

## EIGHTH GRADE MOCK ACT ASPIRE

### Directions:

Today you will be taking a Mock ACT Aspire Mathematics Test

Read each question carefully. Some questions will ask you to choose one correct answer, while other questions will ask you to show your thinking and explain your process. Mark your answers by filling in the circles in your test booklet.

If you do not know the answer to a question, skip it and go on. If you finish the test early, you may review your answers and any questions you may have skipped.

You will have 65 minutes to complete this test. I will give you a 5 minute warning to let you know there is five minutes left in the test. Are there any questions before we begin?

Inside this test booklet are questions about mathematics. Some questions are multiple choice. Others ask to you to write your answer.

**Multiple Choice Questions:**

- There is one correct answer.
- Read the question carefully and then choose the correct answer.
- In the answer document, completely fill in the circle that goes with the answer you think is correct.
- If you decide to change your answer, erase your first answer completely.
- It is best to mark an answer for every question even if you are not sure which answer is correct.
- Instructions for marking your answers are given in your answer document.

**Constructive Response Questions:**

- Write your answer on the answer document.
- Write your entire answer inside the box that goes with the question.
- Give reasons in your answer.
- Instructions for writing your answers are given in your answer document.

**Please Note:**

- Any writing in your test booklet will NOT be scored. Only your responses in your answer document will be scored.
- Begin working on the test when you are told to do so.
- If you finish the test before time is called, you should use the remaining time to review your work.
- When time is called, lay down your pencil immediately.
- You may NOT change answers in any way after time is called.

1. The average distance from Earth to the Moon is approximately 384,400,000 meters. What is the distance, in kilometers, from Earth to the Moon written in scientific notation?
  - a.  $3.844 \times 10^4$  kilometers
  - b.  $3.844 \times 10^5$  kilometers
  - c.  $3.844 \times 10^6$  kilometers
  - d.  $3.844 \times 10^7$  kilometers
  - e.  $3.844 \times 10^8$  kilometers
  
2. A square has 4 sides of equal length. If a diagonal is  $5\sqrt{2}$ , what is the length of each side?
  - f. 25 units
  - g. 12 units
  - h. 10 units
  - j. 5 units
  - k. 3 units
  
3. When the input to a function is -2, the output is 4. Which statement about this function **MUST** be true?
  - a. An input of -2 has infinitely many possible outputs.
  - b. An input of -2 has exactly one possible output.
  - c. An output of 4 has infinitely many inputs.
  - d. An output of 4 has exactly one input.
  - e. None of the above.

4. Martin is considering the expressions  $\frac{1}{2}(7x + 48)$  and  $-\left(\frac{1}{2}x - 3\right) + 4(x + 5)$ . He wants to know if one expression is greater than the other for all values of  $x$ . Which statement about the relationship between the expressions is true.
- f. The value of the expression  $\frac{1}{2}(7x + 48)$  is always equal to the value of the expression  $-\left(\frac{1}{2}x - 3\right) + 4(x + 5)$ .
  - g. The value of the expression  $\frac{1}{2}(7x + 48)$  is always less than the value of the expression  $-\left(\frac{1}{2}x - 3\right) + 4(x + 5)$ .
  - h. The value of the expression  $\frac{1}{2}(7x + 48)$  is always greater than the value of the expression  $-\left(\frac{1}{2}x - 3\right) + 4(x + 5)$ .
  - j. The value of the expression  $\frac{1}{2}(7x + 48)$  is sometimes greater than and sometimes less than the value of the expression  $-\left(\frac{1}{2}x - 3\right) + 4(x + 5)$ .
  - k. The value of the expression  $\frac{1}{2}(7x + 48)$  is never equal to the value of the expression  $-\left(\frac{1}{2}x - 3\right) + 4(x + 5)$ .

