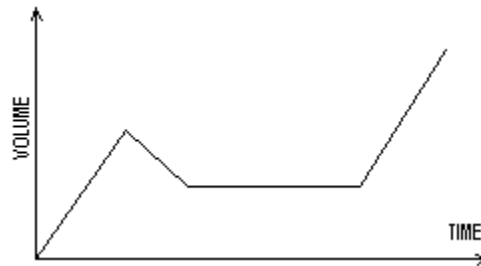


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- 1) A student wants to find the sixth root of 64 using a calculator. However, he does not know how to perform the sixth root on his calculator. He does know how to perform the square root and the cube root. How can the student find the sixth root of 64 using only the square root and cube root operations?
- a) He can take the square root of 64 six times in succession.
 - b) He can take the square root of 64 followed by the cube root.
 - c) He can take the square root of 64 three times in succession.
 - d) He can take the cube root of 64 twice in succession.
- 2) Below is a sequence of numbers;
2, 3, 5, 8, 13, 21, ...
If this pattern continues, how many prime numbers will there be in the first 10 terms of the sequence?
- a) 3
 - b) 2
 - c) 5
 - d) 4
- 3) A small swimming pool is being filled using a garden hose. The following graph depicts the volume of water in the pool with respect to time.
- Which of the following statements best describe the effort to fill the pool?



- a) Filling increased steadily for a time, decreased, went at a steady rate, and then filled more quickly than at the start.
- b) Filling increased at a steady rate for a time, stopped, increased at a steady rate, and then stopped again.
- c) Filling went at a steady rate for a time, the pool began to lose water, filling stopped for a time, and then filled again at a steady rate.
- d) Filling began steadily, slowed down, went at a steady rate, and then stopped completely.

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- 4) The density of a right circular cone with a height of 8 cm and diameter of 5 cm is 2.6 g/cm^3 . What is its mass?

a) $\frac{160}{3} \pi$ grams

c) $\frac{130}{3} \pi$ grams

b) 60π grams

d) $\frac{100}{3} \pi$ grams

- 5) The graph of the function, $f(x) = 3x^9 - 4x^2 + 6$ has

a) Origin symmetry

c) Y-axis symmetry

b) X-axis symmetry

d) No symmetry

- 6) A walker and a biker leave from the same spot at the same time. The walker travels due east at a steady rate of 2 mph and the biker travels north at a steady rate of 7 mph. Which equation must be solved to determine the distance between the two after 2 hours?

a) $4^2 + 14^2 = x^2$

c) $a = \sqrt{4^2 + 14^2 - 2(4)(14) \cos 135^\circ}$

b) $d = \tan^{-1}\left(\frac{7}{2}\right)$

d) $d = \cos^{-1}\left(\frac{2}{7}\right)$

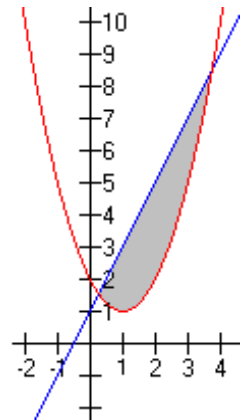
- 7) Given the graphs: $f(x) = 2x + 1$ and $g(x) = x^2 - 2x + 2$, which of the polynomial functions models the vertical distance between the two functions, specified by the shaded region in the figure?

a) $h(x) = -x^2 + 4x - 1$

c) $h(x) = x^2 - 4x + 1$

b) $h(x) = -x^2 + 3$

d) $h(x) = -x^2 - 1$



- 8) A frog attempts to leap across a small pond. On his first jump, he jumps $\frac{5}{8}$ of the total distance. Every jump thereafter, he only manages to jump $\frac{5}{8}$ of the remaining distance. Which of the following sums describes the distance that the frog has jumped?

a) $1 - \left[\left(\frac{5}{8}\right) + \left(\frac{5}{8}\right)^2 + \left(\frac{5}{8}\right)^3 + \dots \right]$

c) $\frac{5}{8} \left[1 + \frac{3}{8} + \left(\frac{3}{8}\right)^2 + \left(\frac{3}{8}\right)^3 + \dots \right]$

b) $\frac{5}{8} + \frac{5}{16} + \frac{5}{32} + \frac{5}{64} + \dots$

d) $\frac{5}{8} + \left(\frac{5}{8}\right)^2 + \left(\frac{5}{8}\right)^3 + \left(\frac{5}{8}\right)^4 + \dots$

