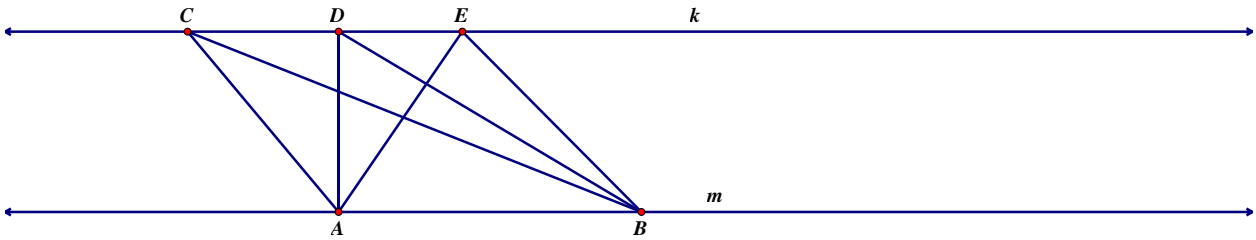


2018 7th Grade Math Contest

1. Alonzo makes a $\frac{1}{40}$ scale drawing of a small building. If the actual building is 15 feet long, how long is the picture of the building?

- A. $\frac{3}{8}$ inch
- B. $4\frac{1}{2}$ inches
- C. 15 inches
- D. $\frac{9}{2}$ feet
- E. 6 inches

2. In the figure below, lines m and k are parallel. Which of the triangles listed has the greatest area?



- A. $\triangle ABC$
- B. $\triangle ABD$
- C. $\triangle ABE$
- D. $\triangle ABC$, $\triangle ABD$, and $\triangle ABE$ all have equal areas.
- E. There is not enough information to be able to tell which triangle has the greatest area.

3. Harold wants to buy a shirt. The price on the label is \$20.00, but the shirt is on sale for 20% off. Harold will have to pay 8% sales tax on the sale price of the shirt. If Harold purchases the shirt and pays for it with a \$20.00 bill, how much change will he get?

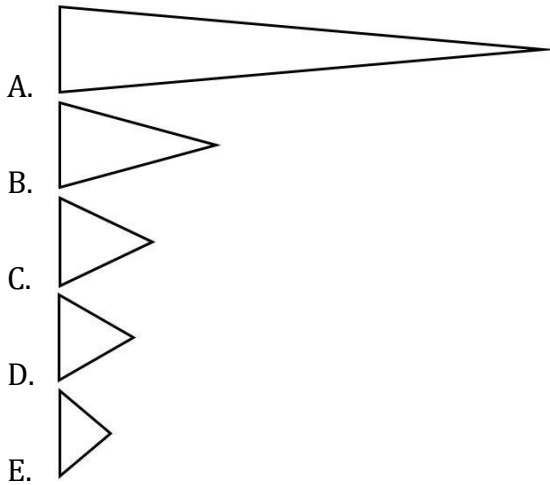
- A. None. He will pay exactly \$20.00 for the shirt.
- B. \$2.72
- C. \$4.00
- D. \$0.32
- E. \$1.82

4. Leigh is learning to ride a bicycle and is doing fairly well at it. The diameter of the tires on her bicycle is 16 inches. On one of her early attempts to ride, she travels in a straight line, and her tires make three complete revolutions before she falls (gently, without being hurt). To the nearest inch, how far did she travel on this attempt?

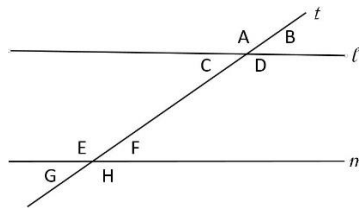
- A. 12 feet, 7 inches
- B. 25 feet, 2 inches
- C. 12 feet, 6 inches
- D. 48 feet
- E. 4 feet, 2 inches

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5. One of the isosceles triangles below has a single interior angle with a measure of 30° . No other angle is within 15° of this measure. Which triangle contains the 30° angle?



