4 remaining choices. The third letter of the code could be any of the 3 remaining choices, and so on. The number of different codes Tien can make is:

$$5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$$

- 59. (D)** The question states that  $PQ = 9$  cm, so we know  $x = 9$ . We can use that information to calculate the length of  $QR$ .

$$QR = \frac{2}{3}x = \frac{2}{3} \cdot 9 = 6 \text{ centimeters}$$

Add  $PQ$  and  $QR$  to get the length of  $PR$ .

$$PQ + QR = 9 + 6 = 15 \text{ centimeters}$$

- 60. (H)** First, read the column headings to find the relevant one, "Spending per Student." To calculate the median spending per student, put the values in this column in order from least to greatest:

\$7,600, \$7,600, \$8,000, \$8,400, \$10,000, \$11,200

The median is the number at the exact center of a set of values. Since there are an even number of values in the above set, find the middle two values and calculate the mean of those to get the median of the set:

$$(\$8,000 + \$8,400) \div 2 = \$8,200$$

- 61. (A)** First, round 1.095 to the nearest tenth, resulting in a value of 1.1. The question asks how much greater this rounded number is than 1.095, so you need to subtract:

$$1.1 - 1.095 = 0.005$$

- 62. (G)** First, round the elevation of each continent to the nearest thousand feet, and then, because the mode is the most frequently occurring value, look for the elevation that appears most often.

**After rounding:**

North America = 2,000

South America = 2,000

Europe = 1,000

Asia = 3,000

Africa = 2,000

Oceania = 1,000

Antarctica = 6,000

The elevation 2,000 is listed most frequently (3 times), so the mode is 2,000 feet.

- 63. (C)** The original 24-ft board is cut in half, resulting in two 12-ft pieces.

One of those 12-ft pieces is cut in half again, resulting in two 6-ft pieces.

One of the 6-ft pieces is cut into thirds, resulting in three 2-ft pieces.

The length of the longest piece is 12 feet, and the length of one of the shortest pieces is 2 feet. The difference is  $12 - 2 = 10$  feet.

- 64. (F)** Each number in the sequence is the difference between the two previous numbers. For example,  $12 - 10 = 2$ , so 2 is the third term.

To find the seventh term, subtract the sixth term from the fifth term:

$$^{-}6 - 14 = ^{-}20$$

- 65. (D)**  $|\frac{1}{16}| \cdot |16| + |^{-}16| + |16|$

$$= \left(\frac{1}{16} \cdot 16\right) + 16 + 16$$

$$= 1 + 16 + 16$$

$$= 33$$

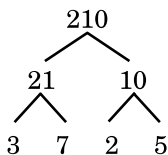
66. (J) Bettina's height is given as 140 cm. Let her sister's height be  $x$ . Set up a proportion to calculate the sister's height, and solve for  $x$ :

$$\begin{aligned}\frac{7}{6} &= \frac{140}{x} \\ 7x &= 140(6) \\ 7x &= 840 \\ x &= 120 \text{ cm}\end{aligned}$$

The question asks "how much taller is Bettina than her sister?" Subtract to find the answer:

$$140 - 120 = 20 \text{ cm}$$

67. (B) Factorize 210 into its prime factors:



The greatest prime factor is 7.

68. (J) Because point T is at the center of the circle and point U is on the circle, TU must be a radius ( $r$ ) of the circle. We know the circumference of the circle is  $8\pi$  cm. Therefore, we can use the formula for the circumference of a circle to calculate the length of TU.

$$\begin{aligned}\text{Circumference} &= 2\pi r \\ 8\pi \text{ cm} &= 2\pi r \text{ cm} \\ 4 \text{ cm} &= r\end{aligned}$$

$$\text{Thus, } TU = 4 \text{ cm.}$$

The formula for the area of a rectangle is length times width. The length of the rectangle (12 cm) is given in the diagram, and the width of the rectangle is TU (4 cm).

$$\text{Area} = (12 \text{ cm}) \times (4 \text{ cm}) = 48 \text{ sq cm}$$

69. (D) To find the greatest common factor, determine the prime factorization of each number first:

$$\begin{aligned}459 &= 9 \times 51 \\ &= 3 \times 3 \times 3 \times 17\end{aligned}$$

$$\begin{aligned}567 &= 9 \times 63 \\ &= 9 \times 9 \times 7 \\ &= 3 \times 3 \times 3 \times 3 \times 7\end{aligned}$$

Because  $3 \times 3 \times 3$ , or 27, is the largest number that divides evenly into both 459 and 567, 27 is their greatest common factor.

