Math

Spring 2019

Grade 8

Released Items

1.   **VH174637**

Each set of ordered pairs (x, y) represents a relationship with input, x, and output, y. Which relationship is a function?

Select **all** that apply.

- ☐ A. $\{(0, 1),(0, 2), (0, 3)\}$

- ☐ B. $\{(1, 1),(2, 2), (3, 3)\}$

- ☐ C. $\{(1, 1),(2, 1), (3, 1)\}$

- ☐ D. $\{(1, 1),(2, 2), (2, {}^-2)\}$

- ☐ E. $\{(1, {}^-1),(2, {}^-2), (3, {}^-3)\}$

2.   **VH007830**

Which of the expressions have a value of 4?

Select **each** correct answer.

- ☐ A. $\sqrt[3]{64}$

- ☐ B. $\sqrt[3]{8}$

- ☐ C. $\sqrt{16}$

- ☐ D. $\sqrt{64}$

- ☐ E. $\sqrt{4}$

3.

Which equations represent a linear function?

Select **each** correct equation.

☐ A. $y = 2x$

☐ B. $y = 7x^2 + 9$

☐ C. $2x - \frac{1}{2}y = 8$

☐ D. $7 - y = x$

☐ E. $y = x^3 + 6$

☐ F. $4y = 4x$

☐ G. $2y = x$

4.

Which of these numbers is equivalent to $\frac{22}{3}$?

○ A. 0.136

○ B. $0.1\overline{36}$

○ C. 7.3

○ D. $7.\overline{3}$

5.

In the equation shown, what is the value of n?

$$\frac{9^7}{9^n} = 9^2$$

Enter your answer in the box.

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│             │
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6.

A system of equations is shown.

$$\begin{cases} 3x + 2y = 5 \\ \quad y = \frac{2}{3} \end{cases}$$

Which statement describes the solution to this system?

○ A. The system has no solution.

○ B. The system has exactly 1 solution.

○ C. The system has exactly 2 solutions.

○ D. The system has infinitely many solutions.

7.

The owner of a canoe-rental shop is comparing the average monthly rainfall, in inches, to the number of canoe rentals per month. The data are shown in the scatter plot.

Canoe Rentals
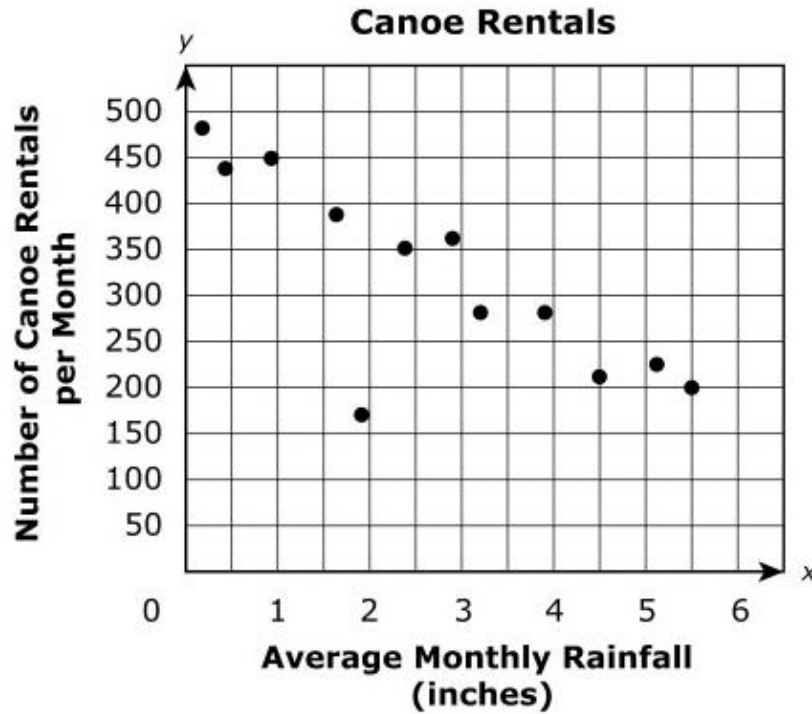
Which sentences correctly describe the data?