6. A prism has a square base. The prism is 3 cm wide, 3cm long, and 8 cm high. The prism is placed in a coordinate system so that the vertices of the prism are at $(0,0,0)$, $(0,3,0)$, $(3,3,0)$, $(3,0,0)$, $(0,0,8)$, $(0,3,8)$, $(3,3,8)$, and $(3,0,8)$. In the same coordinate system, there is a pyramid with a square base. The vertices of the pyramid are $(0,0,0)$, $(0,3,0)$, $(3,3,0)$, $(3,0,0)$, and $(1,2,8)$. What is the ratio of the volume of the pyramid to the volume of the prism?
- A. 72
 B. 24
 C. $\frac{2+\sqrt{3}}{3+\sqrt{2}}$
 D. $\frac{1}{3}$
 E. 3
7. Refer to the diagram. A transversal t crosses lines l and m . The measure of angle A is 140° . What is the measure of angle E?



- A. There is not enough information to answer this question.
 B. 40°
 C. 30°
 D. 150°
 E. 140°

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8. The table shows several quantities. Which of the following statements is most reasonable?

A	B	C	D
5.3	10.6	31.8	11.2
7.2	21.6	64.8	9.7
8.4	33.6	100.8	8.4
9.7	48.5	145.5	7.2
11.2	67.2	201.6	5.3

- A. The quantity in column B is directly proportional to the quantity in column A.
 B. The quantity in column C is directly proportional to the quantity in column A.
 C. The quantity in column D is directly proportional to the quantity in column A.
 D. The quantity in column C is directly proportional to the quantity in column B.
 E. The quantity in column D is directly proportional to the quantity in column B.
9. The two bases of a trapezoid are 10 cm and 12 cm. If its area is 55 cm², what is its height?
- A. 5 cm
 B. 10 cm
 C. 2.5 cm
 D. 11 cm
 E. 12 cm
10. The six sides of a fair number cube (die) are labeled 1, 2, 3, 4, 5, and 6. What is the probability that either a 2 or 5 shows when the number cube is rolled?
- A. $\frac{1}{6}$
 B. $\frac{1}{36}$
 C. $\frac{1}{2}$
 D. $\frac{1}{9}$
 E. $\frac{1}{3}$

11. There are 22 marbles in a bag, 9 red ones and 13 blue ones. If a student pulls a random marble from the bag, what is the probability that the selected marble is blue?

- A. $\frac{1}{2}$
 B. $\frac{1}{13}$
 C. $\frac{9}{22}$
 D. $\frac{13}{22}$
 E. $\frac{1}{22}$

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12. Find the mean and the range of the following data set. 3, 5, 8, 9, 12, 17.
- A. Mean = 9; Range = 8.5
 - B. Mean = 9; Range = 14
 - C. Mean = 8.5; Range = 9
 - D. Mean = 8.5; Range = 14
 - E. Mean = 54; Range = 14
13. The area of a circle is doubled. What effect does this have on the circumference of the circle?
- A. The circumference is doubled.
 - B. The circumference is halved.
 - C. The circumference is decreased by a factor of $\frac{1}{\sqrt{2}}$.
 - D. The circumference is increased by a factor of 4.
 - E. The circumference is increased by a factor of $\sqrt{2}$.
14. Lisa is planning to go on a long hike. She will carry a pack, but wants to ensure that its total weight is no more than 25 pounds. The pack itself weighs four pounds, and she will carry water in the pack. Her water bottles weigh 5 pounds each. If she takes some water and does not exceed her 25 pound weight limit, how many water bottles can she place in the pack?
- A. 5 bottles
 - B. 4 bottles
 - C. Either 0, 1, 2, 3, or 4 bottles
 - D. Either 1, 2, 3, 4, or 5 bottles
 - E. Either 1, 2, 3, or 4 bottles
15. Chains and furlongs are old units for measuring length. An acre of land is defined as the area of a rectangle which is one chain by one furlong. If there are 640 acres in a square mile, and 10 chains in a furlong, how many chains are there in a mile?
- A. 10
 - B. 16
 - C. 32
 - D. 64
 - E. 80
16. Jade and her mother have the same birthday. Three years ago, Jade was one-seventh her mother's age then. This year she is one-fourth her mother age. How many years until she will be one-half her mother's age?
- A. 6
 - B. 8
 - C. 9
 - D. 12
 - E. 18

17. Three circles have their centers on the diameter of a fourth circle as shown on the right. The largest of the four circles has diameter 20. What is the sum of the circumferences of all four circles?