9) For the sets; $A = \{x|x \text{ is a rational number}\}$, $B = \{x|x \text{ is an irrational number}\}$, and $C = \{x|x \text{ is a real number}\}$. Which of the following is true?

a) $A \cap B = C$

c) $A \cap C = B$

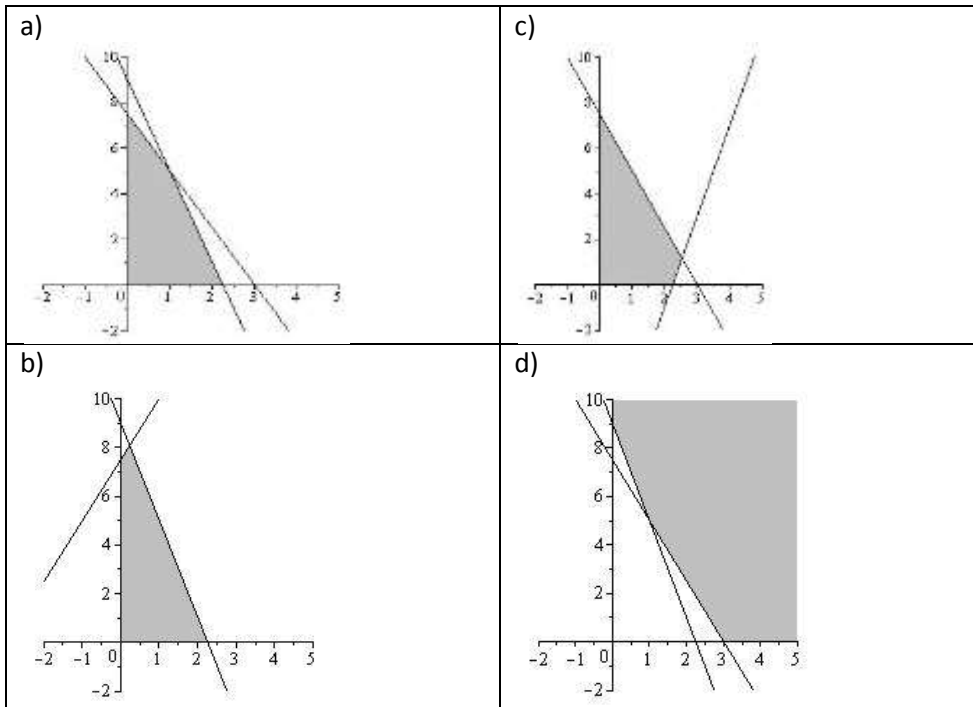
b) $A \cup C = B$

d) $A \cup B = C$

10) Which figure is the graph of all solutions to the following system of inequalities, given that

$x \geq 0$ and $y \geq 0$;

$$\begin{cases} 28x + 7y \leq 63 \\ 5x \leq 15 - 2y \\ -2y \geq 8x - 18 \end{cases}$$



11) Let $A = \{1, 4, 6, 7, 9, 10\}$ and $B = \{2, 4, 5, 8, 10\}$. What is the set $A \cap B$?

