

2019 Grade 8 Mathematics Contest

1. Which of the following numbers has a decimal form that will eventually repeat?

- A. $\frac{11}{23}$
- B. $\frac{5}{8}$
- C. π
- D. $\frac{918425}{12460270}$
- E. 3π

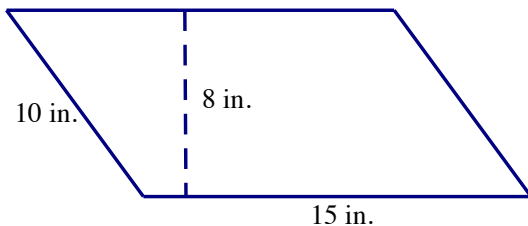
2. Simplify the following expression: $\frac{a^2b^{-6}}{b^{-4}} \times \frac{a^{-2}}{a^5b^3}$

- A. $\frac{b^6}{a^4}$
- B. $\frac{1}{a^5b^5}$
- C. $\frac{a^3}{b^2}$
- D. $\frac{1}{a^5b}$
- E. a^5b^5

3. Which unit would be the most reasonable choice to measure the volume of a typical middle school classroom?

- A. cm^2
- B. km^2
- C. mm^3
- D. m^3
- E. km^3

4. The parallelogram below represents the base of a prism. The prism itself has a height of 20 inches. What is the surface area of the prism?



- A. 120 in.^2
- B. 150 in.^2
- C. 1240 in.^2
- D. 2400 in.^2
- E. 2400 in.^3

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5. Which of the following are equivalent to 1 yd.³?
- A. 36 in.³
 - B. 1296 in.³
 - C. 3 ft.³
 - D. 9 ft.³
 - E. None of the above.
6. Which equation has no solution?
- A. $3x + 4 = -2(x - 5)$
 - B. $5x + 3 = 3$
 - C. $2x + 4 = 2(x - 5)$
 - D. $3x + 4 = -2(x - 2)$
 - E. $4x = 6x$
7. Which system of linear equations will have a solution on the negative y-axis?
- A.
$$\begin{cases} y = 3x - 1 \\ y = -3x + 1 \end{cases}$$
 - B.
$$\begin{cases} y = 3x + 1 \\ y = -3x + 1 \end{cases}$$
 - C.
$$\begin{cases} y = 3x + 3 \\ y = -3x - 3 \end{cases}$$
 - D.
$$\begin{cases} y = 3x - 1 \\ y = -3x + 1 \end{cases}$$
 - E.
$$\begin{cases} y = 3x - 1 \\ y = 4x - 1 \end{cases}$$
8. Lin has a summer job raking leaves. Different customers pay him in different ways. Which of the customers below pay Lin the highest average per hour, if he rakes for 3 hours at each job?
- A. Job 1: \$8 per hour.
 - B. Job 2: \$30 total.
 - C. Job 3: \$4 for the first hour, and each hour after that is double the pay from the previous hour.
 - D. Job 4: \$5 for the first hour, and \$5 more than the previous hour for each additional hour.
 - E. Two of these options offer the same amount for 3 hours, and those two result in a higher average than the other options.

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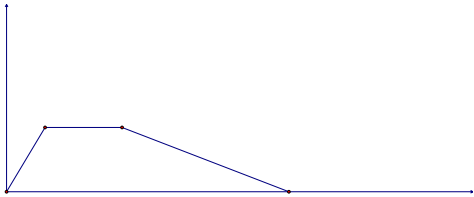
9. The following equation represents googles (g) as a function of wiggglebees (w):

$$g = \frac{2}{3}w - 6$$

What does the slope represent in terms of the situation?

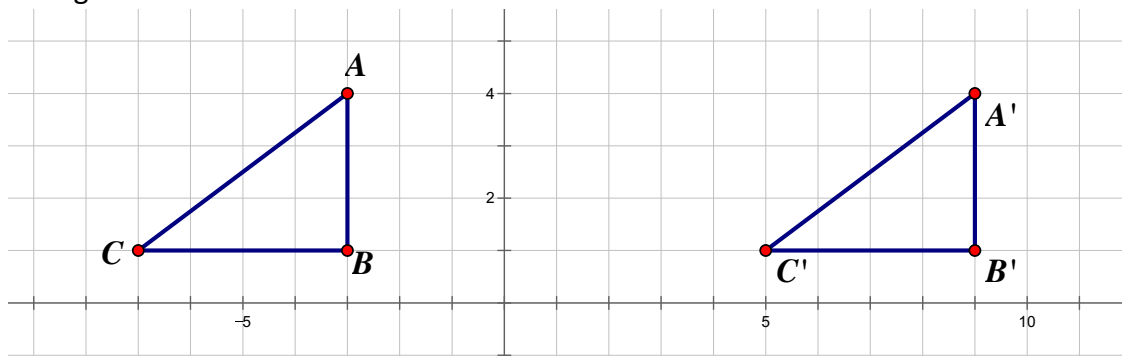
- A. -6 googles per wiggglebee
- B. -6 wiggglebees per google
- C. 2 googles per 3 wiggglebees
- D. 2 wiggglebees per 3 googles
- E. It is impossible to tell.