5. Which system of equations has infinitely many solutions?

- a.  $\begin{cases} y = -x \\ 8y = -8x \end{cases}$
- b.  $\begin{cases} y = 3x + 1 \\ y = -4 \end{cases}$
- c.  $\begin{cases} x + y = 4 \\ 3x + 3y = 1 \end{cases}$
- d.  $\begin{cases} x + y = 4 \\ 3x + 3y = 1 \end{cases}$
- e.  $\begin{cases} x - y = 4 \\ 3x + 3y = 1 \end{cases}$

6. Solve for x:

$$9(3 - 2x) = 2(10 - 8x)$$

f.  $x = 3$

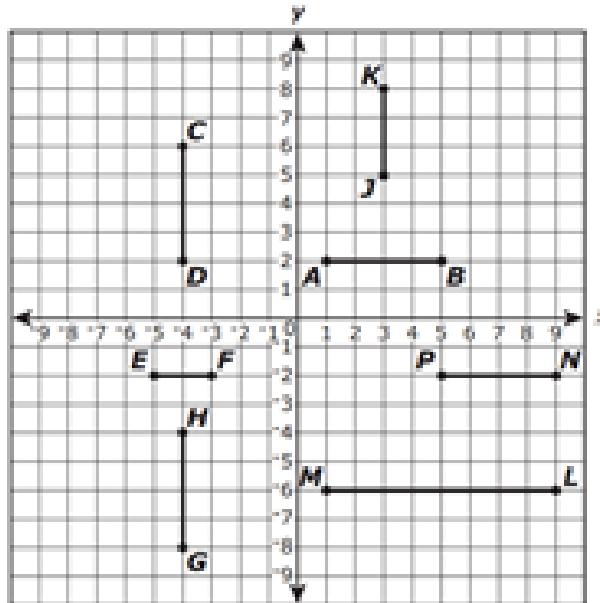
g.  $x = 3.5$

h.  $x = -3.5$

j.  $x = 4$

k.  $x = 17$

7. Seven line segments are shown on the coordinate plane. Explain which of these segments could be the image of segment AB after a sequence of reflections, rotations, and/or translations.



8. Which decimal is the equivalent of  $\frac{6}{11}$ ?

a.  $0.18\bar{3}$

b.  $0.\overline{183}$

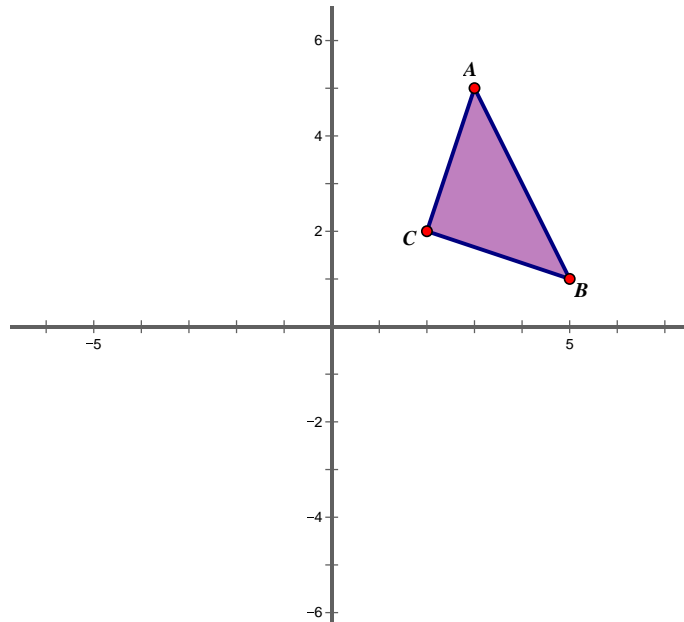
c.  $0.\overline{54}$

d.  $0.5\overline{4}$

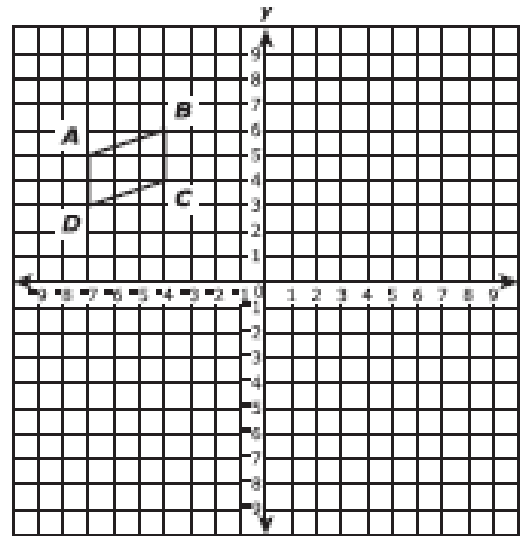
e.  $1.8\bar{3}$

9. The triangle ABC is reflected across the x-axis, resulting in triangle A'B'C'. What are the coordinates of point B'?

- f. (-5,1)
- g. (-1,5)
- h. (1,-5)
- j. (5,-1)
- k. (1,5)



10. Parallelogram ABCD is shown on the coordinate plane.



Parallelogram A'B'C'D' (not shown) is the image of parallelogram ABCD after a rotation of 180° about the origin. Which statement is true?