70. (G) Answer this question by evaluating each statement:

In order for two shapes to be **congruent**, they need to have the same angle measures and the same side lengths. Option F says "all equilateral triangles are congruent." All equilateral triangles have the same angle measures ( $60^\circ$  for each angle), but the side lengths could be different (e.g., triangle A could have side lengths of 3 cm and triangle B could have side lengths of 7 cm). Thus, Option F is false.

By applying the same logic, Option H ("all rectangles are congruent") and Option K ("all squares are congruent") are also false. All rectangles and squares have the same angle measures ( $90^\circ$  for each angle), but the side lengths could be different from one shape to the other.

Two shapes are **similar** when they have the same angle measures and the lengths of the corresponding sides of the two shapes are proportional. Option J is false because it is possible to have two rectangles whose side lengths are not proportional.

Option G ("all equilateral triangles are similar") is the only true statement. All sides of an equilateral triangle are the same length. So, the sides of two equilateral triangles would be proportional.

71. (B) A linear relationship (or function) means that a change in temperature is proportional to a change in the number of cups sold. So, we can start with the proportion showing the relationship between the change in the number of cups sold ( $440 - 200$ ) and the change in the corresponding temperatures ( $50 - 70$ ):

$$\frac{440 - 200}{50 - 70} = \frac{240}{-20} = -12$$

Thus, for every degree the temperature rises, the vendor can plan to sell 12 fewer hot drinks.

When the temperature was  $50^\circ$ , the vendor sold 440 hot drinks. When the temperature rises by  $5^\circ$  to  $55^\circ$ , he can expect to sell  $5 \times 12 = 60$  fewer drinks than when the temperature was  $50^\circ$ . Subtract to find the total number of cups he can expect to sell at  $55^\circ$ :  $440 - 60 = 380$  cups.



- 72. (K)** The first time the bamboo blooms after 1820 is 1824 ( $1807 + 17$ ). Keep adding 17 to your answer until you get to the year 2011:  
1824, 1841, 1858, 1875, 1892, 1909, 1926, 1943, 1960, 1977, 1994, 2011

The answer is 12.

A quicker way to solve this is to find the first year the bamboo blooms within the given range of years (1824). Subtract that year from the final year (2011), and divide by 17 (the number of years between blooms):

$$\frac{2011 - 1824}{17} = 11 \text{ and } 11 + 1 = 12$$

Remember to add 1 to get 12 because both end points (1824 and 2011) need to be counted.

- 73. (E)** In this kind of problem, first simplify the numerator and the denominator separately, and then reduce the fraction to lowest terms.

Numerator:

$$(-1)^2 + (-2)^3 + (-3)^4 = (1) + (-8) + (81) = 74$$

Denominator:

$$(-1)^4 + (-2)^3 + (-3)^2 = (1) + (-8) + (9) = 2$$

Now you can reduce the fraction:

$$\frac{74}{2} = 37$$

- 74. (G)** If 70% to 80% of students own a cell phone, then 20% to 30% do **not** own a cell phone. Since we are looking for the maximum number of students who do **not** own a cell phone, calculate 30% of 900:

$$900 \times 30\% = 270 \text{ students}$$

- 75. (C)** Now:  
Seung's age =  $y$   
Jackson's age = 3 years older than Seung =  $3 + y$

Eight years ago:

$$\text{Jackson's age} = (3 + y) - 8 = y - 5$$

- 76. (G)** To find the midpoint of a line segment, add the two endpoints together and then divide the sum by two:

$$\frac{\frac{2}{5} + -2}{2} = \frac{\frac{2}{5} - \frac{10}{5}}{2} = \frac{-\frac{8}{5}}{2} = -\frac{4}{5}$$

- 77. (B)** We are given the total number of coins (48). If the number of dimes is  $x$ , then the number of nickels is  $48 - x$ . A dime is represented as \$0.10, and a nickel as \$0.05. Now we can set up the problem:

$$\$0.10x + \$0.05(48 - x) = \$3.90$$

$$\$0.10x + \$2.40 - \$0.05x = \$3.90$$

$$\$0.05x = \$1.50$$

$$x = 30$$

Thus, there are 30 dimes and 18 nickels ( $48 - 30$ ).

