



# CBEST

## Comprehensive Success System



Don't Go Into Your  
CBEST Test Unprepared

# **CBEST®**

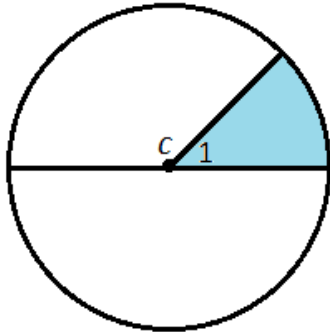
## **“Comprehensive Success System”**

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- 34.) Below is a circle with center  $C$ . If the shaded portion accounts for 15% of the circles total area, what is the measure of angle 1?

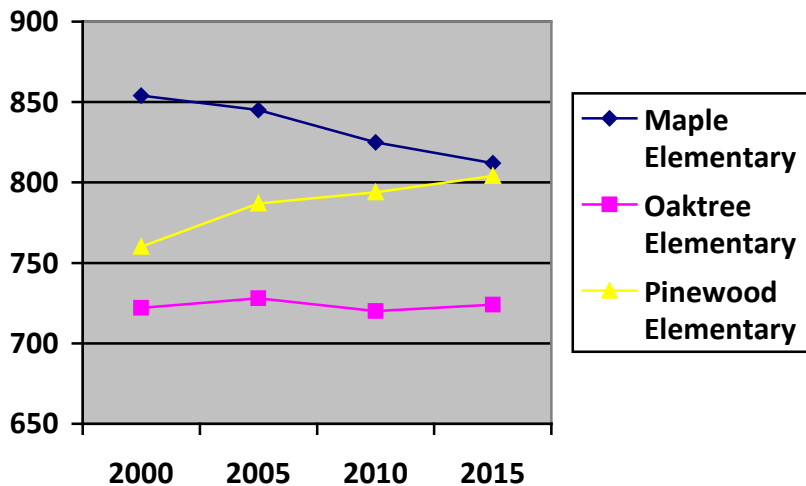


- a)  $15^\circ$   
b)  $24^\circ$   
c)  $25^\circ$   
d)  $45^\circ$   
e)  $54^\circ$
- 35.) A cylindrical container has a height of 20 cm and a base with a radius of 4 cm. What is the volume of the container?
- a)  $80\pi \text{ cm}^3$   
b)  $160\pi \text{ cm}^3$   
c)  $240\pi \text{ cm}^3$   
d)  $320\pi \text{ cm}^3$   
e)  $400\pi \text{ cm}^3$
- 36.) A group of students received the following scores on their most recent math test: 80, 76, 80, 84, 92, 68. Which of the following pairs of measures of variability for this set are equal to one another?

- I. Mean
- II. Median
- III. Range
- IV. Mode

- a) I and II only
- b) I and IV only
- c) I, II, and IV only
- d) III, and IV only
- e) I, II, III, and IV

Questions 37 and 38 refer to the graph below, which shows the total student population of three elementary schools between 2000 and 2015.



- 37.) In which year was Pinewood Elementary’s population closest to the mean population of the three schools combined?
- a) 2000
  - b) 2005
  - c) 2010

- d) 2015
  - e) This cannot be determined from the information given.
- 38.) Based on the trends shown in the graph, which of these predictions about the year 2020 is mostly likely to prove accurate?
- a) The population of Oaktree Elementary will have decreased.
  - b) The population gap between Maple Elementary and Oaktree Elementary will widen.
  - c) The population of Oaktree Elementary will surpass the population of Maplewood Elementary
  - d) Pinewood Elementary will have the highest student population.
  - e) Students from Maple Elementary will transfer to Pinewood Elementary.
- 39.) The height of one pole is 3 feet 4 inches. The height of a second pole is 4 feet 9 inches, and the height of a third pole is 5 feet 5 inches. What is the total combined height of all three poles?
- a) 12 feet 8 inches
  - b) 13 feet 5 inches
  - c) 13 feet 6 inches
  - d) 14 feet 9 inches
  - e) 15 feet 4 inches
- 40.) Kim's test scores revealed that she scored in the 92<sup>nd</sup> percentile. What does this mean?
- a) She answered 92 out of 100 questions correctly.
  - b) 8% of the other test takers scored worse than she did.
  - c) 92 test takers scored as well as she did.

- d) She scored as well as, or better than, 92% of the other test takers.
- e) She answered 8% of the questions wrong.

