



Math

Spring Operational 2016

Grade 8

Released Items

1.

M22642

Which expression is equivalent to $(7^3)^5 \cdot 7^4$?

Select **each** correct answer.

- ☐ A. $7^{3 \cdot 5 \cdot 4}$
- ☐ B. $7^{3 \cdot 5 + 4}$
- ☐ C. $7^{3 + 5 + 4}$
- ☐ D. $7^{3(5 + 4)}$
- ☐ E. $7^{3 \cdot 5} \cdot 7^4$
- ☐ F. $7^{3 + 5} \cdot 7^4$

2

VF554929

If $t^3 = \frac{64}{27}$, what is the value of t ?

Give your answer as a fraction.

Enter your answer in the boxes.

3

M21593

Both of the equations shown have the same solution when solved for x .

$$\frac{1}{2}(x + 6) = 2x \text{ and } 5 - 2x = 7x - h$$

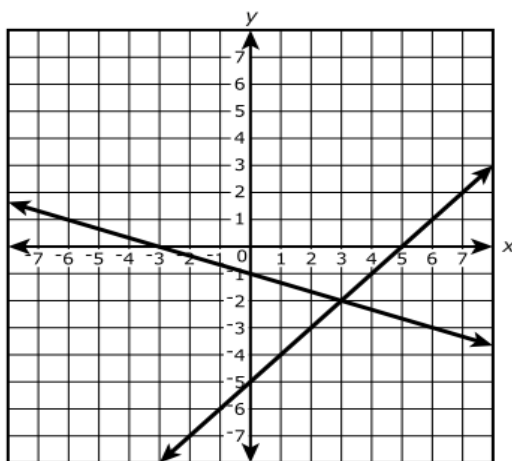
What is the value of h ?

Enter your answer in the box.

4

M20614

The graph of a system of equations is shown on the coordinate grid.



What is the value of y in the solution to this system of equations?

- ☐ A. -5
- ☐ B. -2
- ☐ C. 3
- ☐ D. 5

Here is a system of two linear equations.

$$\begin{cases} x + \frac{3}{4}y = 5 \\ x - \frac{1}{2}y = 0 \end{cases}$$

What is the x-coordinate of the solution to the system of equations?

- ☐ A. -10
- ☐ B. 1
- ☐ C. 2
- ☐ D. 10

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 one answer in each row.

System of Equations	No Solution	One Solution	Infinitely Many Solutions
$y = 3x + 1$ $y = 3x + 5$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
$y = 2x + 2$ $y = -2x + 4$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
$3x + 2y = 2$ $3x + 2y = 5$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
$x - 2y = 1$ $2x - 4y = 2$	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

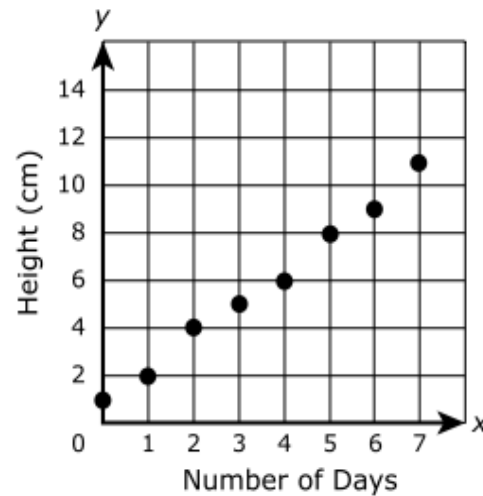
A relation contains the ordered pairs shown. One of the ordered pairs is missing an x -coordinate.

$$\{(-1, 4), (0, 4), (2, 5), (3, -6), (?, 7)\}$$

What could be the missing x -coordinate if the relation is **not** a function?

Enter your answer in the box.

Points are shown plotted on the coordinate plane. The points represent a relation, where x is the input and y is the output.



Complete the sentence to explain whether or not this set of points represents a function.

Drag and drop each appropriate phrase into each box.

does represent a function

does not represent a function

each input has only one output

each output has only one input

one input has two outputs

one output has two inputs

It because .

Which table represents a non-linear relationship between x and y ?