a) $\{1, 6, 7, 9\}$

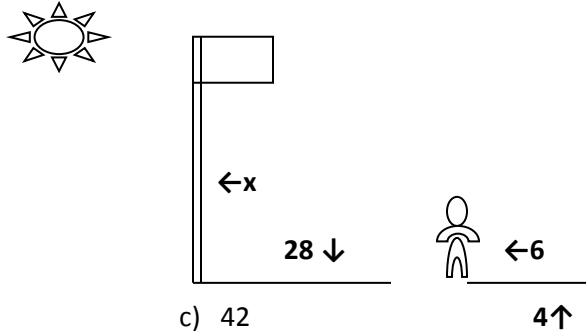
c) $\{2, 5, 8\}$

b) $\{4, 10\}$

d) $\{1, 2, 6, 7, 8, 9\}$

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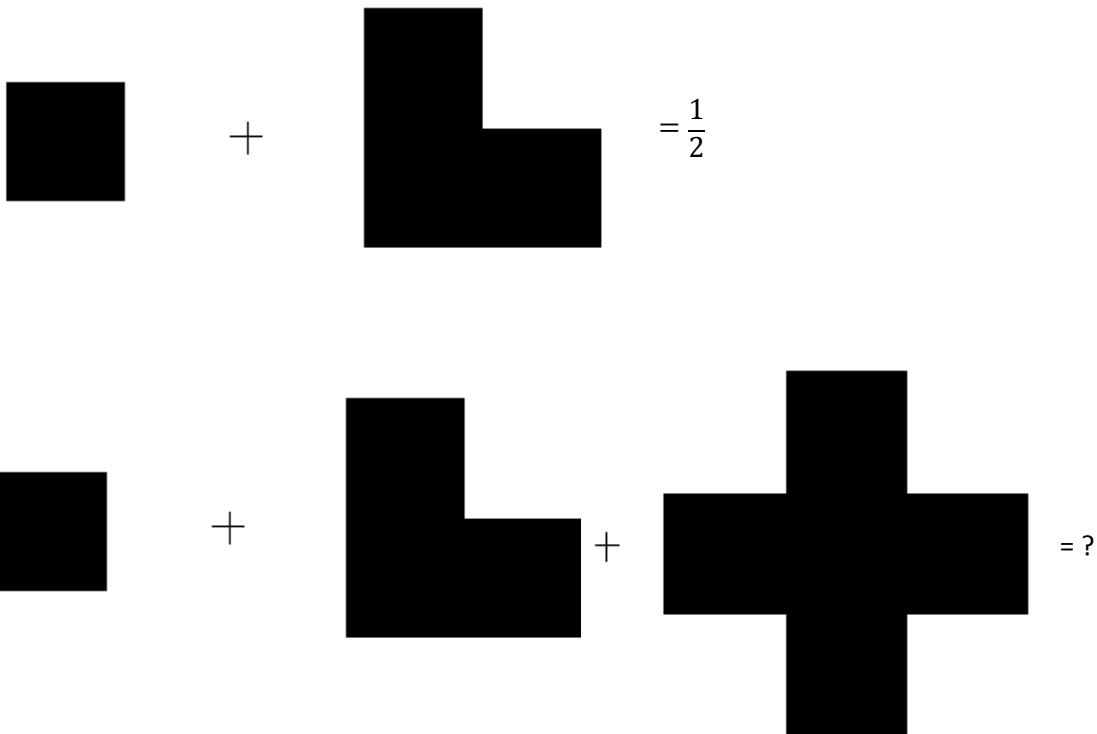
12) If the 6 foot man casts a shadow 4 feet long, and at the same time of day the flag pole casts a shadow 28 feet long, how tall is the pole?



- a) 24
- b) 18.67

- c) 42
- d) 0.86

13) An elementary school math class is using square tiles to learn about fractions. The problem below was created for the students to solve.



What is the solution to this problem?

- a) $1\frac{1}{2}$
- b) $\frac{3}{4}$

- c) 1
- d) $\frac{9}{8}$

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19) Suppose the following statement is true: If it is raining outside, Jethro carries his umbrella. Which of the following statements is definitely true?

- a) If it is not raining outside, Jethro does not carry his umbrella.
- b) If Jethro carries his umbrella, it is raining outside.
- c) If Jethro does not carry his umbrella, then it is not raining outside.
- d) If it is not raining outside, Jethro carries his umbrella.

20) A club has 12 female members and 14 male members. How many different ways can a committee of 6 be formed if an equal number of men and women must be selected?

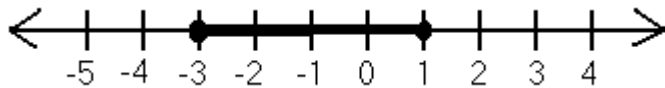
- a) 584
- b) 80,080
- c) 2,882,880
- d) 3,504

21) Solve the following system of equations.

$$\begin{cases} 3x + 2y + z = 2 \\ 2x - y - z = 1 \\ x + y = 1 \end{cases}$$

- a) $x = 2, y = 1, z = 1$
- b) $x = 1, y = 1, z = -3$
- c) $x = \frac{1}{2}, y = 1, z = -\frac{1}{2}$
- d) $x = \frac{1}{2}, y = \frac{1}{2}, z = -\frac{1}{2}$

22) Consider the solution set shown on the number line below.



Which of the following absolute value inequalities has the same solution set as the one shown?

- a) $|x - 1| \leq 2$
- b) $|x + 1| \geq 2$
- c) $|x + 1| \leq 2$
- d) $|x - 1| \geq 2$

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23) Jack goes to Lucky's Casino every Friday after he gets paid. He makes the same bet every week and has decided that he wins 30% of the time. Every week, he either loses \$10 or wins a net of \$25 (including his bet of \$10). Using this information, how much can Jack expect to net, on average, each week?