- a.  $\overline{A'B'}$  is parallel to  $\overline{B'C'}$
- b.  $\overline{A'B'}$  is parallel to  $\overline{A'D'}$
- c.  $\overline{A'B'}$  is parallel to  $\overline{C'D'}$
- d.  $\overline{A'B'}$  is parallel to  $\overline{A'C'}$
- e.  $\overline{A'D'}$  is parallel to  $\overline{D'C'}$

11. Which equation has **both** 4 and -4 as possible values of y?

f.  $y^2=8$

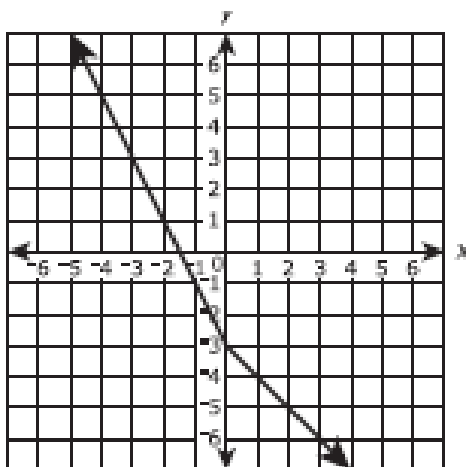
g.  $y^3=8$

h.  $y^2=16$

j.  $y^3=64$

k.  $y=4$

12. The graph of a nonlinear function is shown on the coordinate plane. In the graph, y is a function of x.



When the input of the function is -4, what is the output of the function?

- a. -5
- b. -1
- c. 1
- d. 5
- e. -7

13. In a system of two linear equations, the lines represented by each equation have the same slope. What is the total number of solutions to this system? Explain why you chose your answer.

14. Solve for the value of x.

$$\frac{1}{5}(2x - 10) + 4x = -3\left(\frac{1}{5}x + 4\right)$$

f.  $-\frac{2}{5}$

g.  $-1\frac{1}{5}$

h. -2

j.  $-5\frac{5}{9}$

k. 2

15. Which equation defines y as a nonlinear function of x?

a.  $y = 7.4x$

b.  $y = 2x + 5^2$

c.  $y = 10x^2$

d.  $y = 5x - 3$

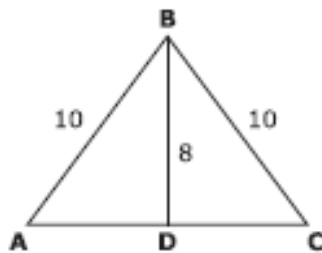
e.  $y = \frac{x}{2}$



16. Which statement **best** describes the value of  $\sqrt{8}$ ?

- f. The value of  $\sqrt{8}$  is between 2 and 2.5
- g. The value of  $\sqrt{8}$  is between 2.5 and 3
- h. The value of  $\sqrt{8}$  is between 3 and 3.5
- j. The value of  $\sqrt{8}$  is between 3.5 and 4
- k. The value of  $\sqrt{8}$  is between 4 and 4.5

17. In  $\triangle ABC$ ,  $\overline{BD}$  is perpendicular to  $\overline{AC}$ . The dimensions are shown in centimeters. What is the length, in centimeters of  $\overline{AC}$ ?