☐ A.

x	y
0	0
1	1
2	4
3	9

☐ B.

x	y
-1	0
3	8
4	10
7	16

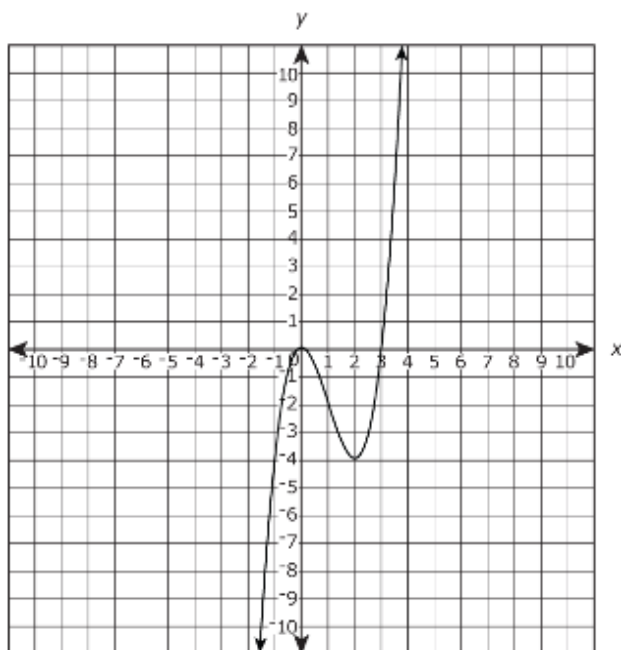
☐ C.

x	y
-3	3
-2	3
-1	3
0	3

☐ D.

x	y
0	0
5	5
10	10
17	17

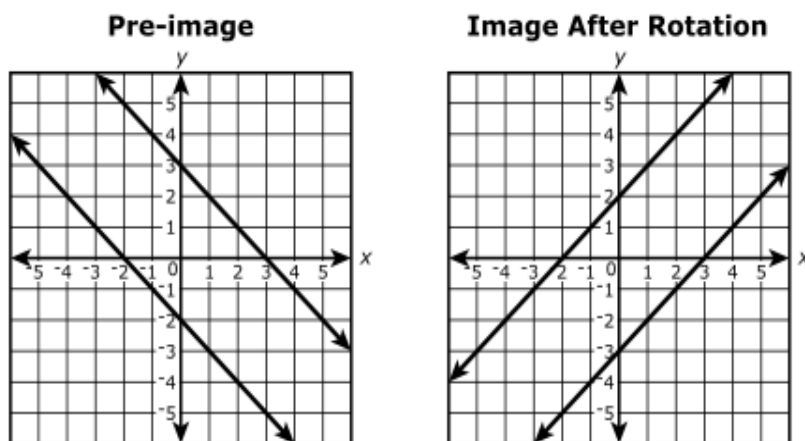
The graph shows y as a function of x .



For each interval in the table, select a box to indicate whether the function is increasing or decreasing over the interval.

Interval	$x < 0$	$0 < x < 1$	$1 < x < 2$	$2 < x < 3$	$x > 3$
Function Is Increasing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Function Is Decreasing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

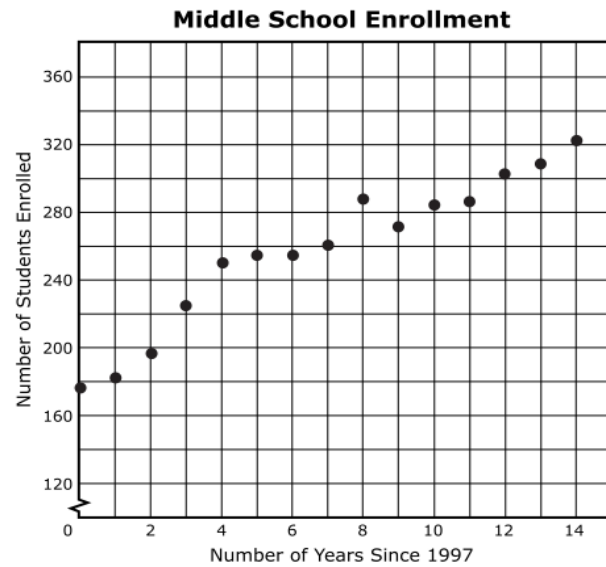
Two parallel lines are graphed on a coordinate plane as shown. The lines are rotated about the origin. The graph of the image of the lines after the rotation is also shown.