- a) \$0 c) \$7.50
b) \$0.50 d) \$2.50

24) Consider the sets S and R below.

$$S = \{x \mid x \text{ is an integer}\}$$

$$R = \left\{x \mid x \text{ is in the form of } \frac{a}{b} \text{ where } a \text{ and } b \text{ are integers and } b \neq 0\right\}$$

Which of the following statements about S and R is true?

- a) Elements of $S \cap R$ are integers c) Elements of $S \cap R$ are complex numbers
b) Elements of $S \cup R$ are complex numbers d) Elements of $S \cup R$ are irrational numbers

25) Which of the following is not a possible rational root of the polynomial $100x^6 + 21x^5 - 40x^3 - 3x^2 + 17x - 100$

- a) $\frac{5}{2}$ c) 20
b) $\frac{3}{4}$ d) $\frac{4}{5}$

26) A student is using a computer program to graph the equation of a line in the form of $y = mx + b$. If both m and b are elements of the set $\{1, 3, 5\}$, how many distinct lines can be drawn?

- a) 3
b) 6
c) 8
d) 9

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- 27) A pig farmer is interested in whether or not his pigs approve of the new slop he obtained from the market today. He takes a random sample from four different pens. The sample size and the population of each pen are given in a table below.

Pen	Population	Sample
1	92,000	500
2	60,000	750
3	35,000	600
4	25,000	400

Which pen has the highest probability of correctly estimating the percentage of pigs that approve the slop?

- a) Pen 1
 - b) Pen 2
 - c) Pen 3
 - d) Pen 4
- 28) The (x, y) , coordinates of the vertices of a polygon are given in the table below.

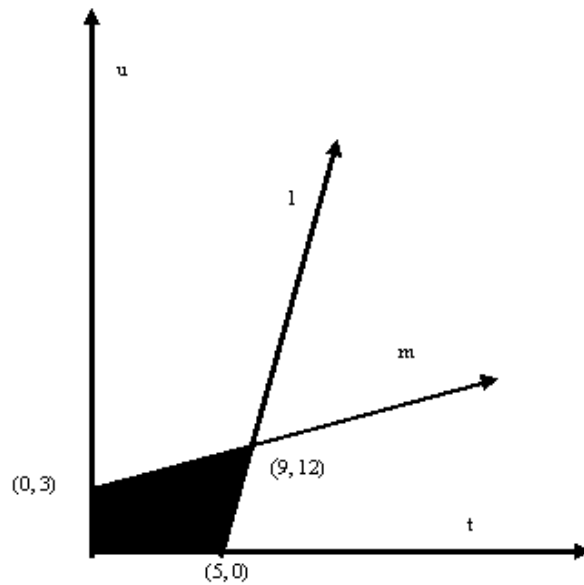
Vertices
(1, 1)
(1, 5)
(4, 1)

Find the area of the shape.

- a) 8
 - b) 10
 - c) 6
 - d) 4
- 29) Bartholomew works every fifth day and Gretchen works every fourth day. How frequently do they work together?
- a) Every 10th day
 - b) Every 15th day
 - c) Every 20th day
 - d) Every 25th day
- 30) On a calculator, a student starts with 5 and takes the cube root three times in succession. This is not equivalent to which of the following.

- a) $5^{\frac{1}{27}}$
- b) ${}^{27}\sqrt{5}$
- c) $5^{0.037}$
- d) $\left(5^{\frac{1}{3}}\right)^3$

31) Use the diagram below to answer the question that follows.



If $u \geq 0$ and $t \geq 0$, which of the following system of equations corresponds to the shaded portion of the graph?

a) $\begin{cases} u - 3t \geq -15 \\ 2u - 2t \leq 6 \end{cases}$

c) $\begin{cases} 2u - 3t \geq 3 \\ u - t \leq 5 \end{cases}$

b) $\begin{cases} u + 3t \geq 10 \\ 2u - t \leq 6 \end{cases}$

d) $\begin{cases} u - 3t > -15 \\ u - t < 6 \end{cases}$

32) Which polygon cannot be tessellated?

a) Equilateral Triangle

c) Square

b) Regular Pentagon

d) Regular Hexagon

33) A hand is two feet from a flashlight and two yards from a screen forming a hand puppet shadow that is twenty inches tall. How tall is the hand that is forming the shadow?

a) 10 inches

c) $\frac{20}{3}$ inches

b) $6\bar{6}$ inches

d) 5 inches

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34) What is the least common multiple and greatest common factor of 4200 and 6160?