Questions 41 and 42 are based on the scenario below:

A marble is chosen at random from a bag that contains 40 marbles of different colors. There are:

- 13 red marbles
- 10 blue marbles
- 8 green marbles
- 5 orange marbles
- 4 yellow marbles

41.) What is the probability that an orange marble will be chosen?

a)  $\frac{1}{5}$

b)  $\frac{1}{7}$

c)  $\frac{1}{8}$

d)  $\frac{3}{10}$

e)  $\frac{11}{40}$

42.) After the orange marble is drawn, it is not replaced. A second marble is pulled from the same bag. What is the probability that this marble is red?

a)  $\frac{13}{40}$

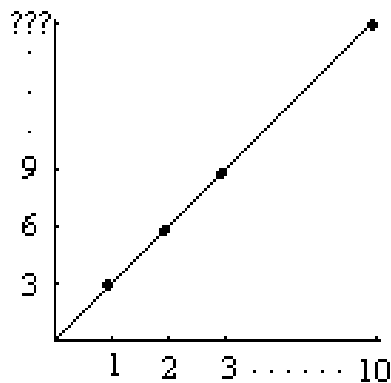
b)  $\frac{1}{3}$

- c)  $\frac{7}{20}$
- d)  $\frac{13}{38}$
- e)  $\frac{9}{20}$

43.) A local newspaper sold 120,000 last month. This month, it sold 150,000 copies. What was the percentage change from last month to this month?

- a) 20%
- b) 25%
- c) 30%
- d) 60%
- e) 80%

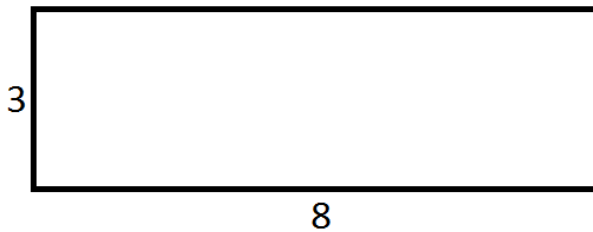
44.) Use the following information to answer the question below.  
(Note: graph is NOT drawn to scale)



What number on the y-axis would correspond to the x-coordinate of 10 on the straight line shown in the graph?

- a) 20
- b) 40
- c) 25

- d) 30  
e) 35
- 45.) A restaurant serves dinner every day of the week. This week, the restaurant served 62 customers at dinner on Monday, 74 on Tuesday, 70 on Wednesday, 73 on Thursday, 99 on Friday, and 98 on Saturday. If the average number of customers each night of the week was 80, how many customers were served dinner on Sunday?
- a) 78  
b) 80  
c) 84  
d) 85  
e) 90
- 46.) The rectangle below is one face of a rectangular prism whose depth is 4 units.



What is the surface area of the prism?

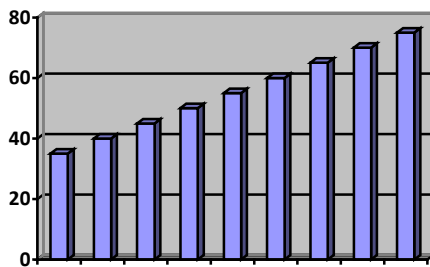
- a) 24 units<sup>2</sup>  
b) 60 units<sup>2</sup>  
c) 68 units<sup>2</sup>  
d) 96 units<sup>2</sup>  
e) 136 units<sup>2</sup>



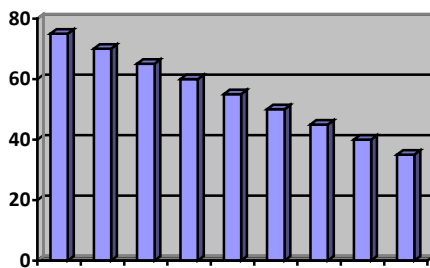
47.) Line segment A has endpoints at (5, 8) and (9, 4). The midpoint of this line segment is

- a) (4, -4)
- b) (4, 4)
- c) (14, 12)
- d) (7, 6)
- e) (-2, 2)

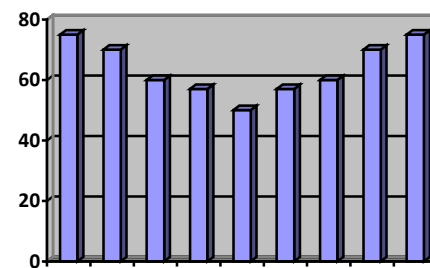
48.) Which of the graphs below best represents a normal distribution of data?