Which conclusion is supported by the image of the lines?

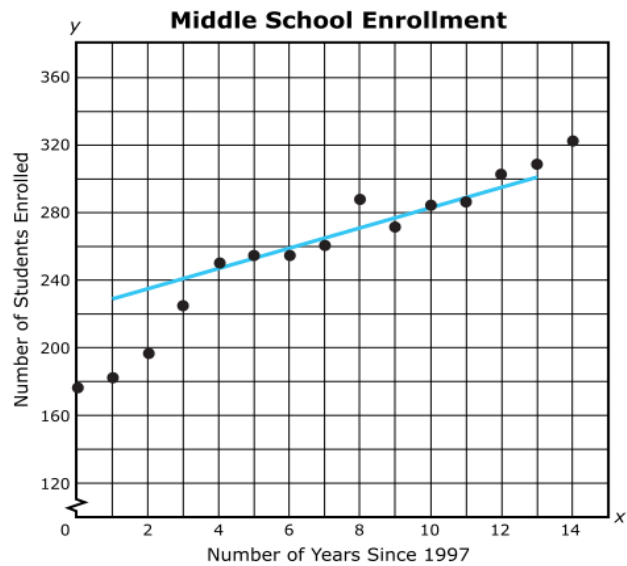
- ☐ A. When parallel lines are rotated, the images of the lines are always parallel.
- ☐ B. When parallel lines are rotated, the images of the lines are always perpendicular.
- ☐ C. When parallel lines are rotated, the images of the lines always have the same slope as the original lines.
- ☐ D. When parallel lines are rotated, the images of the lines always have the same y-intercept as the original lines.

The scatterplot shows the number of students at a middle school over time.

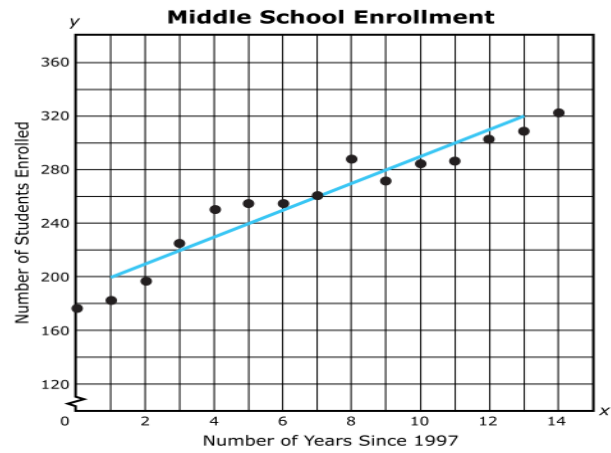


Which graph best shows the line of best fit for the data?

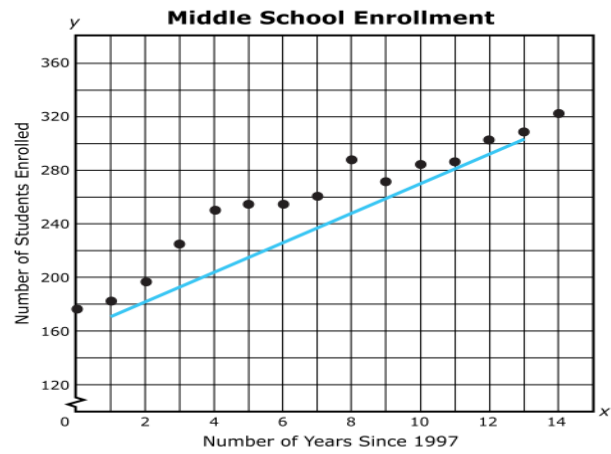
☐ A.