- a) 92400; 280
b) 9240; 280
c) 92400; 2800
d) 9240; 2800

35) If a triangle has side lengths of a , b and c , which relationship has to exist between the three sides for every triangle?

- a) $a + b > c$
b) $ab > bc$
c) $a^2 + b^2 = c^2$
d) (a) and (c) are both correct

36) What is the best type of chart to use to compare two different sets of geometry test scores?

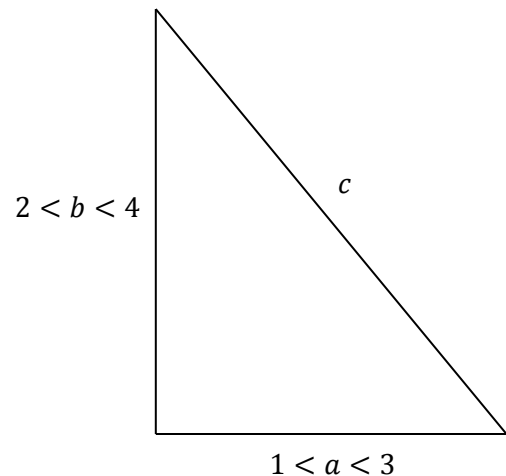
- a) Stem and leaf plot
b) Box plot
c) Scatter plot
d) Pie charts

37) Let $f(a) = \frac{2}{3}(3a + 9) - 3$. Now, $g(b)$ is parallel to $f(a)$, with a y -intercept of 1. $h(c)$ is a line passing through the points (3, 5) and (5, 1). Determine where $g(b)$ intersects $h(c)$.

- a) $(\frac{5}{2}, 6)$
b) $(\frac{5}{2}, 10)$
c) (6, 10)
d) (6, 6)

38) Given the right triangle shown below, which value for c is reasonable?

- a) -5
b) 2
c) 4
d) 13



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39) Simplify the following: $2[3(x + 1) - (4 + x)^2]$

- a) $-2x^2 - 10x - 26$ c) $2x^2 + 22x - 26$
b) $-2x^2 + 6x - 26$ d) $4x^2 + 20x - 52$

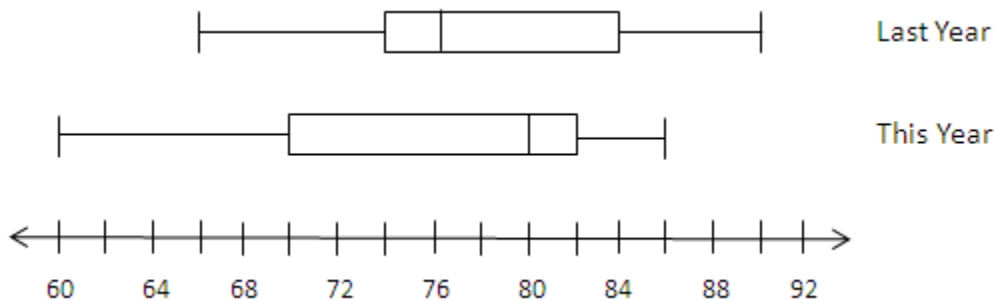
40) Using a base five system, what is $14_5 + 23_5$?

- a) 42_5 c) 37_5
b) 302_5 d) 40_5

41) Sally's Salon sells Simply Sally Hair Spray. Sally wants to sell all of her hair spray by the end of the year, so if she has any left in stock after Thanksgiving, she puts it on sale. Sally has found that the probability of selling all of her hair spray by Thanksgiving is 70%. Sally makes \$7 profit per can at full price and \$4 profit per can at sale price. What profit per can, on average, can Sally expect to make?

- a) \$61.00 c) \$5.50
b) \$6.10 d) \$7.00

42) The plots below display math scores from a 7th grade geometry final exam this year and last year. Which of the following is an accurate statement to report to the math head?



- a) Unfortunately, the current geometry scores are not as high as last year. This year a higher percentage of students than last year had raw scores below 76.
b) Unfortunately, the current geometry scores are not as high as last year. Last year a higher percentage of students scored higher than 86.
c) Even though the median increased, because 50th percentile confidence intervals overlap, the statistical significance of the increase is in doubt without performing additional statistical tests.
d) Fortunately, the current geometry scores show statistically significant improvement because this year's median is higher than last year's median.

43) Use the table below to answer the question that follows.