- A. 20π
- B. 30π
- C. 40π
- D. 50π
- E. 60π

18. A lightning flash catches your eye. After 7 seconds, you hear the sound of thunder. Assuming that the speed of sound is about 1127 feet per second, how far away did the lightning strike?

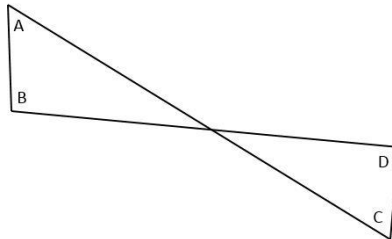
- A. 0.2 miles
- B. 7.0 miles
- C. 4.7 miles
- D. 161 miles
- E. 1.5 miles

19. A group of shipwreck survivors on an inflatable raft see a shark swimming past them and agree the shark was about 3 lengths of their raft long. After rescue, they are asked the length of the shark. If the typical raft is about 14 feet long, what should they say is the approximate length of the shark?

- A. 14 ft.
- B. 3 ft.
- C. 4.7 ft.
- D. 0.21 ft.
- E. 42 ft.

20. The diagram here is not to scale. The measure of angle A is 25° . The measure of angle B is 110° . The measure of angle D is 80° . What is the measure of angle C?

- A. 35°
- B. 45°
- C. 55°
- D. 65°
- E. 75°



21. If a , b , and c are odd whole numbers, which of the following must be an even whole number?

- A. $a + b + c$
- B. $a(b + c)$
- C. $ab + bc + ac$
- D. $a(b + c) - 1$
- E. $a^2 + b^2 + c^2$

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22. Jason and Sara each make a cube. Sara's cube has four times the surface area of Jason's. How do the volumes of the cubes compare?

- A. Sara's cube has 8 times the volume of Jason's.
- B. Sara's cube has 4 times the volume of Jason's.
- C. Sara's cube has 2 times the volume of Jason's.
- D. Sara's cube and Jason's cube have equal volumes.
- E. There is not enough information to determine the answer.

23. If two parallel lines are cut by a transversal, what is the maximum number of congruent angles that can be formed?

- A. two
- B. four
- C. five
- D. six
- E. eight

24. Debbie has a red stick of length 4 inches and a red stick of length 2 inches. She also has a bag containing 4 blue sticks which have lengths of 1, 3, 5, and 7 inches. If she reaches into the bag and pulls one blue stick out at random, what is the probability that she can form a triangle using her blue stick and two red sticks?

- A. 0
- B. $\frac{1}{4}$
- C. $\frac{1}{2}$
- D. $\frac{3}{4}$
- E. 1

25. Sixty percent of the jelly beans in a candy jar are red. If we remove ten of the red jelly beans, the percentage of red jelly beans in the jar drops to fifty percent. How many jelly beans were in the jar originally?

- A. 40
- B. 45
- C. 50
- D. 100
- E. The answer cannot be determined with the given information.