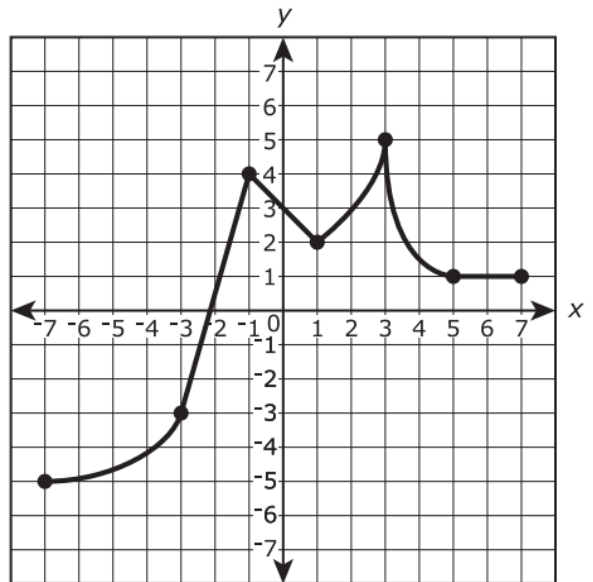


- a. 3 cm
- b. 6 cm
- c. 10 cm
- d. 12 cm
- e. 24 cm

18. Mark is building a rectangular sandbox for his younger brother. The length of the sandbox is 1 foot longer than twice the width of the sandbox. The perimeter of the sandbox is 29 feet. Which equation could be used to determine  $w$ , the width, in feet, of the sandbox?

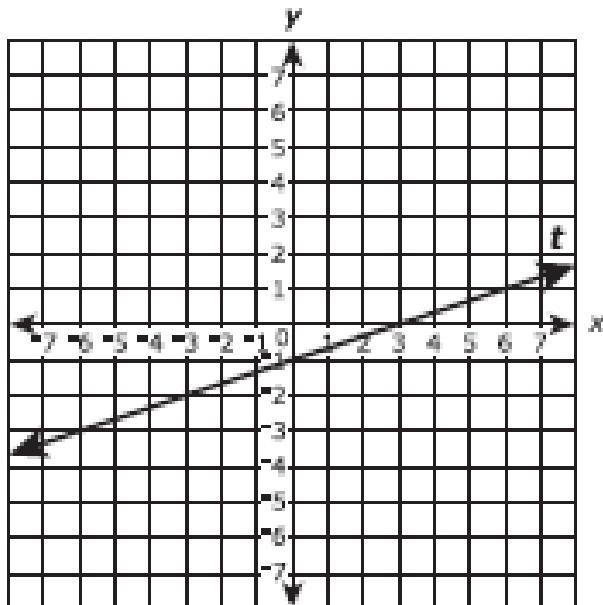
- f.  $w + w + 2 = 29$
- g.  $w + 2w + 1 = 29$
- h.  $2w + 2(w + 2) = 29$
- j.  $2w + 2(2w + 1) = 29$
- k.  $2w + 2w + 1$

19. The graph shows  $y$  as a function of  $x$ . Over which interval(s) is the function decreasing?  
Explain your reasoning.



20. Line  $t$  is shown in the coordinate plane. What is the slope of this line?

- a. 3
- b.  $\frac{1}{3}$
- c.  $-\frac{1}{3}$
- d. -3
- e. 1



21. The erosion rate along a section of the coast is approximately 3 feet per year. Which of these **best** approximates this rate of erosion?

- f.  $9.9 \times 10^{-2}$  inches per day
- g.  $9.9 \times 10^{-2}$  inches per month
- h.  $9.9 \times 10^{-2}$  inches per day
- j.  $9.9 \times 10^{-2}$  feet per hour
- k.  $9.9 \times 10^2$  inches per day

22. Which expression is equivalent to  $\frac{1}{2^6}$

- a.  $2^{-2} \circ 2^4$
- b.  $2^1 \circ 2^5$
- c.  $2^{-5} \circ 2^{-1}$
- d.  $2^3 \circ 2^{-3}$
- e.  $2^{-2} \circ 2^8$