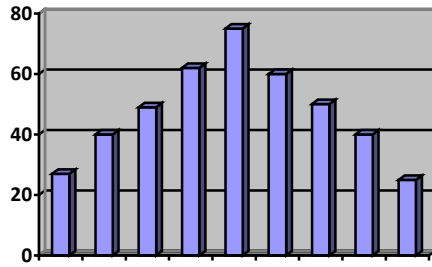
a)



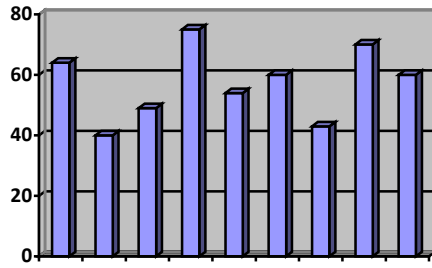
b)



c)



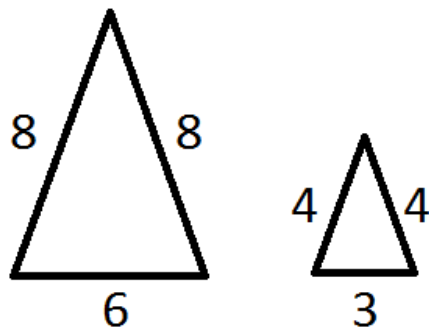
d)



e)

49.) One of the angles of a triangle measures  $90^\circ$ . Which of these sets could NOT be the lengths of the sides of the triangle?

- a) 3, 4, 5
- b) 5, 12, 13
- c) 6, 8, 10
- d) 8, 10, 14
- e) 10, 24, 26

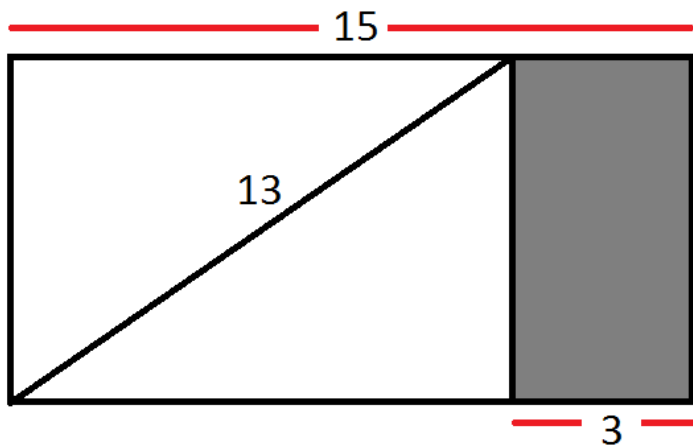


50.) The triangles pictured above are:  
I. Congruent

- II. Similar
- III. Isosceles
- IV. Scalene

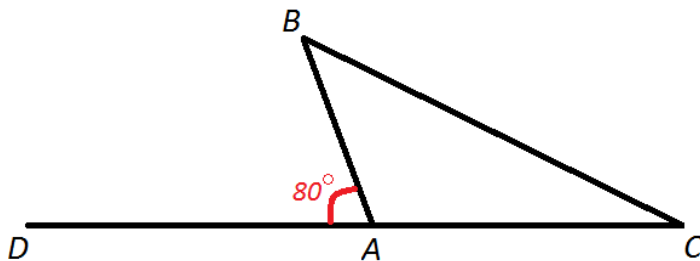
- a) I and III
- b) I and IV
- c) I, II, and III
- d) II and III
- e) II and IV

Questions 51 and 52 are based on the figure below. The outer corners of the figure each measure  $90^\circ$ . Figure is not drawn to scale.



- 51.) The perimeter of the shaded region in the figure above is
- a) 15 units
  - b) 16 units
  - c) 18 units
  - d) 26 units
  - e) 40 units
- 52.) The ratio of the area of the shaded region to the area of the entire figure is

- a) 1:5  
b) 1:4  
c) 2:5  
d) 3:5  
e) 5:1
- 53.) Employees at the retail store where Julia works must wear black bottoms—either pants or a skirt—and a button-down shirt that is solid white, teal, or red—the colors in the store’s logo. Assuming that she has one of each type of acceptable clothing item, how many different outfits could Julia wear to work?
- a) 4  
b) 5  
c) 6  
d) 7  
e) 8
- 54.) Which of the following statements about  $\triangle ABC$  must be true based on the diagram below? (Figure not drawn to scale)



- a) It is an isosceles triangle.  
b) Side BC is the hypotenuse of the triangle.  
c) It is an equilateral triangle.  
d) It is a scalene triangle.

e) It is an obtuse triangle.