Select **each** correct answer.

▢ A. The data have a linear association.

▢ B. The data have a nonlinear association.

▢ C. The data have a positive association.

▢ D. The data have a negative association.

▢ E. The data have at least one outlier.

▢ F. The data do not have any outliers.

A bathtub filled with water has a slow leak. The graph shows the relationship between y, the amount of water, in cups, that leaks from the bathtub in x hours.

Bathtub Leak
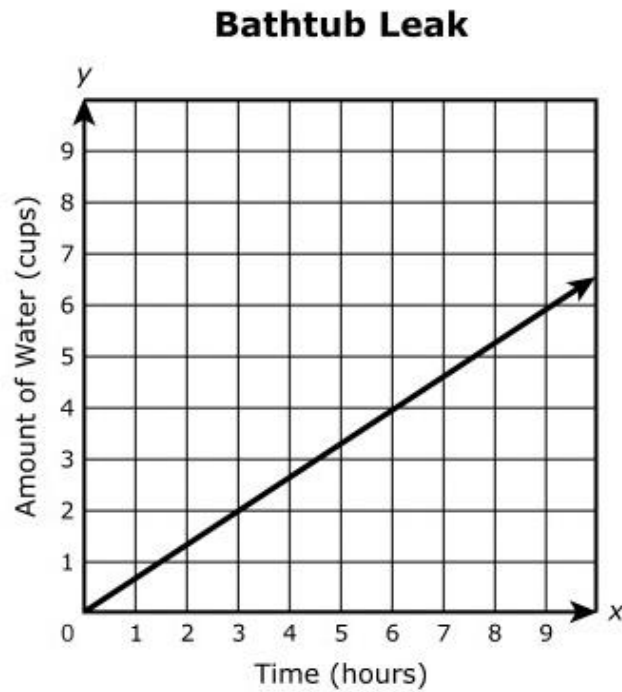
What is the flow rate of the leak?

A. $\frac{1}{4}$ cup per hour

B. $\frac{2}{3}$ cup per hour

C. $\frac{4}{3}$ cups per hour

D. $\frac{3}{2}$ cups per hour

9.

The perimeter of triangle DEF is 81 units. The length of side DE is twice the length of side EF, and the length of side DF is 4 units less than the length of side DE.

Part A

Let s represent the length, in units, of side EF. Which equation can be used to find the value of s?
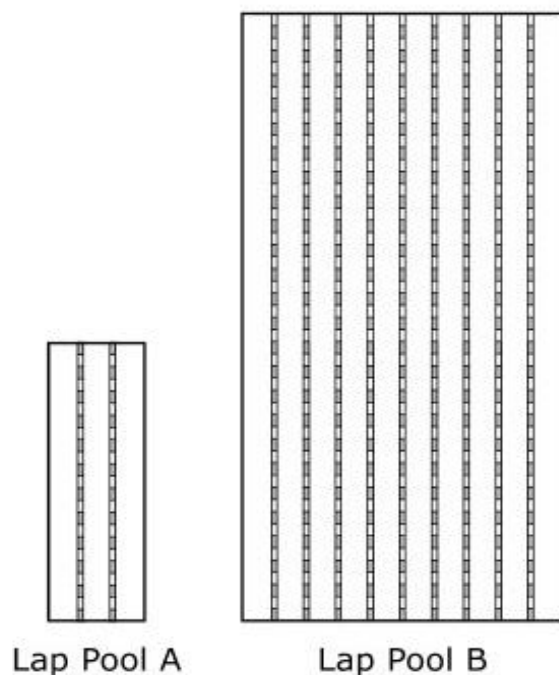
○ A. $s + 2s + 4 = 81$

○ B. $s + 2s - 4 = 81$

○ C. $s + 2s + 2s + 4 = 81$

○ D. $s + 2s + 2s - 4 = 81$

Part B

What will be the length, in units, of side EF?

Enter your answer in the box.

$$\boxed{}$$

The diagrams shown are the top views of two pools used for swimming laps.