The question asks "how many more dimes than nickels?" Subtract to find the answer:

$$30 - 18 = 12$$

- 78. (K)** Because we know that the side of the square is equal in length to the diameter of the circle, we can set the value for both the side of the square and diameter of the circle to  $x$ .

$$\text{Perimeter of the square} = 4 \times \text{side length} = 4x$$

$$\text{Circumference of the circle} = \text{diameter} \times \pi = x\pi$$

Use these values to determine the ratio of the perimeter of the square to the circumference of the circle:

$$\frac{4x}{x\pi} = \frac{4}{\pi}$$

- 79. (B)** To calculate the fraction, divide the down payment by the sale price:

$$\frac{\$400}{\$5,000} = \frac{4}{50} = \frac{8}{100} = 0.08$$



- 80. (J)** First, calculate the volume of the stack using the formula length  $\times$  width  $\times$  height:

$$5 \text{ in.} \times 10 \text{ in.} \times 20 \text{ in.} = 1,000 \text{ cubic inches}$$

To determine the weight of the stack, multiply the number of cubic inches by the weight per cubic inch:

$$1,000 \times 0.035 = 35 \text{ ounces}$$

Notice that the number of sheets of plastic is given (50), but is not relevant to the solution.

- 81. (B)** First, calculate the area of the circular region using the given radius of 3 feet:

$$\begin{aligned} \text{Area} &= \pi r^2 = (3)^2 \pi = 9\pi = 9(3.14) \\ &= 28.26 \text{ square feet} \end{aligned}$$

Notice that  $\pi$  was rounded to 3.14 because the question asks for an approximation.

Subtract the area that the paint can cover (25 sq ft) from the area of the region to get the answer:

$$28.26 - 25 = 3.26 = 3.3 \text{ sq ft}$$

- 82. (H)** Let  $x$  = Gloria's sales for this period. Set up an equation using her commission for this period (\$12,000) and the commission rate (15%):

$$\$12,000 = 0.15x$$

$$\frac{\$12,000}{0.15} = x$$

$$\$80,000 = x$$

- 83. (A)** The solution to this problem requires finding the pattern. The pattern for  $x$  is easy: the numbers in  $x$  always change by 1. The pattern for  $y$  is tougher to see. Since  $y$  is a sum of two terms (an  $a$  term and a negative  $b$  term), we can determine the pattern for each of these terms individually, as follows:

term	term
$-a$	$-\frac{b}{2}$
0	$-\frac{b}{3}$
$a$	$-\frac{b}{4}$
$2a$	$-\frac{b}{5}$
The $a$ term changes by adding $a$ to the previous value.	The $b$ term changes by increasing the denominator by 1.

We want to know the value of  $y$  when  $x = 0$ , so we need to find the value of  $y$  that comes **before** the first  $y$  ( $-a - \frac{b}{2}$ ) in the table. To do this, we subtract  $a$  from the  $a$  term and subtract 1 from the denominator of the  $b$  term in the first  $y$ . Thus, when  $x = 0$ ,  $y = (-a - a) - \frac{b}{2-1} = -2a - b$

- 84. (K)** Daquan sold  $x$  hot dogs. Let  $c$  represent the number of hot dogs that Caitlyn sold:

$$\begin{aligned} c + x &= 5x - 2 \\ c &= 4x - 2 \end{aligned}$$

- 85. (B)** For a house that sells for \$199,000, the real estate agent charges a commission of 3%.

$$\$199,000(0.03) = \$5,970$$

For a house that sells for \$201,000, the real estate agent charges a commission of 2.5%.

$$\$201,000(0.025) = \$5,025$$

Subtract to find how much more the agent makes on the \$199,000 sale:

$$\$5,970 - \$5,025 = \$945$$



- 86. (J)** From the given equation,  $r$  must be a multiple of 3, 4, and 10. To find the least possible value of  $r$ , find the least common multiple of 3, 4, and 10.

All multiples of 10 must end in zero (10, 20, ...), so we just need to look at the multiples of 3 and 4 that also end in zero:

Multiples of 3: 30, 60, 90, ...  
Multiples of 4: 20, 40, 60, 80, ...

Since 60 is the first multiple that appears in both lists above, 60 is the least common multiple of 3, 4, and 10. Thus, the least possible value of  $r$  is 60.

