



Math  
Spring Operational 2015

Grade 8  
End of Year Released Items

Seven expressions are shown. Indicate whether each expression is equivalent to or not equivalent to  $7^8 \times 7^{-4}$ .

Drag and drop each expression into the correct box.

$7^{(8-4)}$   $(7^8)^{-4}$   $\frac{7^8}{7^4}$   $\frac{7^8}{7^{-4}}$   $7^2$   $7^{-2}$   $7^{-32}$

Equivalent to  $7^8 \times 7^{-4}$

Not Equivalent to  $7^8 \times 7^{-4}$

Which equation has the same solution as  $4 - 2(x - 5) = x - 19$ ?

- A.  $2(x + 5) = -8$
- B.  $3(x - 3) = 9$
- C.  $x + 2 = 2x - 3$
- D.  $3x - 4 = 2x + 7$

A system of equations is shown.

$$\begin{cases} x + \frac{1}{2}y = 0 \\ x - \frac{3}{2}y = 4 \end{cases}$$

In the solution to this system of equations, what is the value of  $y$ ?

Enter your answer in the box.

Four systems of equations are shown in the table. Indicate whether each system of equations has no solution, one solution, or infinitely many solutions.

Select a cell in each column of the table.

System of Equations	$2x + 3y = -6$ $4x + 6y = -12$	$x = 1$ $y = 2$	$x - 2y = 4$ $x - 2y = 5$	$y = 5x + 20$ $3y = 15x + 60$
No Solution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
One Solution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Infinitely Many Solutions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The table shows a relation.

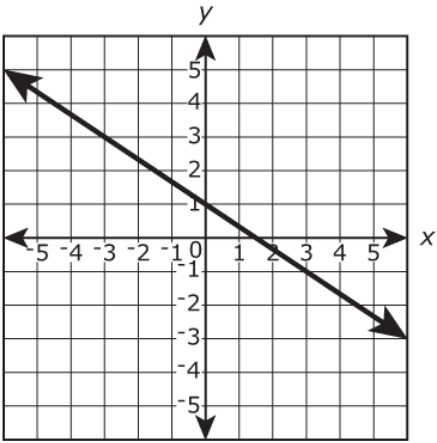
Input	Output
-1	2
3	-1
1	2
-2	3
-1	1

Which statement about the relation is correct?

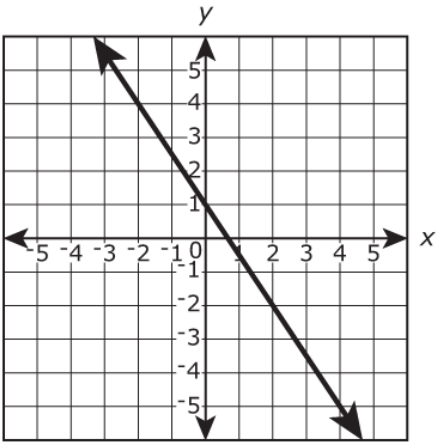
- A. The relation is a function because each input has exactly one output.
- B. The relation is a function because each output has exactly one input.
- C. The relation is not a function because one input has more than one output.
- D. The relation is not a function because one output has more than one input.

Function A is defined by the equation  $y = -\frac{2}{3}x + 1$ . Which is the graph of function A?

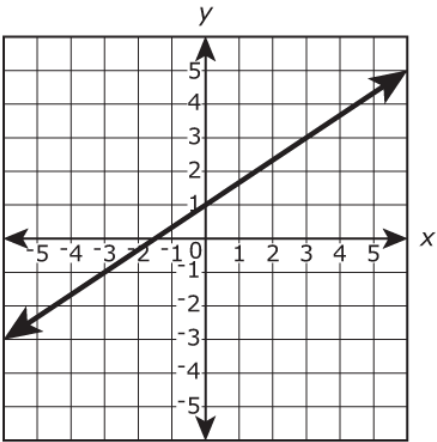
A.



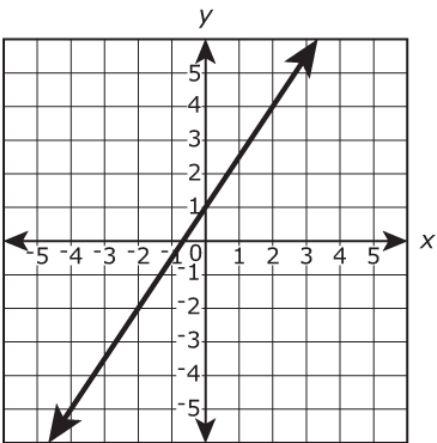
B.



C.



D.