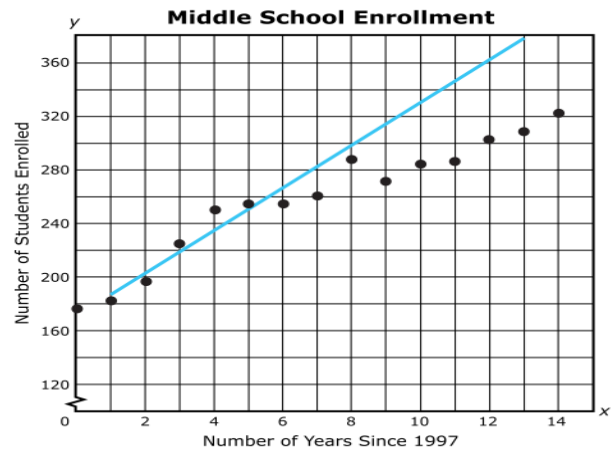
☐ B.



☐ C.



☐ D.



Laurie entered the mass, in kilograms, of four substances into a spreadsheet. Her spreadsheet automatically converted the masses into scientific notation.

	A	B
	Substance	Mass (kilogram)
1	Substance A	2.45×10^{-4}
2	Substance B	6.8×10^{-3}
3	Substance C	7.125×10^{-5}
4	Substance D	9.0×10^{-4}

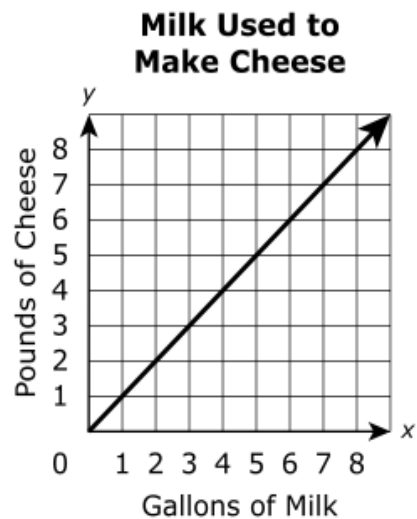
Which list shows the four substances in order from **least** mass to **greatest** mass?

- ☐ A. Substance A, Substance B, Substance C, Substance D
- ☐ B. Substance B, Substance A, Substance D, Substance C
- ☐ C. Substance C, Substance A, Substance D, Substance B
- ☐ D. Substance C, Substance D, Substance A, Substance B

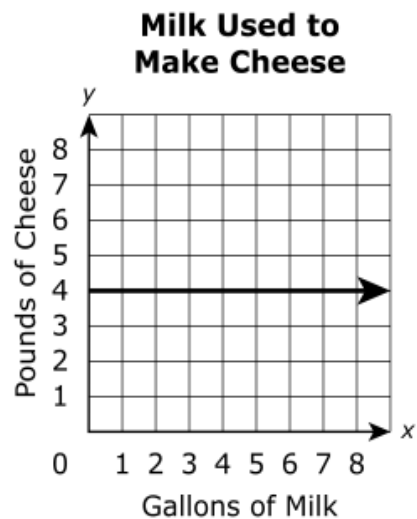
A cheese manufacturer uses 65 gallons of milk to make 52 pounds of cheese. The weight of the cheese is directly proportional to the number of gallons of milk used to make the cheese.

Which graph represents the relationship between the number of gallons of milk and the number of pounds of cheese that can be made from the milk?

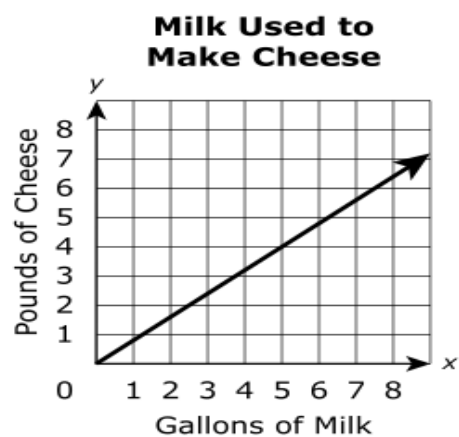
☐ A.



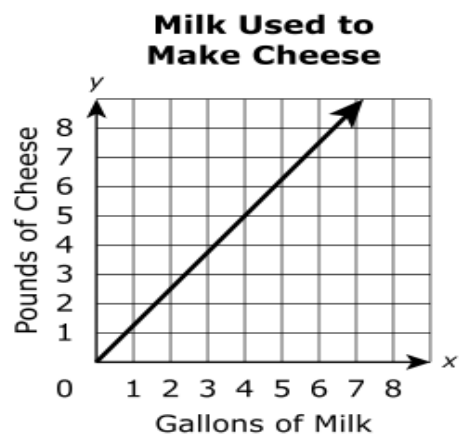
☐ B.