10. Which of the following real world situations is most likely the one depicted in the given graph?



- A. A woman's distance travelled over time as she runs up a hill and down again.
- B. A woman's speed over time as she runs up a hill then down it again.
- C. The height of a ball above the ground over time when it is tossed into the air.
- D. A boy's distance travelled as he runs at a constant speed over time.
- E. A woman's distance from her house over time as she runs to the mailbox, checks the mail, and walks back to the house.

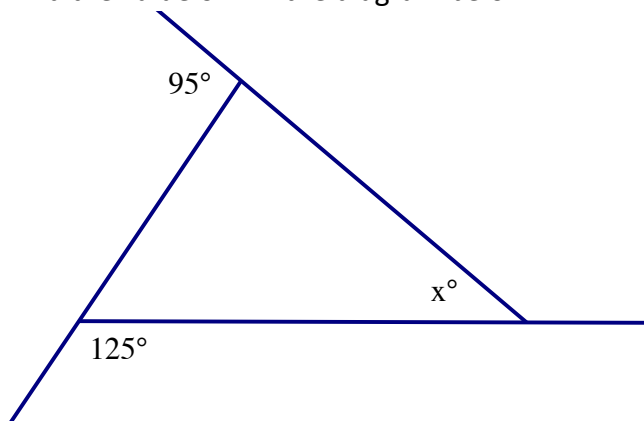
11. Which of the following transformations could have produced Triangle $A'B'C'$ from Triangle ABC ?



- A. A rotation of 180° about $(1, 1)$
- B. A translation 8 units right
- C. A translation 12 units right
- D. A reflection over $x=-2$ followed by a reflection over $x=4$
- E. Both C and D would produce the given figure.

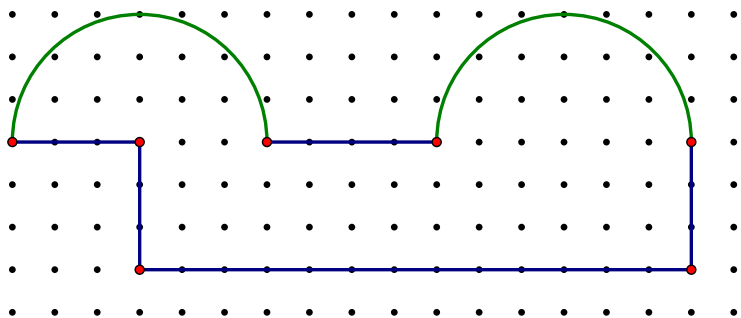
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12. Find the value of x in the diagram below.



- A. 40°
- B. 47.5°
- C. 85°
- D. 140°
- E. 220°

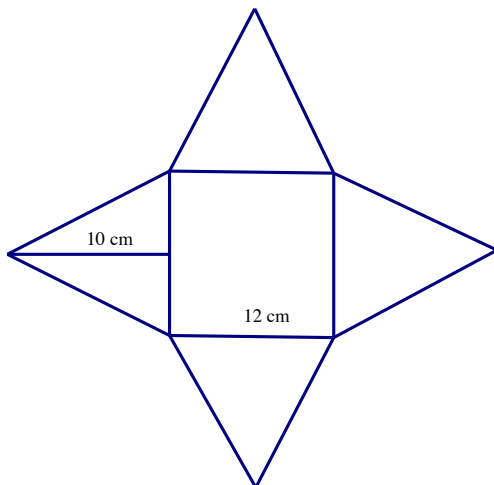
13. If the distance between two adjacent dots on the grid paper is 1 unit, find the perimeter of the figure below.



- A. 6π units + 23 units
- B. 6π units + 26 units
- C. 9π units + 23 units
- D. 9π units + 26 units
- E. 12π units + 26 units

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14. Find the volume of the pyramid below. Assume the base is a square and that all of the triangular faces are congruent.