23. Which of these equations represent functions where x is the input and y is the output?

- f.  $x + y = 2$
- g.  $x = 2y$
- h.  $y = 2x$
- j.  $x = 4y$
- k.  $x - y = 4$

24. Lines  $m$  and  $n$  are parallel on a coordinate plane. Lines  $m$  and  $n$  are transformed by the same rotation, resulting in image lines  $s$  and  $t$ . Which statement describes the relationship between lines  $s$  and  $t$ ?
- a. Lines  $s$  and  $t$  are parallel.
  - b. Lines  $s$  and  $t$  are perpendicular.
  - c. Lines  $s$  and  $t$  are intersecting but not perpendicular.
  - d. The relationship between lines  $s$  and  $t$  cannot be determined without knowing the angle of the rotation.
  - e. Lines  $s$  and  $t$  are no longer in the same coordinate plane.
25. Terri makes a quilt using three sizes of fabric squares. The side length of each fabric square is the square root of the area. The areas of the fabric squares are 29, 40, and 62 square inches. Which could be an approximate side length of a square on the quilt?
- f. 2.9 inches
  - g. 9.4 inches
  - h. 7.9 inches
  - j. 10 inches
  - k. 31 inches
26. Which expression has a value that is less than 4.47?
- a.  $\sqrt{14}$
  - b.  $4\pi$
  - c.  $\sqrt{24}$
  - d.  $3\sqrt{20}$
  - e.  $\sqrt{100}$

27. Which system of equations has (4, 1) as its solution?

f.  $-3x + 8y = -4$   
 $3x - 7y = 5$

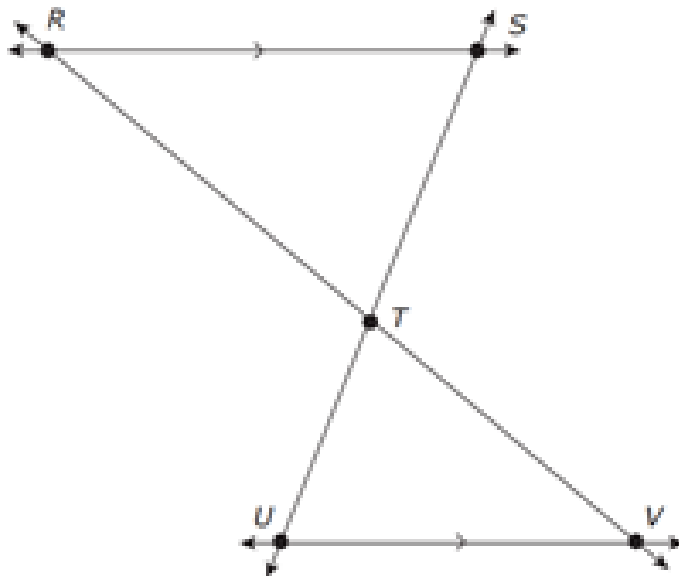
g.  $y = -2x + 9$   
 $2x + y = 4$

h.  $y = \frac{3}{4}x - 2$   
 $y = \frac{1}{2}x - 2$

j.  $x + 2y = 5$   
 $4y = x$

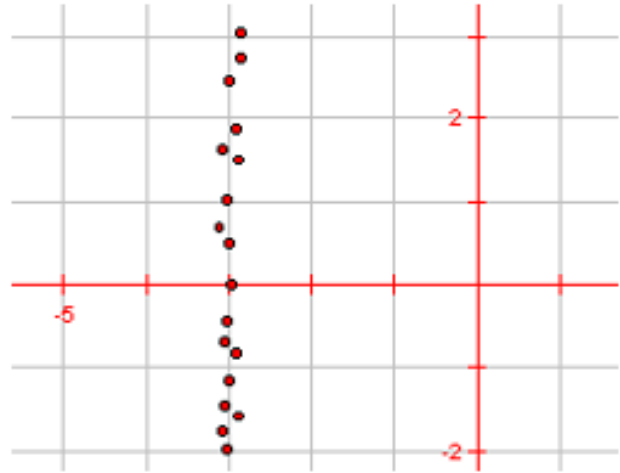
k.  $3x + 2y = 14$   
 $2x + 3y = 7$

28. The figure shows line RS parallel to line UV. The lines are intersected by 2 transversals. All lines are in the same plane. Explain why  $\triangle RTS$  is similar to  $\triangle VTU$ .