What fraction is equivalent to  $0.\overline{4}$ ?

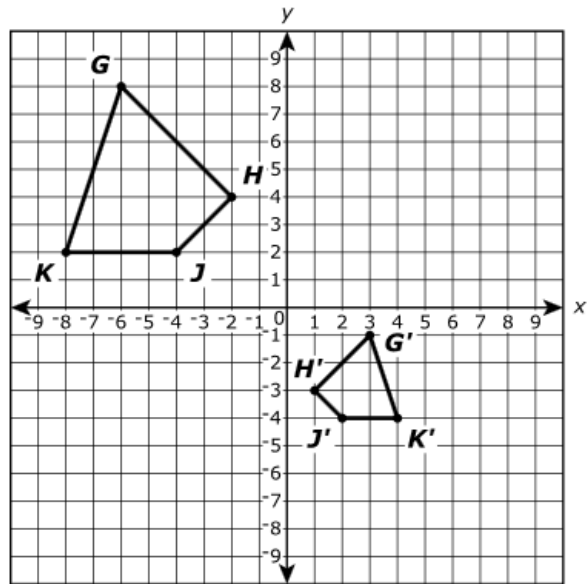
Enter your answer in the space provided. Enter **only** your answer.


The length of the diagonal of a rectangle is  $\sqrt{181}$  inches.

Which statement describes the length of the diagonal?

- A. The length is between 12 and 13 inches.
- B. The length is between 13 and 14 inches.
- C. The length is between 14 and 15 inches.
- D. The length is between 15 and 16 inches.



### Part A

Which describes a possible sequence of transformations that transforms polygon  $GHJK$  into polygon  $G'H'J'K'$  ?

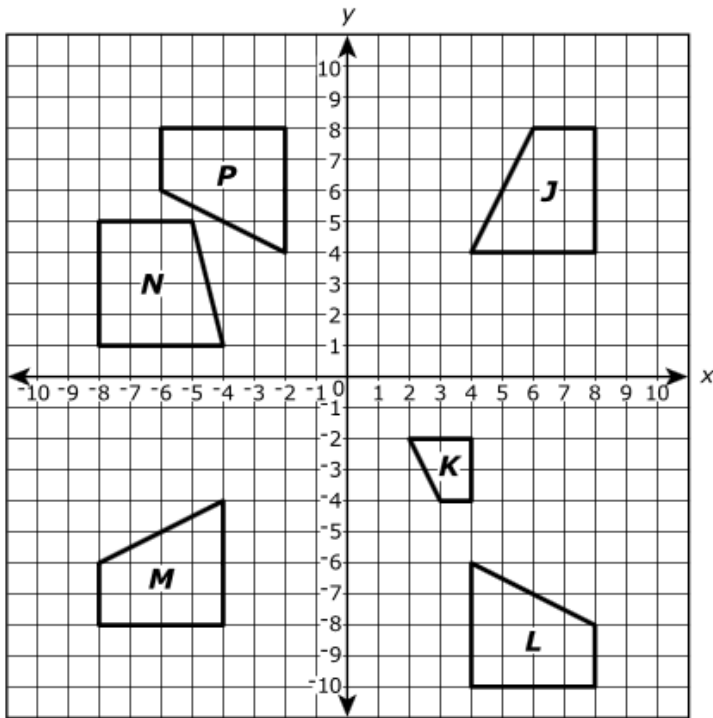
- A. a 180-degree rotation about the origin, followed by a dilation centered at the origin with a scale factor of  $\frac{1}{2}$
- B. a reflection across the line  $y = x$ , followed by a dilation centered at the origin with a scale factor of 2
- C. a reflection across the  $y$ -axis, followed by a reflection across the  $x$ -axis, followed by a dilation centered at the origin with a scale factor of 2
- D. a reflection across the  $y$ -axis, followed by a translation down 10 units, followed by a dilation centered at the origin with a scale factor of  $\frac{1}{2}$

### Part B

Which **best** describes the relationship between polygon  $GHJK$  and polygon  $G'H'J'K'$  ?

- A. They are similar because polygon  $G'H'J'K'$  can be obtained from polygon  $GHJK$  by a sequence of transformations.
- B. They are similar because the area of polygon  $GHJK$  is the same as the area of polygon  $G'H'J'K'$ .
- C. They are NOT similar because polygon  $G'H'J'K'$  cannot be obtained from polygon  $GHJK$  in a single transformation.
- D. They are NOT similar because the orientation of polygon  $GHJK$  is not the same as the orientation of polygon  $G'H'J'K'$ .

Figures *J*, *K*, *L*, *M*, *N*, and *P* are shown on the coordinate plane.