☐ C.



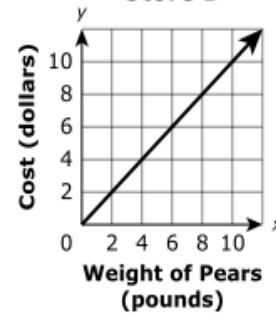
☐ D.



The table, graph, and register receipt show the cost of pears at each of three different stores. For each store, the relationship between the number of pounds of pears and the cost is a direct proportion.

Store A

Weight of Pears (pounds)	Cost (dollars)
3	3.87
5	6.45

Store B**Store C**

Market World	09/10/14
Shredded Wheat	\$1.99
Pears 2 pounds	\$1.78
Milk gallon	\$3.68

Drag and drop each store into the correct order from the least to the greatest cost per pound of pears.

Store A**Store B****Store C****Least****Greatest**

Information about two linear functions is shown.

Function P

The input is multiplied by 2, then added to 3.

Function Q

x	y
-3	-4.5
5	7.5

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

The average rate of change of function P is

less than
equal to
greater than

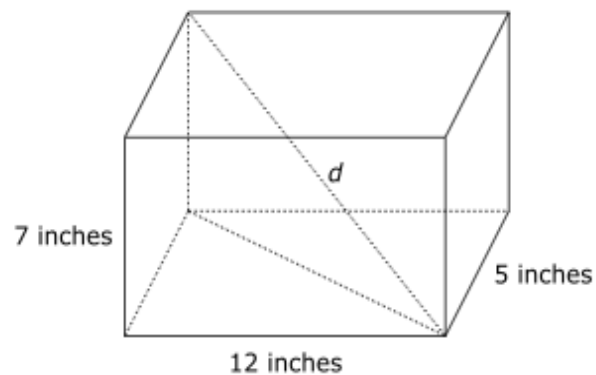
 the average rate of change of function Q.

The y-intercept of function P is

less than
equal to
greater than

 the y-intercept of function Q.

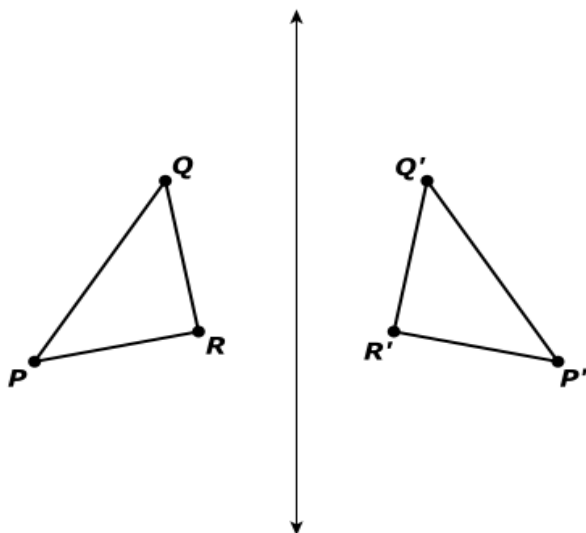
A right rectangular prism is shown.



To the nearest thousandth of an inch, what is the length of the diagonal, d ?

Enter your answer in the box.

$\triangle PQR$ is transformed to the image $\triangle P'Q'R'$.



Part A

Describe the single transformation that maps $\triangle PQR$ onto its image $\triangle P'Q'R'$. Determine whether $\triangle PQR$ maintains its shape as a result of the transformation.

Drag and drop the correct words and phrases into the boxes.

dilation	rotation	reflection	translation	by a factor of $\frac{1}{2}$
90 degrees about vertex R	by a factor of 2	180 degrees about vertex R	to the right	
across the line	to the left	not congruent	congruent	

The transformation is a .