- 87. (C)** To solve this problem, find the number of multiples of 2 between 4 and 81. Then, find the number of multiples of 7 between 4 and 81:

**Multiples of 2** (4, 6, 8, ..., 80):

$$\frac{80 - 4}{2} = 38, \text{ but we need to add 1 because}$$

both ends are counted, so  $38 + 1 = 39$

**Multiples of 7** (7, 14, 21, 28, ..., 77):

$$\frac{81 - 4}{7} = 11$$

Next, we need to determine how many of the multiples of 7 are even, because they will have been counted twice (once in the list of the multiples of 2 and again in the list of the multiples of 7). The multiples of 7 alternate odd and even, which means approximately half of them are odd and half are even. (Because there are 11 values, 6 must be either even or odd, and 5 must be the other.) The first and last multiple of 7 in this case are both odd, so that means 6 are odd and 5 are even (i.e., multiples of 2).

To find the total number of integers that are multiples of 2, multiples of 7, or both, add the count of the multiples of 2 and the multiples of 7, and subtract the number of integers that appear in both lists:

$$\begin{aligned} &(\text{multiples of 2}) + (\text{multiples of 7}) - (\text{both}) \\ &= 39 + 11 - 5 \\ &= 45 \end{aligned}$$

- 88. (K)** Solve for  $s$ :

$$\frac{3t - s}{4} = 8s$$

$$3t - s = 32s$$

$$3t = 33s$$

$$\frac{t}{11} = s$$

- 89. (A)** The values of  $r$  and  $s$  are not known, but the information given ( $r \neq s$  and  $r \neq -s$ ) rules out the possibility that the denominator of either fraction could be zero, which would result in an undefined expression. Simplify the expression by canceling out  $r + s$  and  $r - s$ . Only  $rs$  remains.

- 90. (H)** Complete the calculations for the quantity under the square root sign:

$$\sqrt{6^2 + 7^2}$$

$$\sqrt{36 + 49}$$

$$\sqrt{85}$$

85 falls between the squares of 9 and 10, which are 81 and 100, respectively.

$$81 < 85 < 100$$

$$9^2 < 85 < 10^2$$

- 91. (D)** Use the formula for the area of a triangle to solve for BE:

$$\text{Area} = \frac{1}{2} (\text{base}) (\text{height})$$

$$25 = \frac{1}{2} (5) (\text{BE})$$

$$25 = 2.5 (\text{BE})$$

$$10 = \text{BE}$$

The area of a parallelogram is base  $\times$  height. The base of ABCD is 50 cm. BE is perpendicular to AED, so the height of the parallelogram is 10 cm.

$$\text{Area} = (50 \text{ cm})(10 \text{ cm})$$

$$\text{Area} = 500 \text{ sq cm}$$

92. (J) Since there are 60 minutes in 1 hour, multiply 2.35 by 60 to convert it to minutes:

$$2.35 \times 60 = 141 \text{ minutes}$$

93. (E) Because we know that 100% of the group indicated whether or not they were in favor of Proposition A, Proposition B, or both, we can add the percentages given in the question:

$$\begin{aligned} 65\% \text{ (in favor of Proposition A)} + 72\% \text{ (in favor of} \\ \text{Proposition B)} + 3\% \text{ (in favor of neither)} \\ = 140\% \text{ total} \end{aligned}$$

The amount over 100% is the percentage of people who indicated they were in favor of both Proposition A and Proposition B and were therefore counted twice. So, the answer is  $140\% - 100\% = 40\%$ .

94. (G) For any one triangular face of the pyramid, we know the base (8 cm) and height (6 cm).

$$\begin{aligned} \text{Area of one triangle} &= \frac{1}{2} \times \text{base} \times \text{height} \\ &= \frac{1}{2} \times (8 \text{ cm}) \times (6 \text{ cm}) \\ &= 24 \text{ sq cm} \end{aligned}$$

All four of the triangular faces have the same area, so the total surface area of the pyramid is:

$$4 \times 24 = 96 \text{ sq cm}$$

95. (D) The distance from A to B is  $\frac{1}{6}$  of a revolution. The arrow will point to B for the eleventh time after  $10\frac{1}{6}$  revolutions. The rate of the arrow is:

$$5 \frac{\text{rev}}{\text{min}} = 5 \frac{\text{rev}}{\text{min}} \times \frac{1 \text{ min}}{60 \text{ sec}} = \frac{1 \text{ rev}}{12 \text{ sec}}$$