- A. 120 cm^3
B. 384 cm^3
C. 480 cm^3
D. 1152 cm^3
E. 1440 cm^3
15. Ally's beach ball has a surface area of 144π square inches. How many cubic inches of air would it hold?
- A. 48π
B. 192π
C. 288π
D. 864π
E. $2,304\pi$
16. There are six socks in a drawer. Two are white, two are black, one is red, and one is gray. If you pick 2 socks out of the drawer at random, what is the probability that you choose a match?
- A. $\frac{2}{15}$
B. $\frac{4}{15}$
C. $\frac{2}{720}$
D. $\frac{4}{720}$
E. $\frac{2}{30}$

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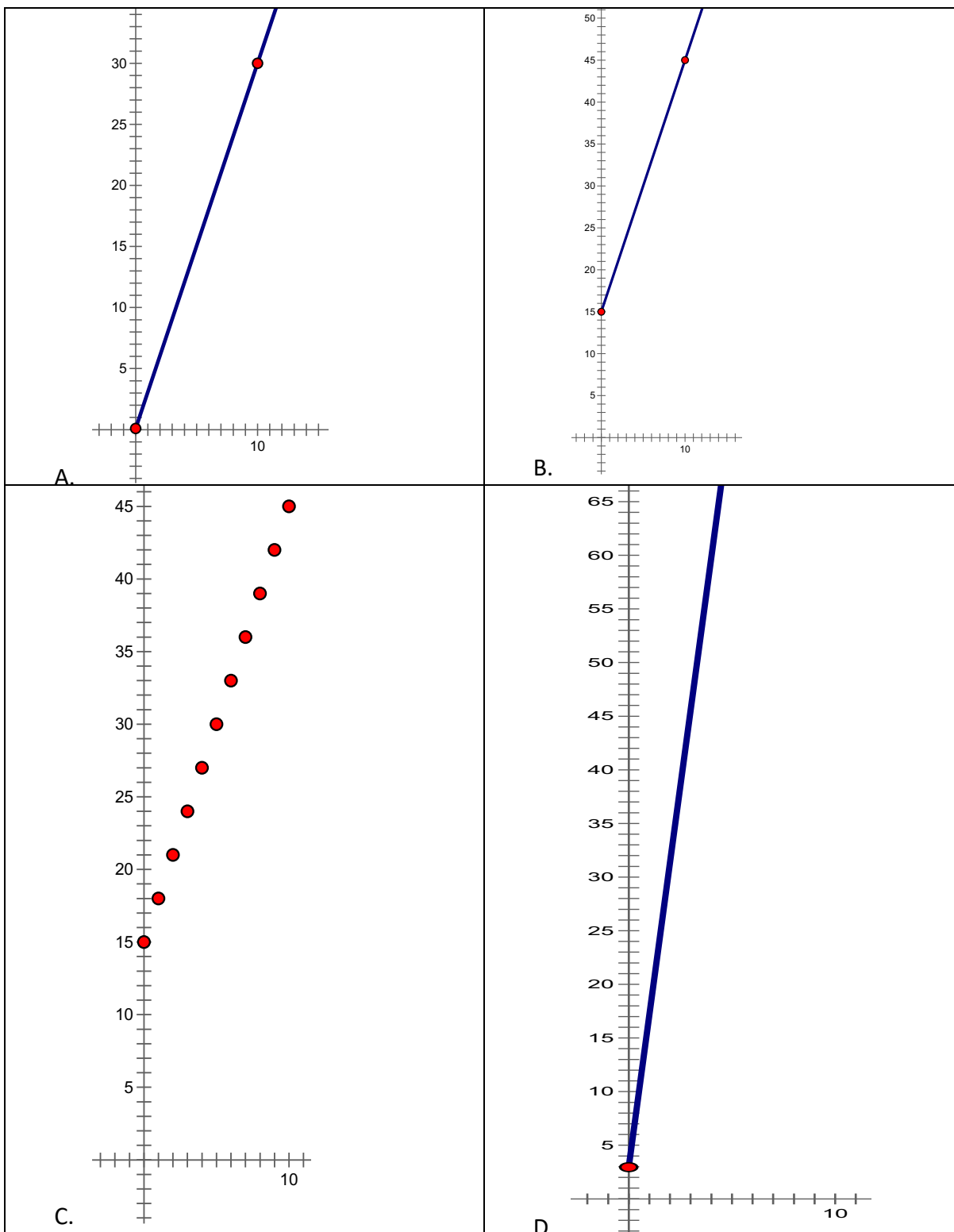
17. Which best describes the linear association of the data in the given table?