**Part A**

Which figure can be transformed into figure *P* by a translation 2 units to the right followed by a reflection across the *x*-axis?

- A. figure *J*
- B. figure *K*
- C. figure *L*
- D. figure *M*

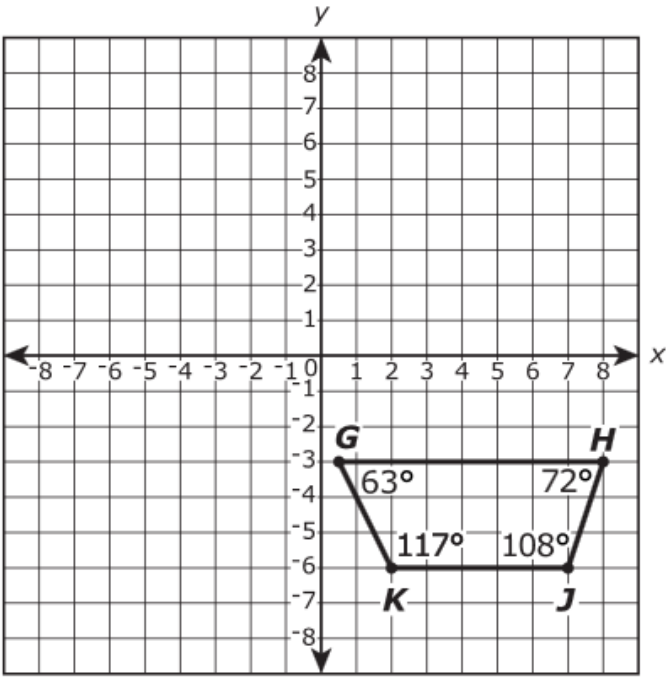
**Part B**

Which figure can be transformed into figure *L* by a 90° rotation clockwise about the origin followed by a translation 2 units down?

- A. figure *J*
- B. figure *M*
- C. figure *N*
- D. figure *P*



Trapezoid  $GHJK$  is shown on the coordinate plane with angle measures shown to the nearest degree.



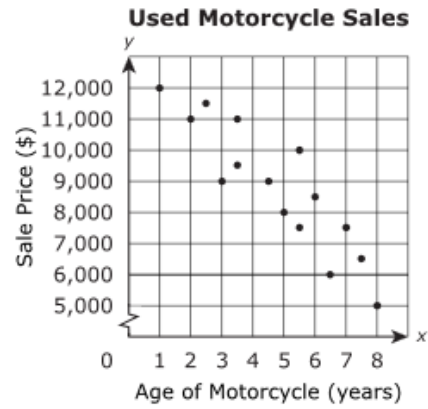
The following transformations occur:

- Trapezoid  $GHJK$  is rotated  $90^\circ$  clockwise about the origin, resulting in trapezoid  $G'H'J'K'$  (not shown).
- Trapezoid  $G'H'J'K'$  is reflected across the x-axis, resulting in trapezoid  $G''H''J''K''$  (not shown).

Drag and drop each of the angles of the transformations into the box with its angle measure.

$\angle G'$	$\angle J'$	$\angle H''$	$\angle K''$
$63^\circ$	$72^\circ$	$108^\circ$	$117^\circ$

The scatter plot shows the age and sale price of fifteen used motorcycles.