Use the formula for rate  $\times$  time = distance. Let  $x$  represent the number of seconds.

$$\begin{aligned} x \text{ sec} \left( \frac{1 \text{ rev}}{12 \text{ sec}} \right) &= 10\frac{1}{6} \text{ revolutions} \\ \frac{x}{12} &= \frac{61}{6} \\ x &= \frac{(61)(12)}{6} = (61)(2) \\ &= 122 \text{ sec} \end{aligned}$$

96. (F) First, combine like terms, and then solve for  $k$ :

$$\begin{aligned} (3m + 2n) - (2m - 3n) + k &= 0 \\ 3m + 2n - 2m + 3n + k &= 0 \\ m + 5n + k &= 0 \\ k &= -m - 5n \end{aligned}$$

97. (D) Each even digit in the right column is twice the position (left column) minus 2.

$$\text{For example, in position 1: } 2(1) - 2 = 0$$

$$\text{In position 2: } 2(2) - 2 = 2$$

$$\text{In position 3: } 2(3) - 2 = 4$$

$$\text{So, for position 500: } 2(500) - 2 = 1,000 - 2 = 998$$

98. (G) The answers are given in cubic yards, so the dimensions of the foam must be calculated in yards. The width and length of the rectangular region are 10 yards and 50 yards, respectively. The depth (height) of the foam over the rectangular region is 9 inches, which is  $\frac{1}{4}$  yard (1 yard = 36 inches).

$$\begin{aligned} \text{Volume} &= (\text{length})(\text{width})(\text{height}) \\ &= (50)(10)\frac{1}{4} \\ &= \frac{500}{4} \text{ cu yd} \\ &= 125 \text{ cu yd} \end{aligned}$$

99. (D) Whole numbers are the “counting” numbers: 1, 2, 3, 4, etc. Test each value of  $x$  in the given expression:

$$x = 5 \quad \frac{5 + 7}{5 - 7} = \frac{12}{-2} = -6$$

This **cannot** be a value of  $x$  because  $-6$  is not a whole number.

$$x = 6 \quad \frac{6 + 7}{6 - 7} = \frac{13}{-1} = -13$$

This **cannot** be a value of  $x$  because  $-13$  is not a whole number.

$$x = 7 \quad \frac{7 + 7}{7 - 7} = \frac{14}{0} = \text{undefined}$$

This **cannot** be a value of  $x$  because the expression is undefined.

$$x = 8 \quad \frac{8 + 7}{8 - 7} = \frac{15}{1} = 15$$

This **can** be a value of  $x$  because 15 is a whole number.

$$x = 9 \quad \frac{9 + 7}{9 - 7} = \frac{16}{2} = 8$$

This **can** be a value of  $x$  because 8 is a whole number.

The question asks how many of the listed numbers **cannot** be a value of  $x$ , so the answer is 3.

100. (J) The range is the difference between the highest score and the lowest score.

First, calculate the highest score for each section. Use the sum of the lowest score and the range to get the highest score.

$$\text{Section I: } 65 + 28 = 93$$

$$\text{Section II: } 62 + 25 = 87$$

$$\text{Section III: } 67 + 22 = 89$$

To find the **overall** range of all the scores, take the highest of all the scores (93) and subtract the lowest of all the scores (62). The answer is 31.

### Answer Key for Sample Form B

Paragraph 1 T Q U R S	11. C	21. A	31. A	41. B	51. B	61. A	71. B	81. B	91. D
Paragraph 2 R Q T U S	12. J	22. G	32. J	42. G	52. G	62. G	72. K	82. H	92. J
Paragraph 3 S R U Q T	13. C	23. E	33. C	43. A	53. A	63. C	73. E	83. A	93. E
Paragraph 4 T R U Q S	14. J	24. G	34. H	44. H	54. H	64. F	74. G	84. K	94. G
Paragraph 5 U Q S R T	15. B	25. E	35. E	45. E	55. E	65. D	75. C	85. B	95. D
	16. F	26. H	36. K	46. H	56. F	66. J	76. G	86. J	96. F
	17. E	27. E	37. D	47. B	57. E	67. B	77. B	87. C	97. D
	18. K	28. G	38. F	48. F	58. J	68. J	78. K	88. K	98. G
	19. E	29. C	39. D	49. A	59. D	69. D	79. B	89. A	99. D
	20. F	30. F	40. K	50. F	60. H	70. G	80. J	90. H	100. J