55.) What is the probability of getting heads three times in a row in a fair coin toss?

a)  $\frac{1}{8}$

b)  $\frac{1}{2}$

c)  $\frac{1}{4}$

d)  $\frac{1}{6}$

e)  $\frac{3}{2}$

56.) The slope of a line with the equation  $2y + 3 = -4x - 9$  is

a) -6

b) -4

c) -2

d) 2

e) 4

Questions 57-61 refer to the following passage.

English is considered one of the most “living” languages in the world. It is constantly changing and evolving. Every year, new words and expressions make it into the most popular dictionaries. By some linguistic counts, there are twice as many words used commonly in English as there are in many of the modern European languages.

English speakers tend to embrace new words with good grace. Words that are first considered slang and only understood by a few often enter into the popular lexicon and are accepted eventually by the

majority. This is not always the case in other countries. France, in particular, has enacted laws that aim to halt the modernization of their language. They have not been that successful, however, and words like “email” and “I’hamburger” have crept into day-to-day usage.

Some attribute the expansion of the English language to the wide area where it is spoken. From North America to the United Kingdom to Australia, English is spoken in the four corners of the world and each region adds its own local mix. Even within the United States alone, there are considerable regional variations in the language.

There are people who claim that the elastic nature of the English language allows people to communicate with greater nuance than they would be able to in other tongues. Others complain that the fluid nature of the language makes it one of the hardest to learn.

57.) According to the passage, what makes a language “living?”

- a) It is still in modern use.
- b) It is understood all over the world.
- c) New words and expressions are frequently added.
- d) It contains regional dialects.
- e) Restrictions are put on new words entering the language.

58.) The word “I’hamburger” is used in order to

- a) provide an example of when French law has prohibited a new word from being added to the language
- b) show how languages borrow from one another
- c) argue that English is superior to French
- d) demonstrate the inevitability of linguistic evolution
- e) show that French is a more flexible language than English

- 59.) Which of the following words, if substituted for the word “lexicon” in the passage, would result in the LEAST change in the meaning of the sentence?
- a) use
  - b) opinion
  - c) dictionary
  - d) culture
  - e) vocabulary
- 60.) Which of the following statements, if true, would most undermine the author’s primary argument?
- a) Japanese contains more unique words than English.
  - b) English borrows many words from other languages.
  - c) Each year, German adds more words to its lexicon than any other language in the world.
  - d) The French language has remained largely unchanged for centuries.
  - e) English is widely considered the most difficult language to learn.
- 61.) Which of the following does the author claim as his own opinion?
- a) English is the most difficult language to learn.
  - b) English has twice as many words as most European languages.
  - c) The complexity of English enables people to speak with greater nuance than they could with other languages.
  - d) English-speakers are often receptive to new words.
  - e) English is one of the world’s most widely-spoken languages.

Answer Key  
Multiple Choice

34.) Answer E

A circle contains  $360^\circ$ . An angle with its vertex at the center of that circle will create a section of the circle whose area relates to the area of the whole circle proportional to the relationship between that angle and  $360^\circ$ . Since the shaded portion makes up 15% of the circle's area, you can determine the measure of its angle by taking 15% of  $360^\circ$ , which is  $54^\circ$ .

35.) Answer D

The formula for the volume of a cylinder is  $V = \pi r^2 h$ . Plug in the given values to solve.

$$V = \pi r^2 h$$

$$V = \pi 4^2 (20)$$

$$V = \pi 16 (20)$$

$$V = 320\pi$$

The volume of the container is  $320\pi \text{ cm}^3$ .



36.) Answer C

The mean (average) of a set is found by adding up the terms and dividing by the number of terms:

$$\text{Mean} = \frac{80+76+80+84+92+68}{6} = \frac{480}{6} = 80$$

The mode of a set is the term that appears most frequently. In this set, 80 is the only term that appears more than once, so 80 is the mode.

The median of a set is the term in the middle when the terms are arranged in numerical order:

$$68, 76, 80, 80, 84, 92$$

In this case, there are two numbers in the middle. Since they are both 80, the median is 80. If there were two different numbers in the middle, you would average the two numbers to find the median of the set.