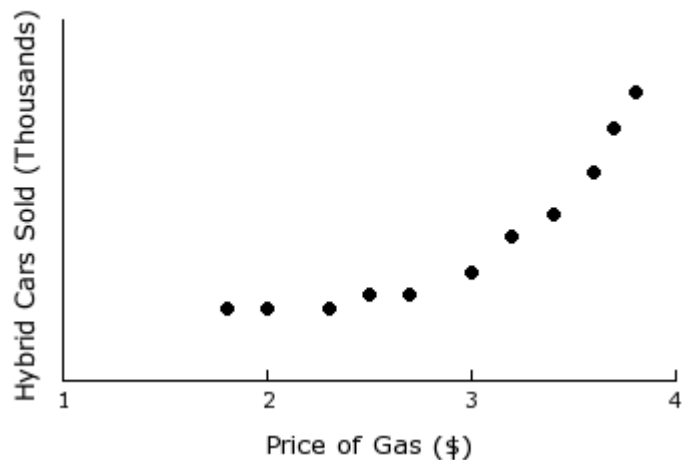
29. Which linear equation is the BEST representation of the line of best fit for the scatterplot?

- a.  $y = 3$
- b.  $x = 3$
- c.  $y = -3$
- d.  $x = -3$
- e. There is no correlation



30. The scatterplot shown compares the price of gasoline (in dollars) and the number of hybrid cars sold (in thousands) in Georgia. Describe the relationship between price of gasoline and number of hybrid cars sold.

**Gas and Hybrid Cars**



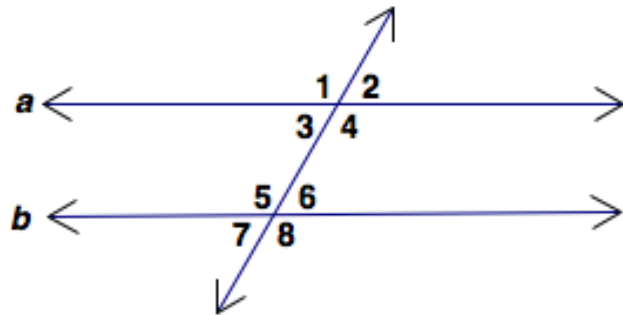
- f. There is no correlation
- g. There is a positive linear correlation
- h. There is a negative linear correlation
- j. There is a non-linear relationship
- k. This graph does not represent a scatterplot

31. If you rotate a right triangle, what features of the triangle changes?

- a. Leg lengths
- b. Angle measures
- c. Length of the hypotenuse
- d. Position of the triangle
- e. The right angle changes to another angle.

32. Given line  $a$  is parallel to line  $b$ . Identify a pair of congruent alternate interior angles.

- f. 3 and 6
- g. 1 and 8
- h. 2 and 5
- j. 4 and 8
- k. 1 and 7

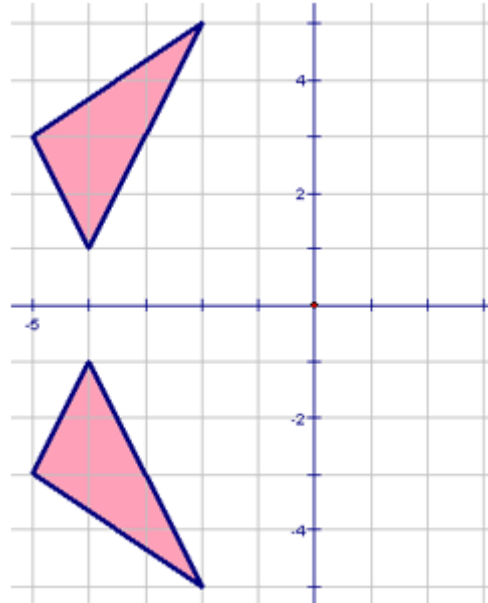


33. What is the volume of a cereal box that is 2 inches thick, 12 inches high, and 10 inches wide?

- a. 24 cubic inches
- b. 72 cubic inches
- c. 122 cubic inches
- d. 120 cubic inches
- e. 240 cubic inches

34. Which best describes the transformation that occurs in the graph below?

- f. Dilation
- g. Reflection
- h. Rotation
- j. Translation
- k. Rotation then Dilation



35. Tara's car accelerated from 10 miles per hour to 60 miles per hour in 12 seconds. What is the approximate rate of change in the miles per hour Tara's car accelerated?