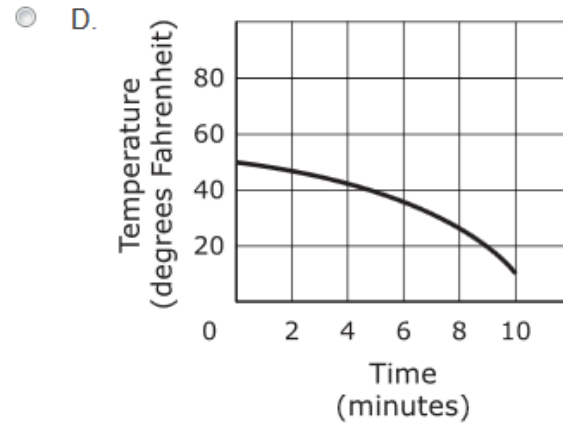
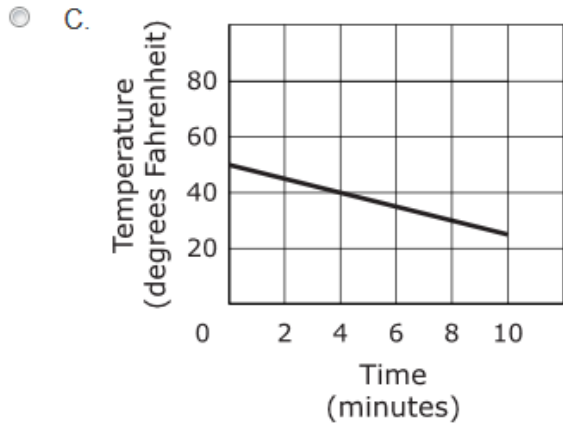
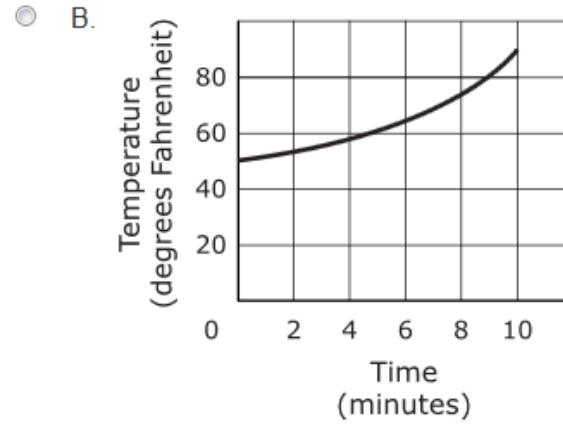
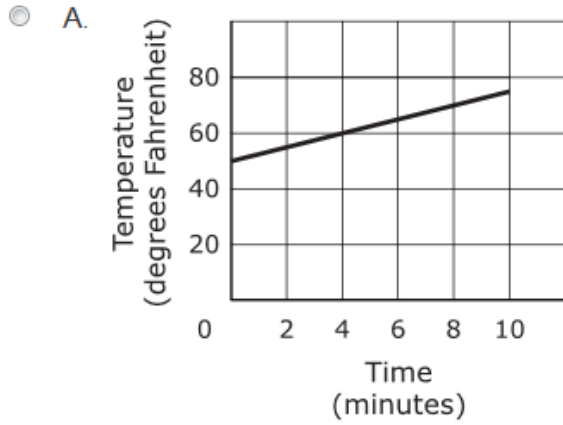


Describe the association shown in the scatter plot.

Select from the drop-down menus to correctly complete the sentence.

The scatter plot shows  association between the age of a motorcycle and the sale price of the motorcycle because as the age of a motorcycle increases, the sale price of the motorcycle .

During a ten-minute science experiment, the temperature of a substance decreases at a constant rate. Which graph represents this situation?



Which functions are **not** linear?

Select **three** such functions.

- A.  $y = \frac{x}{5}$
- B.  $y = 5 - x^2$
- C.  $-3x + 2y = 4$
- D.  $y = 3x^2 + 1$
- E.  $y = -5x - 2$
- F.  $y = x^3$

A relationship between  $x$  and  $y$  is defined by the equation  $-5x + 3y = 12$ , where  $x$  is the input and  $y$  is the output.

Indicate whether each of these statements about the relationship is true or false by selecting a box in each row.

Statement	True	False
$y$ is a function of $x$ .	<input type="checkbox"/>	<input type="checkbox"/>
The graph of the relationship is a line.	<input type="checkbox"/>	<input type="checkbox"/>
The graph of the relationship passes through the origin.	<input type="checkbox"/>	<input type="checkbox"/>
When the input is 6, the output is 14.	<input type="checkbox"/>	<input type="checkbox"/>

The equation of line  $j$  is  $y = -2x + 8$ .

The equation of line  $k$  is  $y = 3x - 7$ .