The range is the difference between the highest and lowest values in a set.

$$92 - 68 = 24$$

The range is the only measure that is not equal to the other three.

37.) Answer B

In 2005, Pinewood's population is clearly closest to being centered between that of Maple and Oaktree. It is closest to average during that year.

38.) Answer D

The graph shows a consistent downward trend in Maple Elementary's population and a consistent upward trend in Pinewood Elementary's population. In 2015, Pinewood's population is just below that of Maple. If these trends

continue, it is very likely that the population of Pinewood would surpass that of Maple by 2020, making it the most populous of the three schools.

(A) is incorrect because Oaktree's population has moved slightly up and down over the years, remaining fairly steady overall. There is nothing to indicate a downward trend by 2020.

(B) is incorrect because the trends indicate that Maple's population is likely to continue to decrease, which would close, not widen, the population gap with Oaktree.

(C) is incorrect because Oaktree's population is far lower than Maple's and there is no reason to suspect that it would suddenly increase greatly enough to surpass Maple's population.

(E) is incorrect because the graph gives no indication of the reasons for the population shifts and it cannot be determined that the students coming into Pinewood are the same ones that are leaving Maple.

39.) Answer C

It is important to remember that a foot is equal to 12 inches. One way to approach this problem is to convert all measurements to inches to ensure that they are added properly (it is easier to add while working with only one unit rather than two at once), and then convert the answer back to feet. To convert each measurement into inches, simply multiply the number of feet by 12 and add in the additional inches.

$$3 \text{ feet } 4 \text{ inches} = 3(12) + 4 = 36 + 4 = 40 \text{ inches}$$

$$4 \text{ feet } 9 \text{ inches} = 4(12) + 9 = 48 + 9 = 57 \text{ inches}$$

$$5 \text{ feet } 5 \text{ inches} = 5(12) + 5 = 60 + 5 = 65 \text{ inches}$$

Add these together to find the total height.

$$40 + 57 + 65 = 162$$

Divide by 12 to convert back to feet. If there is a remainder, this is the additional number of inches. Do NOT mistake a decimal for the number of inches.

$$162 \div 12 = 13 \text{ R } 6$$

The combined height of the poles is 13 feet 6 inches.

40.) Answer D

Percentile scores are a way to compare one test taker's score with that of the rest of the test takers. Your percentile score reflects the percentage of test takers whose scores were lower than yours. In this case, Kim is in the 92<sup>nd</sup> percentile, which means she scored the same or better than 92% of the people who took the test. A percentile score is not the same as a percentage score, which tells you the percentage of the questions you answered correctly, regardless of how anyone else did.

41.) Answer C

Simple probability is expressed as a fraction with a numerator that represents the desired outcome(s) and a denominator that represents the total number of possible outcomes. In this case, the desired outcome is an orange marble, of which there are 5. The total number of possible outcomes is 40, since there are 40 marbles in the bag all together. Expressed as a fraction this is:

$$\frac{5}{40} = \frac{1}{8}$$

42.) Answer B

This question is answered the same way as the previous one, only you must be sure to account for the marble that has

already been drawn, which affects the total number of marbles in the bag. The desired outcome is a red marble, of which there are 13. Since one marble is now missing, the total number of possible outcomes is 39 ( $40 - 1$ ). Expressed as a fraction, this is:

$$\frac{13}{39} = \frac{1}{3}$$

43.) Answer B

Answer this question using the percent change formula:

$$\text{Percent change} = \frac{\text{Amount of change}}{\text{Original amount}} \times 100$$

$$\text{Percent change} = \frac{150,000 - 120,000}{120,000} \times 100$$

$$\text{Percent change} = \frac{30,000}{120,000} \times 100$$

$$\text{Percent change} = 0.25 \times 100$$

$$\text{Percent change} = 25\%$$

44.) Answer D

The points given are enough to show you that each y-value is 3 times greater than its corresponding x-coordinate value. The equation of this line is therefore  $y = 3x$ . Plug in 10 to find that  $y = 3(10) = 30$ .

45.) Answer C

The average (mean) of a set of values is found by adding up the terms and dividing the sum by the number of terms. You can use the same formula to solve for a missing term if you have the average.

$$\text{Mean} = \frac{\text{Sum of terms}}{\text{Number of terms}}$$

$$80 = \frac{62+74+70+73+99+98+x}{7}$$

$$80 = \frac{476+x}{7}$$

$$560 = 476 + x$$

$$84 = x$$

Sunday night, the restaurant served 84 customers.