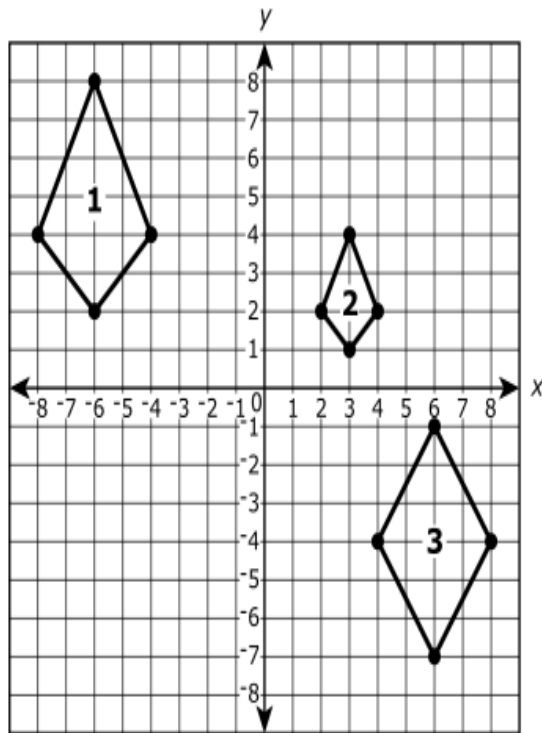
$\triangle PQR$ is to the image $\triangle P'Q'R'$.

Part B

A translation is performed on $\triangle P'Q'R'$ to create image $\triangle P''Q''R''$. How does line segment $P''Q''$ compare to line segment $P'Q'$?

- ☐ A. Line segment $P''Q''$ is longer than line segment $P'Q'$.
- ☐ B. Line segment $P''Q''$ is shorter than line segment $P'Q'$.
- ☐ C. Line segment $P''Q''$ is congruent to line segment $P'Q'$.
- ☐ D. There is not enough information to compare the two line segments.

Three figures are shown on the coordinate plane.



Part A

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

Figure 1 can be transformed into Figure 2 by a

by a

translation 4 units down
reflection across the y-axis
 rotation 90° clockwise about the origin
dilation centered at the origin with a scale factor of $1/2$

translation 1 unit down
reflection across the x-axis
 reflection across the y-axis
dilation centered at the origin with a scale factor of 2

followed

Part

Which statement **best** describes the relationship between Figure 1 and Figure 3?

- ☐ A. They are similar, because Figure 3 can be obtained from Figure 1 by a reflection across the line $y = x$.
- ☐ B. They are similar, because Figure 3 can be obtained from Figure 1 by a 180° rotation about the origin.
- ☐ C. They are **not** similar, because the area of Figure 1 is the same as the area of Figure 3.
- ☐ D. They are **not** similar, because there is no sequence of rotations, reflections, translations, and/or dilations that maps Figure 1 to Figure 3.

At a fall festival, a student council sold two types of drinks: hot chocolate and apple cider. The student council earned \$1.25 for every cup of hot chocolate it sold and \$0.75 for every cup of apple cider it sold.

There were 375 cups of drinks sold, and the total amount of money earned from selling drinks was \$393.75.

The system of equations shown can be used to represent this situation.

$$\begin{cases} x + y = 375 \\ 1.25x + 0.75y = 393.75 \end{cases}$$

Part A

What does the variable x represent in this system of equations?

- ☐ A. the number of dollars earned from selling one cup of hot chocolate
- ☐ B. the number of dollars earned from selling one cup of apple cider
- ☐ C. the number of cups of hot chocolate sold
- ☐ D. the number of cups of apple cider sold

Part B

What does the expression $0.75y$ represent in this system of equations?

- ☐ A. the number of dollars earned from selling one cup of hot chocolate
- ☐ B. the number of dollars earned from selling one cup of apple cider
- ☐ C. the total number of dollars earned from selling hot chocolate
- ☐ D. the total number of dollars earned from selling apple cider

Part C

How many cups of apple cider were sold?

Enter your answer in the box.

cups of apple cider

Part D

How much money did the student council earn from selling hot chocolate?

Enter your answer in the box.

\$

A farmer is building a fence around a rectangular region.

- Fencing costs \$20 per yard.
- The length of the rectangular region will be 4 more yards than the width.
- The farmer wants to have a total cost of \$1,200.

Part A

Let w represent the width, in yards, of the rectangular region. Which equation can be used to find the value of w ?