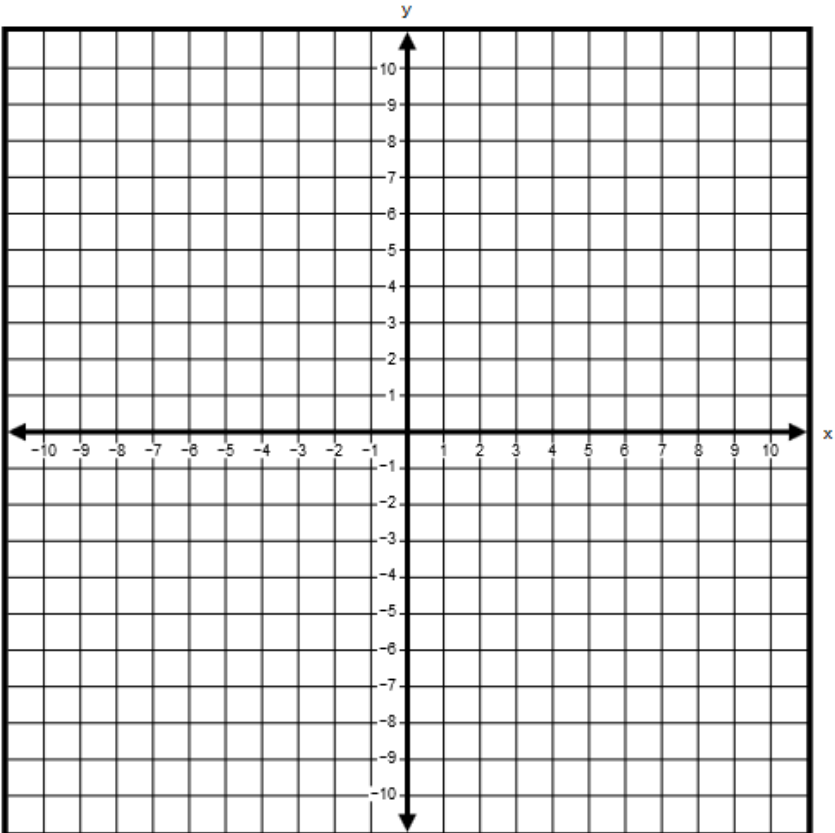
The equations of lines  $j$  and  $k$  form a system of equations. The solution to the system of equations is located at point  $P$ .

- Graph the system of equations on the coordinate plane. To graph each line, select two points on the grid. A line connecting the two points will be automatically drawn.
- Plot point  $P$  on the graph. To plot the point, select its location on the grid.

Line  $j$

Line  $k$

Point  $P$



What value of  $x$  makes the equation  $3(x - 6) - 8x = -2 + 5(2x + 1)$  true?

Enter your answer in the box.

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Which of these expressions represent solutions to the equation  $y^3 = 64$ ?

Select **each** correct answer.

- A.  $-\sqrt[3]{64}$
- B.  $\sqrt[3]{64}$
- C.  $-8$
- D.  $8$
- E.  $-4$
- F.  $4$

A carpenter bought 750 nails. Each nail has a mass of  $5.2 \times 10^{-3}$  kilogram. What is the total mass, in kilograms, of the nails the carpenter bought? Give your answer as a decimal.

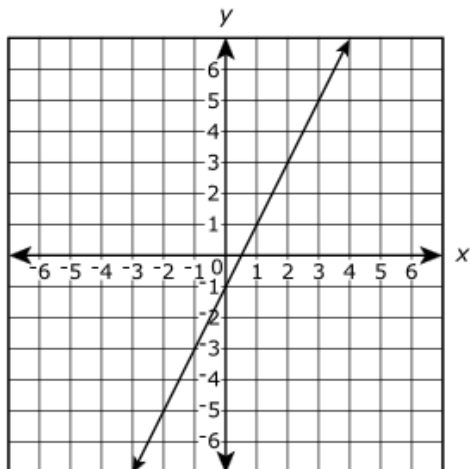
Enter your answer in the box.

A system of two linear equations is graphed on a coordinate plane. If the system of equations has infinitely many solutions, which statement must be true?

- A. On the graph, there are no points  $(x, y)$  that satisfy both equations.
- B. On the graph, there is exactly one point  $(x, y)$  that satisfies both the equations.
- C. On the graph, any point  $(x, y)$  that satisfies one of the equations cannot satisfy the other equation.
- D. On the graph, any point  $(x, y)$  that satisfies one of the equations must also satisfy the other equation.

The graph of Function 1 is shown on the coordinate plane.

**Function 1**



The equations of three other functions are given.

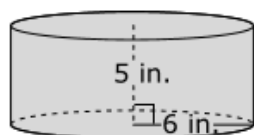
Function 2	Function 3	Function 4
$y = 3 + 2x$	$y = 2$	$y = \frac{3}{2}x + 6$

Which function or functions have a slope equal to the slope of Function 1?

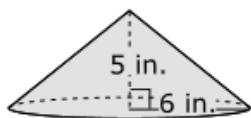
- A. Function 2 only
- B. Function 4 only
- C. Function 2 and Function 3 only
- D. Function 2 and Function 4 only



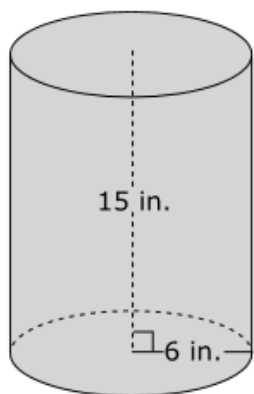
Consider the figures shown.