Lap Pool A   Lap Pool B

Lap Pool A has lanes for 3 swimmers and Lap Pool B has lanes for 10 swimmers. The lap pools have the same uniform depth. Lap Pool B contains approximately 6.6×10^5 gallons of water.

Estimate the number of gallons of water in Lap Pool A. Express your answer in scientific notation. Explain how you determined your estimate.

Enter your answer and your explanation in the space provided.

▼ Math symbols

+	−	×	÷
±	-	·	/
=	≠	🯅	🯆
y^x	√	$\sqrt[3]{}$	π
(·)	°	|·|

▶ Relations

▶ Geometry

Function A is a linear function that passes through the points shown in the table.

Function A

x	y
6	7
−3	4

Function B is a linear function defined by the equation $y = 2x + 1$.

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

The slope of Function A is [Choose... ▾] the slope of Function B.

> greater than
> less than
> equal to

The y-intercept of Function A is [Choose... ▾] the y-intercept of Function B.

> greater than
> less than
> equal to

A truck scale is used to weigh heavy objects. The scale cannot weigh objects less than 70 kilograms or greater than 34,000 kilograms. Which of the following measurements could be a reading from this scale?

- A. 7.5×10^0 kilograms

- B. 6.2×10^1 kilograms

- C. 4.5×10^3 kilograms

- D. 2.3×10^5 kilograms

Two rival companies began the same year. The equations below model the number of employees, y, at these companies x years after the companies began.

Company R: $y = 3x + 24$

Company T: $y = 4x + 10$

Company R stated, "We have 42 employees, the same number of employees as company T has this year." Determine if company R's claim is possible. Explain your reasoning.

Company T stated, "After 15 years, we will have the same number of employees as company R." Determine if company T's claim is possible. Explain your reasoning.

Enter your answers and your explanations in the space provided.

Math symbols

$+$	$-$	$\times$	$\div$
$\pm$	$-$	$\cdot$	$/$
$=$	$\neq$	$\frac{\square}{\square}$	$\square\frac{\square}{\square}$
y^x	$\sqrt{\ }$	$\sqrt[3]{\ }$	π
$(\cdot)$	$^\circ$	$|\cdot|$	

▸ Relations

▸ Geometry

The average price of a movie ticket from 1960 to 1990 can be modeled by the equation $y = 0.12x + 0.48$, where y represents the average price, in dollars, and x represents the number of years since 1960.

Part A

What does the slope of the graph of the equation $y = 0.12x + 0.48$ represent?

○   A.   the average price of a movie ticket in 1960

○   B.   the average price of a movie ticket in 1990

○   C.   the increase in the average price of a movie ticket each year from 1960 to 1990

○   D.   the total increase in the average price of a movie ticket every 30 years

Part B

For which year does the equation $y = 0.12x + 0.48$ predict the average price of a movie ticket to be $3.00?

○   A.   1979

○   B.   1981

○   C.   1983

○   D.   1985

A 10-ounce box of cereal costs $3. A 20-ounce box of the same cereal costs $5. A third box of the same cereal costs $8.

- Use the given relationships to write a linear equation that expresses the price of a box of cereal as a function of the number of ounces of cereal in the box.
- Calculate the number of ounces in the third box of cereal.
- Show your work or explain your answer.

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

▼ Math symbols

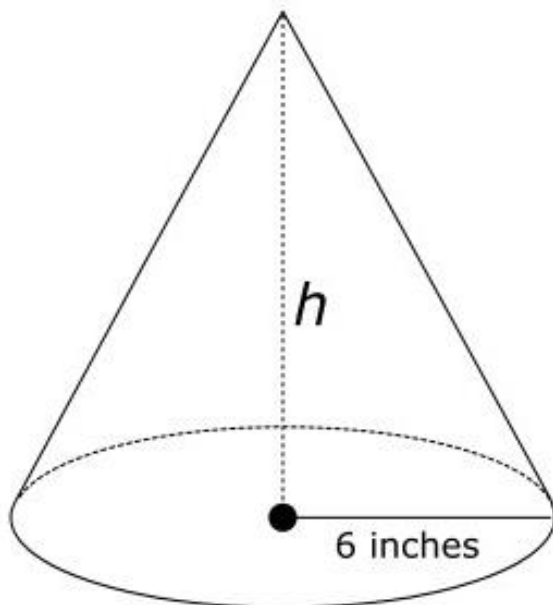| + | − | × | ÷ |
±	–	·	/
=	≠	묘	묘
y^x	√	$\sqrt[3]{}$	π
(·)	°	|·|	