Vertex	Coordinates
A	(1,2)
B	(5,2)
C	(5,4)

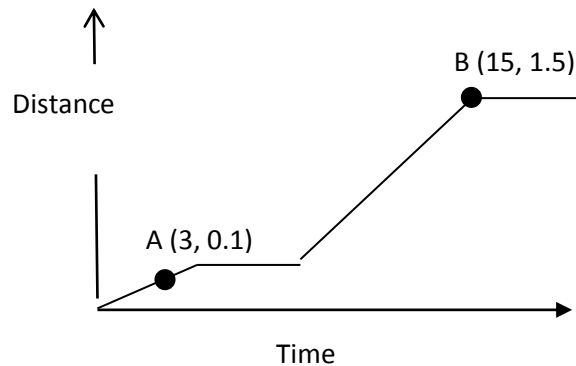
The three vertices A, B, C make up a triangle. What is the area of the triangle?

- a) 5 square units
b) 4 square units
c) $2\sqrt{5}$ square units
d) 8 square units

44) A farmer is building a pig pen. He needs at least 10 square feet per pig. The length is 2 units longer than a constant and the width is 1 more than a constant. What are the possible values for the constant so the farmer can hold at least three pigs?

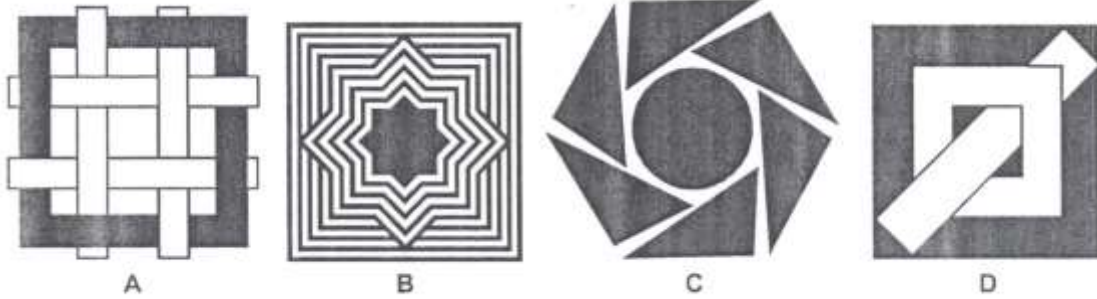
- a) $x > 4$
b) $x < 7$
c) $x = 4$
d) $-7 < x < 4$

45) Bre went for a jog. Her distance as a function of time is shown in the graph. From the slope of the secant line between points A and B, what would you be able to determine about her jog?



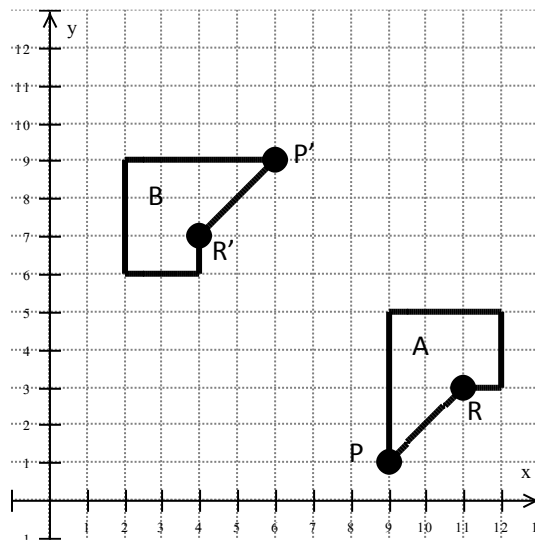
- a) How far she went between points A and B.
b) Her acceleration between points A and B.
c) Her average speed between points A and B.
d) The time it took for her to go from A to B.

46) Which of the figures below has both reflective and rotational symmetry?



- a) Figure A
- b) Figure B
- c) Figure C
- d) Figure D

47) Describe the transformation from A to B with rotation about point R.



- a) Reflect over the line $y = 5$, translate left 7, rotate 90° clockwise.
- b) Translate down 4, reflect over $y = 7$, rotate 90° clockwise.
- c) Translate right 6, rotate 180° clockwise, reflect over $y = 5$.
- d) Rotate 270° clockwise, reflect over $y = 5$, translate right 6.

48) A radioactive material has a half-life of 10 s. If there was 1000 mg of material at time zero, how much is left after t seconds?

- a) $A = A_0(2)^{-t/10}$
- b) $A = A_0(e)^{-t/10}$
- c) $A = \log\left(\frac{A_0}{t}\right)$
- d) $A = 2\ln\left(\frac{A_0}{10t}\right)$