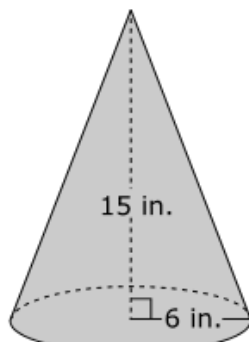
Cylinder #1



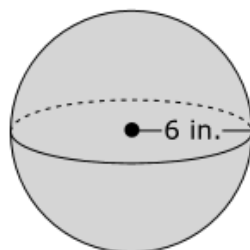
Cone #1



Cylinder #2



Cone #2



Sphere

### Part A

Which figures have a volume greater than 600 cubic inches?

- A. Cylinder #1
- B. Cone #1
- C. Cylinder #2
- D. Cone #2
- E. Sphere

### Part B

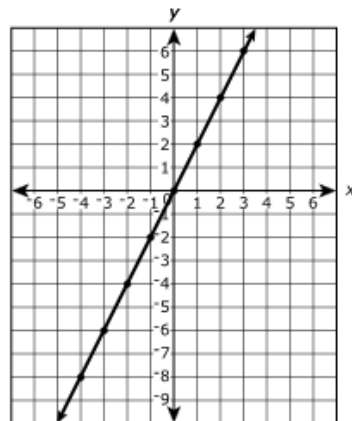
How many times greater is the volume of the Sphere than the volume of Cone #1? Round your answer to the nearest tenth.

Enter your answer in the box.

Some values of linear functions A and B are shown in the table and graph.

**Function A**

x	y
0	1
1	1.25
2	1.5
3	1.75
4	2

**Function B**

Which of the following describes the y-intercepts of the two functions?

- A. The y-intercept of Function A is equal to the y-intercept of Function B.
- B. The y-intercept of Function A is 1 unit less than the y-intercept of Function B.
- C. The y-intercept of Function A is 1 unit greater than the y-intercept of Function B.
- D. The y-intercept of Function A is 2 units greater than the y-intercept of Function B.

A tank of water was drained at a constant rate. The table shows the number of gallons of water left in the tank after being drained for two amounts of time.

Draining Time (minutes)	Water in Tank (gallons)
10	450
30	330

**Part A**

What is the rate at which the water was drained from the tank?

- A. 6 gallons of water per minute
- B. 11 gallons of water per minute
- C. 45 gallons of water per minute
- D. 120 gallons of water per minute

**Part B**

What was the total amount of water in the tank before it was drained?

- A. 450 gallons
- B. 510 gallons
- C. 560 gallons
- D. 570 gallons

**Part A**

Paul wrote the equation  $t = 2m + 40$  to represent the temperature,  $t$ , in degrees Celsius, after a substance had been heated for  $m$  minutes.

Describe the relationship between the temperature of the substance and the time the substance has been heated.

Select from the drop-down menus to correctly complete each statement.

The temperature was initially  degree(s) Celsius. The temperature increased by  degree(s) Celsius every  minute(s) it was heated.

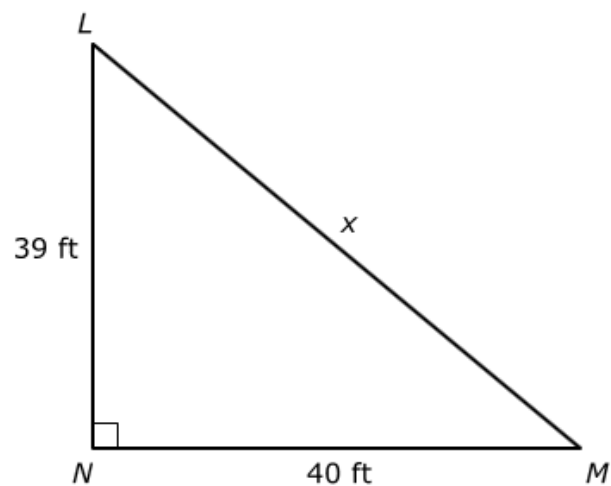
**Part B**

Based on Paul's equation, how many minutes does the substance have to be heated to reach a temperature of 100 degrees Celsius?

Enter your answer in the box.

minutes

Right triangle  $LMN$  is shown.



What is the length of the hypotenuse,  $x$ , of triangle  $LMN$ ? Round your answer to three decimal places.

Enter your answer in the box.

 feet

A survey of 7th and 8th grade students asked whether they were in favor of or against school uniforms. The two-way table shows the results.

**Survey Results**

Grade	Number of Students		
	In Favor	Against	Total
7th	48	64	112
8th	68	70	138
Total	116	134	250

To the nearest tenth of a percent, what percent of the 7th grade students were in favor of wearing school uniforms?