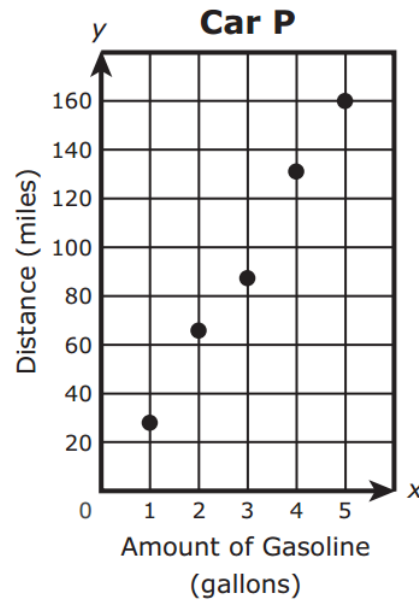
- a. 4 miles per hour per second
- b. 5 miles per hour per second
- c. 48 miles per hour per second
- d. 50 miles per hour per second
- e. 60 miles per hour per second



36. The gasoline mileage for two cars can be compared by finding the distance each car traveled and the amount of gasoline used. The table shows the distance that car M traveled using  $x$  gallons of gasoline. The graph shows the distance,  $y$ , that car P traveled using  $x$  gallons of gasoline.

**Car M**

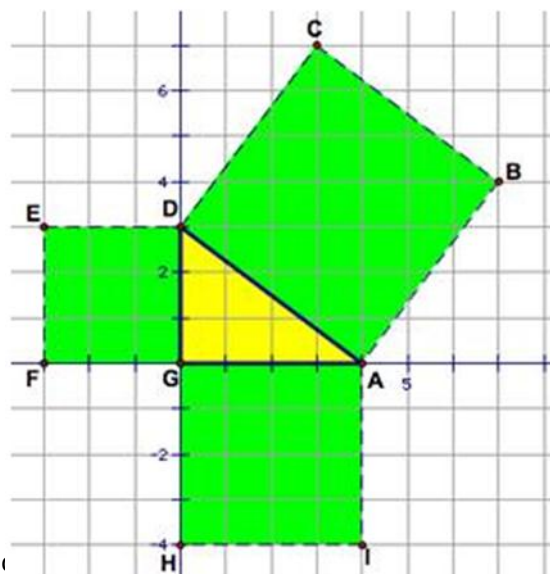
Amount of Gasoline (gallons)	Distance (miles)
2	50.4
3	80.5
7	181.3
5	137.5



Based on the information in the table and the graph, compare the approximate miles per gallon of car M to car P. Show your work or explain your answers.

37. What is the length of segment AD using the figure below?

- f. 3
- g. 4
- h. 5
- j. 6
- k. 7



38. Identify the linear equation.

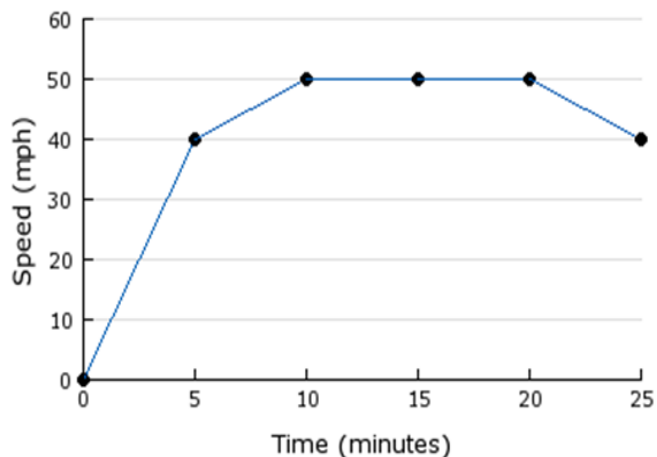
- a.  $y = |x| + 5$
- b.  $y = \frac{1}{2}x + 3$
- c.  $y = x^2 - 4$
- d.  $y = \frac{3}{4}x^2$
- e.  $x^2 + y^2 = 25$

39. Olivia is growing roses and keeps track of how much fertilizer (in ounces) she adds to the soil and how many blooms each rose bush has. She finds a linear relationship that can be modeled by the equation  $y = 1.345x + 4$ . What does the 1.35 mean in the context of the problem?

- f. That she must add 1.345 ounces of fertilizer every day.
- g. That every day she found an additional 1.345 blooms on her rose bushes.
- h. That for every additional bloom on the rose bush she added 1.345 ounces of fertilizer.
- j. That for every ounce of fertilizer she adds there is an additional 1.345 blooms on the rose bush.
- k. That for every 1.345 blooms she finds on the roses she will need to add 4 ounces of fertilizer.