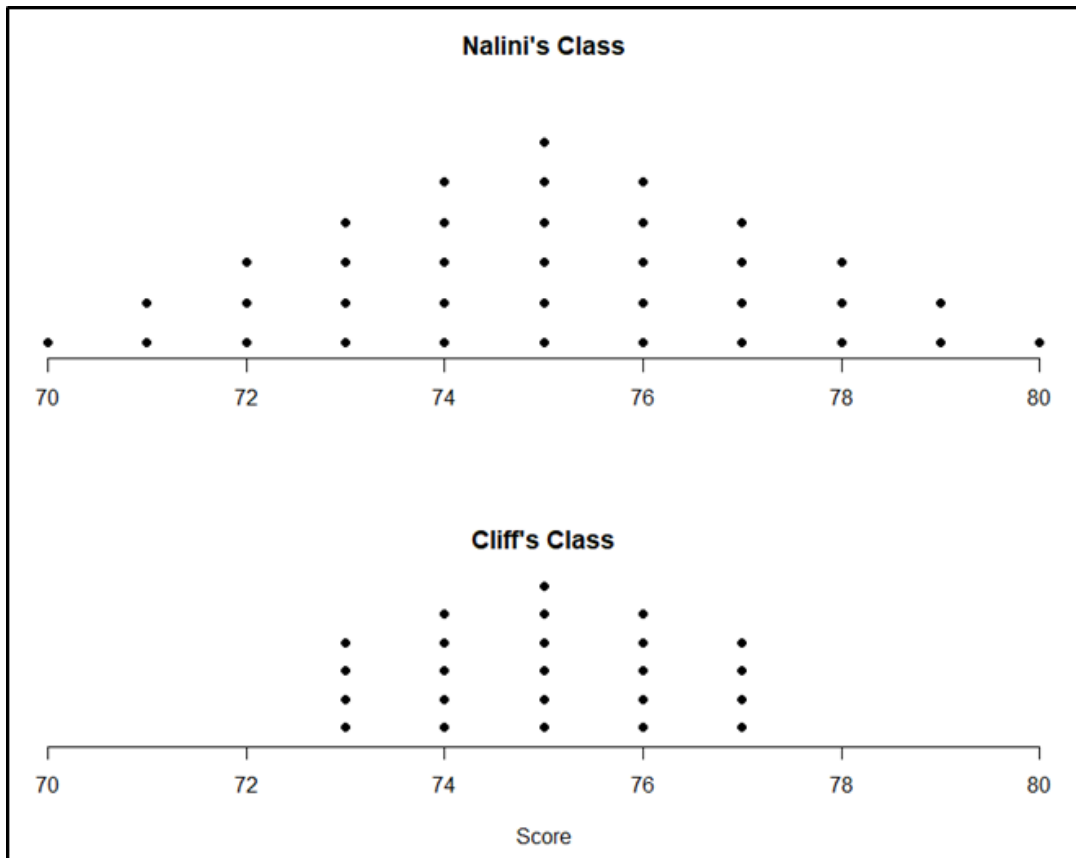
26. The mean of ten data items is 40. Nine of the data items are 56, 25, 30, 36, 42, 43, 45, 47, and 23. What is the tenth data item?

- A. 38
- B. 40
- C. 44
- D. 50
- E. 53

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27. Translate the following sentence into an equation using the variable x .
"Three more than a number is the same as two times the number."
- A. $3x = x + 2$
 - B. $x + 3 = 2x$
 - C. $x^3 = 2x$
 - D. $x = 3$
 - E. $x + 3 = x^2$
28. Suppose that a cookie jar contains 5 chocolate chip cookies, 3 sugar cookies, and 2 peanut butter cookies that are all mixed randomly. If you reach in without looking, what is the probability that you select either a chocolate chip cookie or a sugar cookie? Is this event likely?
- A. $\frac{8}{10}$; this event is likely because the probability is close to 1.
 - B. $\frac{8}{10}$; this event is not likely because the probability is close to 0.
 - C. $\frac{15}{100}$; this event is likely because the probability is close to 1.
 - D. $\frac{15}{100}$; this event is not likely because the probability is close to 0.
 - E. $\frac{2}{10}$; this event is likely because the probability is close to 1.
29. Below are the weights (in pounds) of 8 randomly selected bulldogs. Use the data to find the median weight of the sampled bulldogs.
- 40, 25, 29, 27, 25, 29, 29, 24
- A. 16 pounds
 - B. 27 pounds
 - C. 28 pounds
 - D. 28.5 pounds
 - E. 29 pounds

30. Below are two dot plots that show random samples of math exam scores for Nalini's class and Cliff's class. Use the graphs to make inferences comparing the two classes.



- A. The mean exam score from both classes is the same, but the exam scores from Nalini's class have more variation.
- B. The mean exam score from both classes is the same, but the exam scores from Cliff's class have more variation.
- C. The variation of exam scores from both classes is the same, but the mean exam score from Cliff's class is higher.
- D. The variation of exam scores from both classes is the same, but the mean exam score from Nalini's class is higher.
- E. The mean exam score and the variation from both classes is the same.