- A. 19.2%
- B. 41.3%
- C. 42.9%
- D. 57.1%

The figure shows a spreadsheet Shona made to record the mass, in grams, of several samples of cells. Her spreadsheet automatically converts the masses into scientific notation.

	A	B
1	<b>Sample</b>	<b>Mass (grams)</b>
2	Sample A	7.50 E -5
3	Sample B	3.22 E -7
4	Sample C	8.00 E -10
5	Sample D	6.13 E -5

List the four samples from least mass to greatest mass.

Sample A

Sample B

Sample C

Sample D

Least Mass

Greatest Mass

A history club sold rolls of wrapping paper as a fundraiser. The wrapping paper was sold in small rolls and large rolls.

- The club earned \$3.00 for every small roll sold.
- The club earned \$4.50 for every large roll sold.
- The club sold 10 more large rolls than small rolls.
- The club collected \$135.00 more from sales of large rolls than from sales of small rolls.

The equation  $3s + 135 = 4.5(s + 10)$  can be used to represent this situation, where  $s$  represents the number of small rolls the club sold.

**Part A**

In the equation  $3s + 135 = 4.5(s + 10)$ , what does the expression  $3s$  represent?

- A. the total number of small rolls sold
- B. the total number of large rolls sold
- C. the total number of dollars earned from selling small rolls
- D. the total number of dollars earned from selling large rolls

**Part B**

In the equation  $3s + 135 = 4.5(s + 10)$ , what does the expression  $(s + 10)$  represent?

- A. the total number of small rolls sold
- B. the total number of large rolls sold
- C. the total number of dollars earned from selling small rolls
- D. the total number of dollars earned from selling large rolls

**Part C**

How many small rolls did the history club sell?

Enter your answer in the box.

small rolls

**Part D**

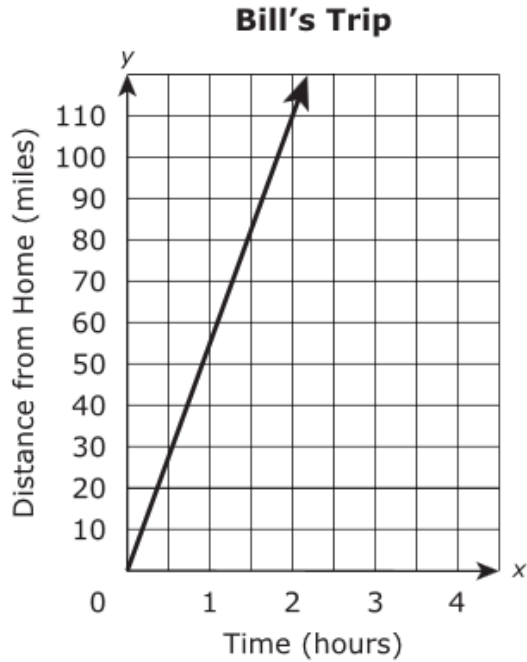
How much money, in dollars, did the history club earn from selling small and large rolls?

Enter your answer in the box.

\$



Bill drove his car at a constant speed while on a trip. Kevin drove his car at a different constant speed while on the same trip. The graph and the table show information about the trips Bill and Kevin took.



**Kevin's Trip**

Time (hours)	Distance from Home (miles)
0	0
2	90
3	135
5	225
6	270

Which sentence correctly compares the rates Bill and Kevin drove on their trips?

- A. Bill drove at a rate that was 10 miles per hour slower than the rate Kevin drove.
- B. Bill drove at a rate that was 10 miles per hour faster than the rate Kevin drove.
- C. Bill drove at a rate that was 20 miles per hour slower than the rate Kevin drove.
- D. Bill drove at a rate that was 20 miles per hour faster than the rate Kevin drove.

Tim has \$20 to buy snacks for 12 people in an office. Each person will get one snack. Tim is buying bags of pretzels that cost \$1.50 per bag and bags of crackers that cost \$2.00 per bag.

**Part A**

Tim is buying  $x$  bags of pretzels and  $y$  bags of crackers. Which system of equations can be used to find the value of  $x$  and  $y$ ?