40. The graph represents part of Brooke's trip to work. During what time period is her speed increasing?

- a. between 0 and 10 minutes
- b. Between 15 and 20 minutes
- c. Between 20 and 25 minutes
- d. Between 10 and 15 minutes
- e. Between 10 and 20 minutes



41. Two companies offer different charges for text messaging. Company 1 charges \$0.04 per text message, while Company 2 charges rates according to the table. Which company offers the cheapest plan for up to 500 text messages?

# of text messages	Price (\$)
0 - 100	5
101 - 200	10
201 - 300	15
301 - 400	20
401 - 500	25

**Company 2**

- f. Company 1 because the cost of 500 text messages is \$15.
- g. Company 1 because the cost of 500 text messages is \$20.
- h. Company 2 because the cost of 500 text messages is \$25.
- j. Company 2 because the cost of 500 text messages is \$20.
- k. The cost for both plans are exactly the same for 500 text messages.

42. Which function has the largest slope?

a.  $y = 4x + 5$

b.  $y = \frac{8x+2}{4}$

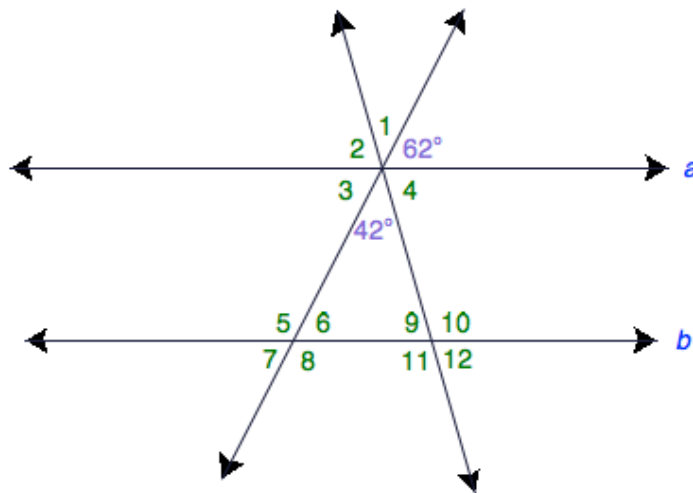
c.  $y$  equals seven added to three times  $x$

d. a function showing a rock collection growing by five rocks per day

e.  $y = \frac{3}{4}x$

43. Find the missing angles in the diagram. Explain how you find each angle measure.

Given:  $a \parallel b$



44. If  $a$  is a rational number and  $b$  is an irrational number, then the sum  $a + b$  is.

f. rational

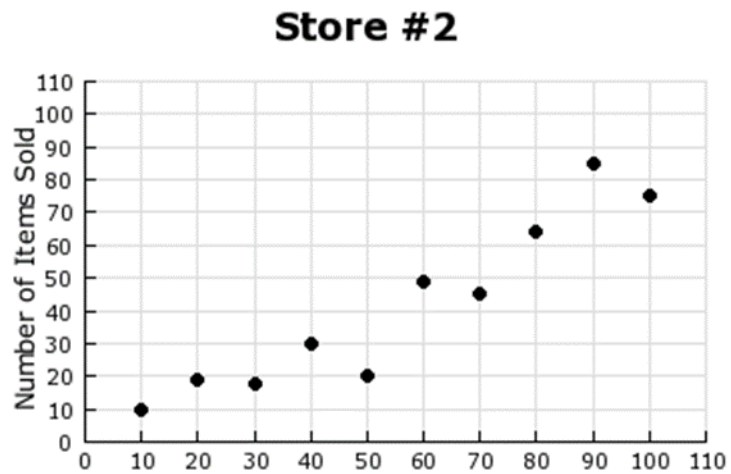
g. imaginary

h. irrational

j. an integer

k. real

45. Mike owns two hardware stores. The scatterplots show the number of items sold at a specific price for each store for one week. Which store sells more items?



- a. Store #1
- b. Store #2
- c. The stores bring in the same amount of sales
- d. This cannot be determined from the scatterplots
- e. None of the above