46.) Answer E

The surface area of a prism is found by adding the areas of each of its face. A rectangular prism has 6 faces—3 pairs of identical ones. One of these 3 types of faces is shown in the diagram. This face measures 3 x 8, so its area would be 24 units<sup>2</sup>. The depth of the prism—not pictured in the diagram—is 4 units. This means that another set of faces have dimensions of 3 x 4, giving them an area of 12 units<sup>2</sup>, and the final set have dimensions of 8 x 4, giving them an area of 32 units<sup>2</sup> each. Add these up to find the total surface area (be sure you include 2 of each type of face):

$$\begin{aligned} 2(3 \times 8) + 2(3 \times 4) + 2(8 \times 4) &= \\ 2(24) + 2(12) + 2(32) &= \\ 48 + 24 + 64 &= \\ 136 \text{ units}^2 & \end{aligned}$$

47.) Answer D

The midpoint is the halfway point between two points. You can find the midpoint using the midpoint formula, in which you find the average of the x-coordinates and the y-coordinates.

$$\text{Midpoint} = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$\text{Midpoint} = \left( \frac{5+9}{2}, \frac{8+4}{2} \right)$$

$$\text{Midpoint} = \left(\frac{14}{2}, \frac{12}{2}\right)$$

$$\text{Midpoint} = (7, 6)$$

48.) Answer D

Normal distribution occurs when the mean, median, and mode are equal and there are an equal number of values are greater than the mean and less than the mean. This is often represented as a bell curve, although other types of graphs, such as the bar graph shown, can also be used to represent the data. Although not perfect, the data in graph (D) is very close to matching normal distribution.

49.) Answer D

The sides of a right triangle follow the Pythagorean Theorem:  $a^2 + b^2 = c^2$ , where a and b are the lengths of the legs of the triangle and c is the length of the hypotenuse. To solve this problem, plug the numbers from the answer choices into the equation to see which ones work and which one does not. The two smaller values in each set are the legs (a and b) and the largest value is the hypotenuse (c). The only one that does not work is (D).  $8^2 + 10^2$  does not equal  $14^2$ . You can also solve questions like these more quickly by memorizing common Pythagorean triplets and their multiples. For example, 3:4:5 (A) makes up a right triangle, and so do any of its multiples, such as 6:8:10 (C). Another common one is 5:12:13 (B), which has multiples such as 10:24:26 (E).

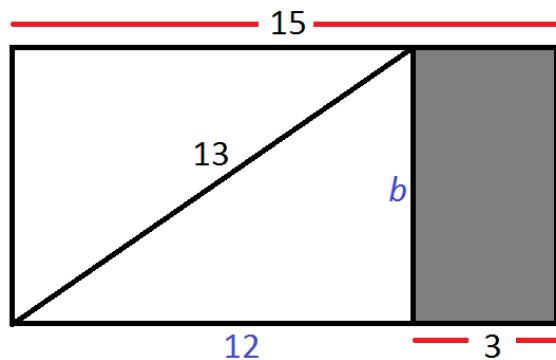
50.) Answer D

Congruent shapes are exactly the same size and shape. These triangles are not the same size, therefore they are not congruent (I). You can eliminate answers (A), (B), and (C)

because they each contain (I). Similar shapes have the same shape but not necessarily the same size. These triangles' sides are in proportion to one another, therefore their shape is considered the same and they are similar (II). Isosceles triangles (III) have two equal sides and scalene triangles (IV) have no equal sides. These triangles are isosceles (III), therefore the correct answer is (D).

51.) Answer B

Perimeter is the distance around a shape. The shaded region is a rectangle, which means that it contains two pairs of equal sides. We are given one of the sides—3 units. The other side is unknown, but in addition to being a side of the rectangle, it is also a leg of a right triangle, which means we can use the Pythagorean Theorem to solve for its length. We have the length of the hypotenuse—13 units. The other leg measures 12 units ( $15 - 3$ ). Plug these values into the Pythagorean Theorem and solve for the missing leg:



$$a^2 + b^2 = c^2$$

$$12^2 + b^2 = 13^2$$

$$144 + b^2 = 169$$

$$b^2 = 25$$

$$b = 5$$

The missing side is 5 units long. Now add the sides together to find the perimeter of the shaded rectangle:

$$3 + 3 + 5 + 5 = 16 \text{ units}$$

52.) Answer A

As we found in the previous question, the shaded region measures 3 units by 5 units. Multiply these dimensions to find the area:

$$3 \times 5 = 15 \text{ units}^2$$

The entire figure is also a rectangle, and its dimensions are 15 units by 5 units. The area is therefore 75 units<sup>2</sup> (15 x 5). The ratio of the shaded region to the entire figure is therefore 15:75, which reduces to 1:5.