A. 
$$\begin{cases} x + y = 20 \\ 1.5x + 2y = 12 \end{cases}$$

B. 
$$\begin{cases} x + y = 20 \\ 2x + 1.5y = 12 \end{cases}$$

C. 
$$\begin{cases} x + y = 12 \\ 1.5x + 2y = 20 \end{cases}$$

D. 
$$\begin{cases} x + y = 12 \\ 2x + 1.5y = 20 \end{cases}$$

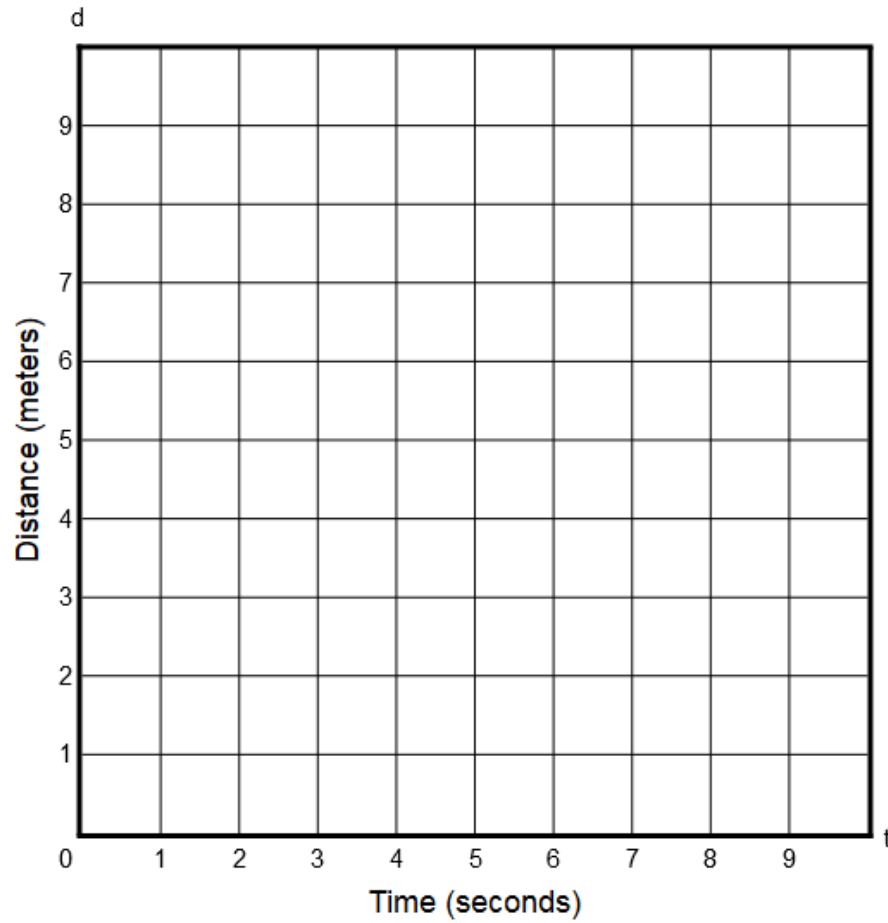
**Part B**

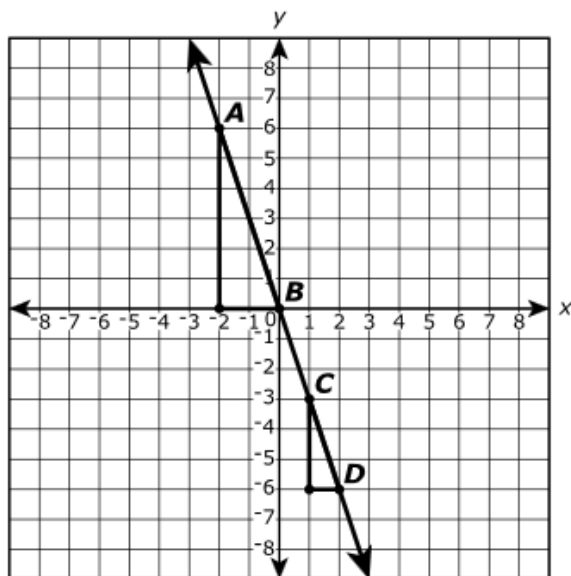
How many bags of pretzels does Tim buy?

Enter your answer in the box.

A model train is traveling at a constant rate of 0.75 meter per second when Rebecca starts a stopwatch. Create a graph that represents the relationship between  $t$ , the amount of time since Rebecca started her stopwatch, and  $d$ , the total distance the train has traveled during that time.

Select two points on the coordinate grid. A line connecting the two points will be automatically drawn.





On the coordinate plane shown, points  $A$ ,  $B$ ,  $C$ , and  $D$  lie on the same line.

Select from the drop-down menus to correctly complete the sentence.

The slope of  $\overline{AB}$  is  the slope of  $\overline{CD}$  because the ratio of the vertical change to the horizontal change between points  $A$  and  $B$  is  the ratio of the vertical change to the horizontal change between points  $C$  and  $D$ .