x	y
0	2
2	7
5	21
7	36
9	42
11	54
14	64

- A. strong negative
 - B. strong positive
 - C. weak negative
 - D. weak positive
 - E. no association
18. Becky had 8 roses. Jared has three-fourths as many roses as Becky. Ali had one-third as many roses as Jared. Kali had twice as many roses as Jared. How many roses did Tori have if she had two-sevenths of the total roses of the other four combined?
- A. 3
 - B. 4
 - C. 6
 - D. 8
 - E. The answer is not a whole number.
19. Isamar has 6 cups of flour. Each batch of cookies takes $1\frac{2}{3}$ cups of flour. Assuming she has enough of all the other ingredients, what is the greatest number of batches of cookies Isamar can make and how much flour will be leftover?
- A. She can make 4 whole batches and will have $1\frac{1}{3}$ cups leftover.
 - B. She can make 4 whole batches and will have 0 cups leftover.
 - C. She can make 3 whole batches and will have $1\frac{1}{3}$ cups leftover.
 - D. She can make 3 whole batches and will have $\frac{2}{3}$ cups leftover.
 - E. She can make 3 whole batches and will have 1 cup leftover.

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20. A T-shirt company charges \$3 per shirt ordered, plus a one-time design fee of \$15. Which of the following graphs best represent the cost of the total order as a function of the number of shirts ordered?



F. None of the above.

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21. Which statement is true?
- A. Every triangle is a polygon.
 - B. Every rectangle is a rhombus.
 - C. Some circles are polygons.
 - D. Every right triangle is isosceles.
 - E. Every trapezoid has at least 2 congruent angles.
22. If I roll a standard number cube (die), what is the probability that the number I roll is either even or a multiple of 3?
- A. $\frac{1}{6}$
 - B. $\frac{1}{3}$
 - C. $\frac{1}{2}$
 - D. $\frac{2}{3}$
 - E. $\frac{5}{6}$
23. If I roll two number cubes (dice), what is the probability that the sum I roll is even and a multiple of 4?
- A. $\frac{1}{12}$
 - B. $\frac{1}{9}$
 - C. $\frac{1}{4}$
 - D. $\frac{1}{2}$
 - E. $\frac{3}{4}$
24. Which two terms could not describe the same triangle?
- A. Acute, Isosceles
 - B. Acute, Scalene
 - C. Obtuse, Isosceles
 - D. Obtuse, Scalene
 - E. Right, Equilateral

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25. Assuming the pattern below continues, what will be the 100th term in the sequence?
53, 46, 39, 32,
- A. -700
 - B. -647
 - C. -640
 - D. -633
 - E. -632
26. Meliah is drawing a timeline that is to scale. The years 1998 and 2004 are $5\frac{1}{8}$ inches apart. What would the distance be between 1998 and the current year?
- A. $10\frac{15}{16}$ inches
 - B. $12\frac{13}{16}$ inches
 - C. $16\frac{1}{16}$ inches
 - D. $17\frac{13}{16}$ inches
 - E. $17\frac{15}{16}$ inches
27. I need to order concrete for my patio. The patio needs to be 6 inches thick, and is 20 ft by 20 ft. The concrete comes in cubic yards, and I can only order whole cubic yards. How many cubic yards of concrete do I need to order to make my patio?
- A. 7
 - B. 8
 - C. 23
 - D. 67
 - E. 200
28. Which measurement is the exact circumference of a circle with diameter 10 m?
- A. 5π m
 - B. 31.4m
 - C. 31.41592654 m
 - D. 10π m
 - E. 20π m

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29. You have conducted linear regression to model the trend of global temperatures. Which of the following formulae is the only plausible equation to show warming?
- A. temperature = $14.89 + 0.567(\text{year})$
 - B. temperature = $14.89 - 0.567(\text{year})$
 - C. year = $14.89 + 0.567(\text{temperature})$
 - D. year = $14.89 - 0.567(\text{temperature})$
 - E. None of the above
30. Two of every three students in Mr. Allen's class prefer buying lunch to bringing it. Nine students prefer bringing lunch. How many students are in Mr. Allen's class?
- A. 15
 - B. 18
 - C. 21
 - D. 27
 - E. 45