53.) Answer C

To find the number of combinations of bottoms and tops, multiply the number of choices for each type of item. There are 2 different bottoms and 3 different tops.  $2 \times 3 = 6$  possible outfits.

54.) Answer E

$\angle DAB$  and  $\angle BAC$  share a straight line and are therefore supplementary—their measures add up to  $180^\circ$ . This means that the measure of  $\angle BAC$  is  $100^\circ$  ( $180 - 80$ ). That makes  $\angle BAC$  an obtuse angle (an angle that measures more than  $90^\circ$ ). If a triangle contains one obtuse angle, it is classified as an obtuse triangle (E).

The triangle *could* be isosceles (A), meaning it has two equal sides, but the figure gives no information about the lengths of any sides so this could not be determined from only the given information.

BC cannot be the hypotenuse (B) because only a right triangle



can have a hypotenuse and we have already established that this is an obtuse triangle rather than a right triangle.

The triangle cannot be equilateral (C) because an obtuse triangle cannot be equilateral. In an equilateral triangle, all sides and angles are equal and if one angle is obtuse, the other two must be acute.

The triangle *could* be scalene (A), meaning it has no equal sides, but the figure gives no information about the lengths of any sides so this could not be determined from only the given information.

55.) Answer A

Each time the coin is flipped, there is a  $\frac{1}{2}$  chance that it will land on heads. The outcome of one flip does not affect the next, so the probability is  $\frac{1}{2}$  every time. To find the probability of getting heads three times in a row, multiply each probability together:  $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$ .

56.) Answer C

The equation of a line in slope-intercept form is  $y = mx + b$ , where  $m$  is the slope,  $b$  is the  $y$ -intercept, and  $x$  and  $y$  are the coordinates of any point on the line. To find the slope, put the given equation into slope-intercept form by solving for  $y$ .

$$2y + 3 = -4x - 9$$

$$2y = -4x - 12$$

$$y = -2x - 6$$

The slope is the coefficient of  $x$ , which is  $-2$ .

57.) Answer C

The passage begins by saying, "English is considered one of the

most ‘living’ languages in the world. It is constantly changing and evolving.” The author defines “living” as “changing and evolving.” The rest of the passage describes the primary way in which language evolves over time—through the introduction of new words.

58.) Answer D

The author says that the French have begun using “l’hamburger” in common speech despite the fact that French law has attempted to curtail the introduction of new words into the language. This shows that changes in language are inevitable.

This word is not specifically listed as having been outlawed (A). While it is a word borrowed from English (B), this is not the point the author is making, nor is it used to argue for the superiority of one language or another (C).

While this word does demonstrate that French does contain some degree of flexibility (E), the author would not argue that it is a more flexible language than English.

59.) Answer E

“Lexicon” means “vocabulary.” In this context, the author is writing about how slang words grow in popularity until they become a part of the common vocabulary and eventually are considered a true part of the language.

60.) Answer C

To undermine the argument would be to weaken it. You need to look for a statement that goes against what the author is saying. Note that the question says IF the statements are true. You do not need to evaluate the validity of each statement. You need to pretend they are all true and decide which one

would most weaken the author’s argument. The author’s primary point is that English changes more than nearly any other language in the world because of all the new words and expressions that are introduced, as well as regional variations of the language as it is widely spoken around the world. If it were true that German added more new words to its vocabulary each year than English did, that would weaken the author’s argument.

61.) Answer D

Look for words that signify when the author is stating the opinion of others, as opposed to his personal beliefs. The difficulty of learning English (A) is something that “others complain” about. English has twice as many words as most European languages (B) “by some linguistic counts.” “There are people who claim” that the ability to create nuance is a benefit of English’s complexity (C). The widespread nature of English (E) is a fact rather than an opinion. This leaves (D) as the only statement that is the author’s own opinion.