- ☐ A. $20(w + 4) = 1200$
- ☐ B. $20(2w + 8) = 1200$
- ☐ C. $20(4w + 4) = 1200$
- ☐ D. $20(4w + 8) = 1200$

Part B

What will be the width, in yards, of the rectangular region?

Enter your answer in the box.

To ship a package, a company charges a one-time fee plus a fee based on the weight of the package. This table shows the total shipping costs for four packages of different weights.

Shipping Costs

Weight of Package (pounds)	Total Shipping Cost (dollars)
4	\$11.00
8	\$17.00
12	\$23.00
16	\$29.00

Part A

What is the rate of change of the shipping cost, in dollars per pound of weight?

Enter your answer in the box.

Part B

Which equation represents the total shipping cost, C , in dollars, of a package weighing w pounds?

- ☐ A. $C = 4.0w + 6$
- ☐ B. $C = 2.5w + 1$
- ☐ C. $C = 1.5w + 5$
- ☐ D. $C = 1.5w + 4$

Shot put is a track-and-field event where athletes throw a heavy spherical ball. Shot put balls come in various sizes and materials.

The diameter of a brass shot put ball is 4.2 inches.

Part A

What is the volume of the brass shot put ball? Round your answer to the nearest cubic inch.

Enter your answer in the box.

Part B

The volume of a stainless steel shot put ball is 45 cubic inches.

What is the approximate diameter of the stainless steel shot put ball? Round your answer to the nearest hundredth of an inch.

Enter your answer in the box.

The equation shown is a model developed by a researcher, where x represents the height, in inches, of a 36-month-old boy, and y represents his maximum height, in inches, as an adult.

$$y = 3.5x - 60$$

Part A

A 36-month-old boy has a height of 36 inches. Based on the model, what is his expected height, in inches, as an adult?

Enter your answer in the box.

Part B

Jack and Kris are 36-month-old boys. Jack is exactly 1 inch taller than Kris.

Based on the model, how many inches taller is Jack expected to be than Kris is expected to be when they are adults?

Enter your answer in the box.

Part C

An adult male has a height of 73 inches. Based on the model, what was his height, in inches, when he was 36 months old?

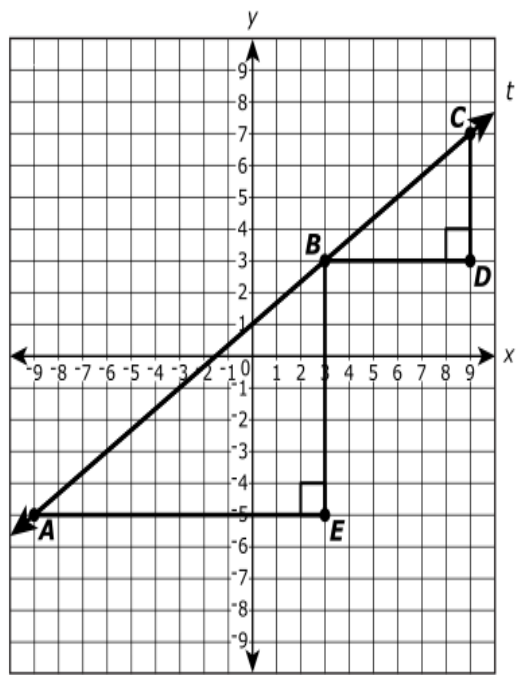
Enter your answer in the box.

Part D

Bill and Ryan are adult males. Bill is exactly 10.5 inches taller than Ryan. Based on the model, how many inches taller was Bill than Ryan when they were 36 months old?

Enter your answer in the box.

Similar triangles ABE and BCD are shown on the coordinate plane. Line t passes through points A , B , and C .



Part A

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

The slope of segment AB is

Choose greater than less than equal to

 the slope of segment BC .

Part B

Use the ratios of the side lengths of triangle ABE and triangle BCD to explain your answer to Part A.

Enter your explanation in the space provided.



▼ Math symbols

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$\frac{\Box}{\Box}$

$\frac{\Box}{\Box}$

y^x

$\sqrt{\Box}$

$\sqrt[3]{\Box}$

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► Relations

► Geometry

Part C

Write an equation for line t . Show or explain how you determined your equation.

Enter your equation and your work or explanation in the space provided.