▶ Relations

▶ Geometry

The cone shown in the diagram has a circular base with a radius of 6 inches perpendicular to the height. The volume of the cone is 414.7 cubic inches.

Part A

What is the height, h, of the cone to the nearest whole inch?

Enter your answer in the box.

☐

Part B

If the length of the radius is doubled and the height of the cone changed to 8 inches, find the volume of the new cone. Round your answer to the nearest whole cubic inch.

Enter your answer in the box.

☐

17.   VH074629
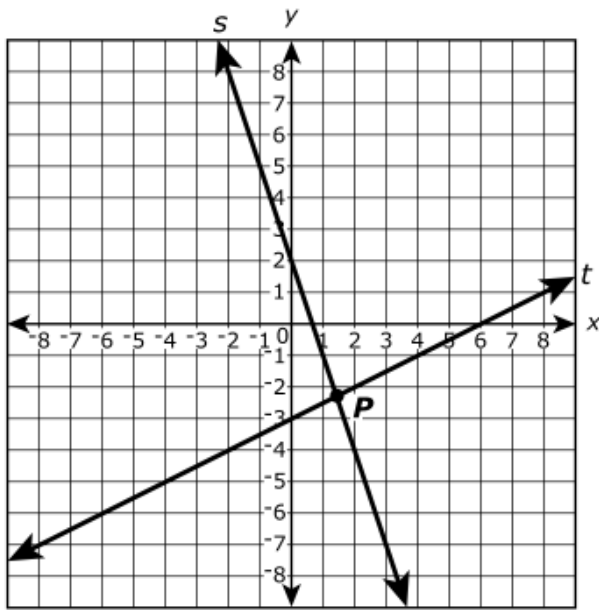
The equation of line s is $y = -3x + 2$.

The equation of line t is $y = \frac{1}{2}x - 3$.

Line s and line t form a system of equations. The solution to the system of equations is located at point P.
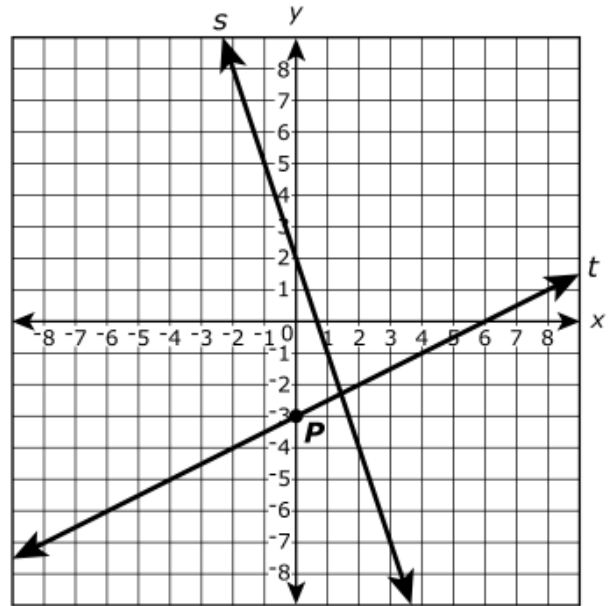
Part A
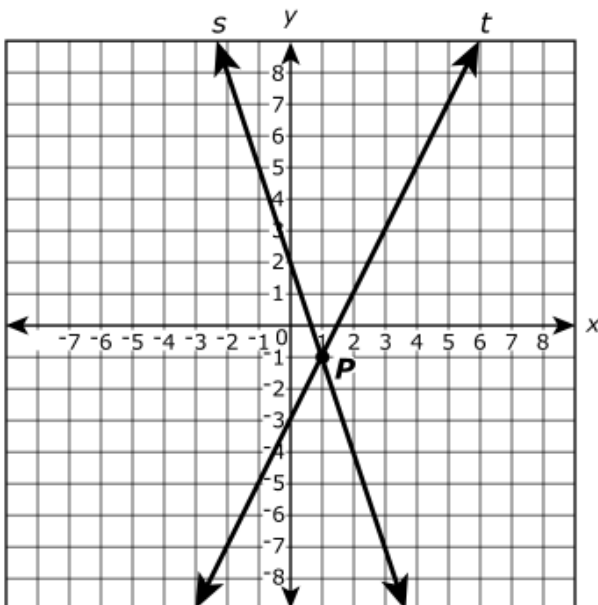
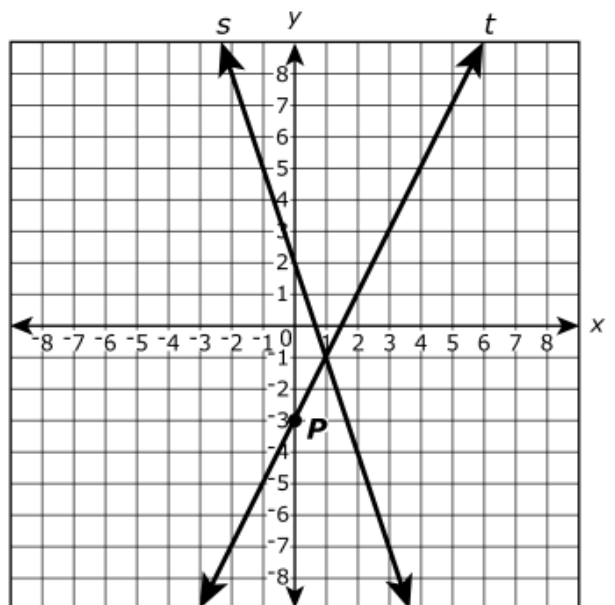Which graph correctly shows line s, line t, and point P?

A.

B.

C.

D.

(continues on next page)

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Part B

Can an equation of a line share more than one solution with line *s*?

- If yes, explain your reasoning and provide an example of an equation.
- If no, explain your reasoning and list any assumptions that you have made.

Enter your answer and your explanation in the space provided.

▼ Math symbols

+	−	×	÷
±	–	·	/
=	≠	▯/▯	▯▯
y^x	√	$\sqrt[3]{\ }$	π
(·)	°	|·|	

▶ Relations

▶ Geometry

A store sells almonds for $8 per pound and peanuts for $14 per pound. A customer paid $31.50 for a 3-pound mixture of almonds and peanuts. The system of equations shown can be used to represent this situation.

$$\begin{cases} x + y = 3 \\ 8x + 14y = 31.5 \end{cases}$$

Part A

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

○ A. the number of dollars the customer paid for almonds

○ B. the number of dollars the customer paid for peanuts

○ C. the number of pounds of almonds the customer purchased

○ D. the number of pounds of peanuts the customer purchased

Part B

What does the term $14y$ represent in this system of equations?

○ A. the total number of dollars the customer paid for almonds

○ B. the total number of dollars the customer paid for peanuts

○ C. the number of dollars the customer paid for 1 pound of almonds

○ D. the number of dollars the customer paid for 1 pound of peanuts

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Part C

What is the value of x in the system of equations?

Enter your answer in the box.

$$\boxed{}$$

Part D

The customer bought an additional pound of almonds. Which system of equations represents this change to the situation?

A. $\begin{cases} x + y = 3 \\ 8x + 14y = 31.5 \end{cases}$

B. $\begin{cases} x + y = 3 \\ 8x + 14y = 39.5 \end{cases}$

C. $\begin{cases} x + y = 4 \\ 8x + 14y = 39.5 \end{cases}$

D. $\begin{cases} x + y = 4 \\ 8x + 14y = 45.5 \end{cases}$