▼ Math symbols

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y^x

$\sqrt{\Box}$

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► Relations

► Geometry

Four rational numbers are represented by j , k , m , and p .

Part A

State all possible conditions that must be true for j and k so that the product of this expression is negative.

$$-2jk$$

Justify your response.

Enter your response and your justification in the space provided.



▼ Math symbols

+	-	×	÷
±	-	·	/
=	≠	$\frac{\Box}{\Box}$	$\frac{\Box}{\Box}$
y^x	$\sqrt{\Box}$	$\sqrt[3]{\Box}$	π
(·)	°	·	

► Relations

► Geometry

Part B

What must be true for $(m+p)$ so that the value of this expression is negative?

$$-2 + (m + p)$$

Justify your response.

Enter your response and your justification in the space provided.



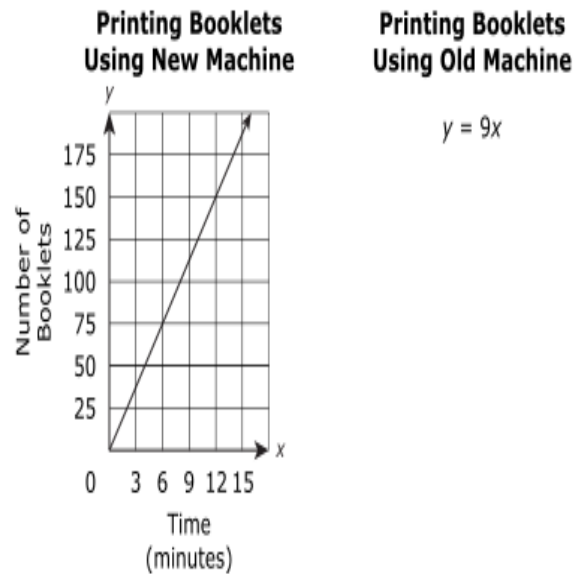
▼ Math symbols

+	-	×	÷
±	-	·	/
=	≠	$\frac{\Box}{\Box}$	$\frac{\Box}{\Box}$
y^x	$\sqrt{\Box}$	$\sqrt[3]{\Box}$	π
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► Relations

► Geometry

A company uses a new machine and an old machine to print booklets. Each machine prints booklets at a constant rate. The graph and the equation represent the relationships between x , the number of minutes the machines print, and y , the number of booklets printed.



The company uses both machines to print a total of 1,250 booklets. Both machines start printing at the same time. During printing, the old machine breaks down and stops printing. The new machine continues printing for an additional 14 minutes and completes the order.

What is the total number of minutes the new machine prints? Show or explain all your work.

Enter your answer and your work in the space provided.



▼ Math symbols

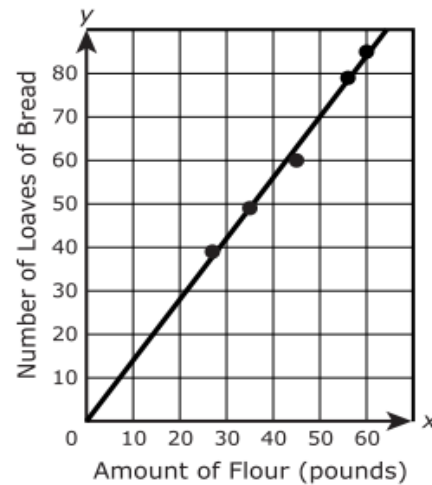
+	-	×	÷
±	-	·	/
=	≠	□	□
y^x	$\sqrt{\quad}$	$\sqrt[3]{\quad}$	π
(.)	°	·	

► Relations

► Geometry

A bakery makes small batches of bread daily. Each day, the bakery records the amount of flour used and the number of loaves of bread made. All loaves are approximately the same size. The table and graph show the bakery's data for five days.

Flour (pounds)	Loaves of Bread
35	49
45	60
27	39
60	85
56	79



- Write an equation that can be used to model the number of loaves of bread, y , that can be made from x pounds of flour.
- Use your equation to predict the number of loaves that could be made from 85 pounds of flour.
- Show your work or explain your answer.

Enter your equation, your answer, and your work or explanation in the space provided.



▼ Math symbols



► Relations

► Geometry