MASSACHUSETTS COMPREHENSIVE ASSESSMENT SYSTEM

PRACTICE TEST

Mathematics

Grade 8

Student Name

School Name

District Name

MASSACHUSETTS
Department of Elementary
and Secondary Education

Grade 8 Mathematics

PRACTICE TEST

SESSION 1

This session contains 20 questions.

You may use your reference sheet during this session.
*You may **not** use a calculator during this session.*

Directions

Read each question carefully and then answer it as well as you can. You must record all answers in this Practice Test Booklet.

For some questions, you will mark your answers by filling in the circles in your Practice Test Booklet. Make sure you darken the circles completely. Do not make any marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely.

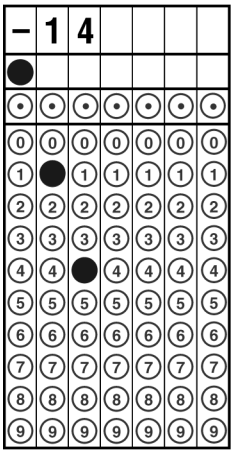
For other questions, you will need to fill in an answer grid. Directions for completing questions with answer grids are provided on the next page.

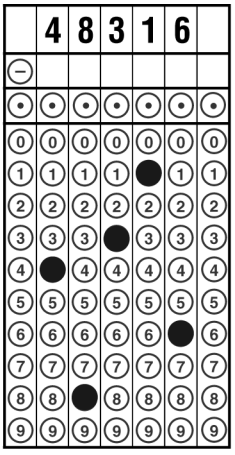
If a question asks you to show or explain your work, you must do so to receive full credit. Write your response in the space provided. Only responses written within the provided space will be scored.

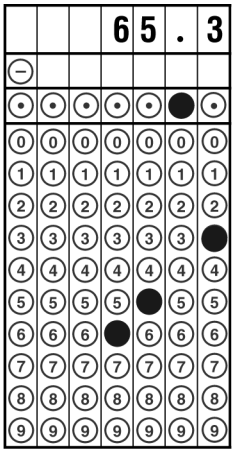
Directions for Completing Questions with Answer Grids

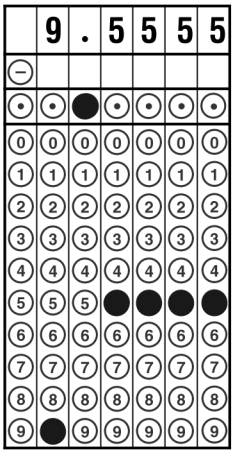
1. Work the question and find an answer.
2. Enter your answer in the answer box*es* at the top of the answer grid.
3. Print only one number or symbol in each box. Do not leave a blank box in the middle of an answer.
4. Under each answer box, fill in the circle that matches the number or symbol you wrote above. Make a solid mark that completely fills the circle.
5. Do not fill in a circle under an unused answer box.
6. Fractions cannot be entered into an answer grid and will not be scored. Enter fractions as decimals.
7. If you need to change an answer, be sure to erase your first answer completely.
8. See below for e*x*amples of how to correctly complete an answer grid.

E*x*amples









1 What is 5.17×10^{-6} written in standard notation?

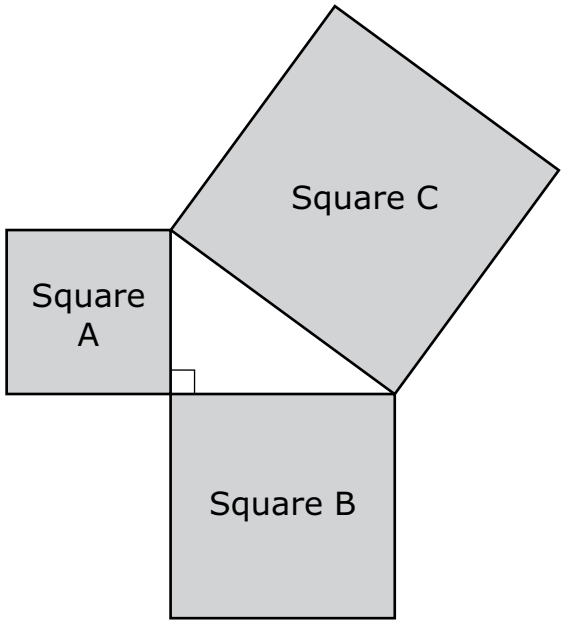
Ⓐ 0.00517

Ⓑ 0.000517

Ⓒ 0.0000517

Ⓓ 0.00000517

2 A right triangle is formed by the sides of three squares joined at their vertices, as shown in this diagram.



Which statement about the squares is true?

Ⓐ The sum of the areas of square A and square C is equal to the area of square B.

Ⓑ The sum of the areas of square A and square B is equal to the area of square C.

Ⓒ The sum of the areas of square A and square C is less than the area of square B.

Ⓓ The sum of the areas of square A and square B is greater than the area of square C.

3 When climbing a mountain, Jack stopped at each elevation sign and recorded x, the altitude in feet, and y, the temperature in degrees Fahrenheit. Jack analyzed his data and realized that it could be represented by this equation.

$$y = -0.0055x + 75$$

Which of the following statements explains the meaning of the number –0.0055 in Jack's equation?

Ⓐ Jack started his trip up the mountain in a valley that is 0.0055 feet below sea level.

Ⓑ The temperature was 0.0055 degrees below 0°F when Jack got to the top of the mountain.

Ⓒ For every increase of 75 feet in altitude, the temperature increased by 0.0055 degrees.

Ⓓ For every increase of 1 foot in altitude, the temperature decreased by 0.0055 degrees.

4 What value of x makes this equation true?

$$7(x - 2) = 5x - 10$$

Ⓐ –4

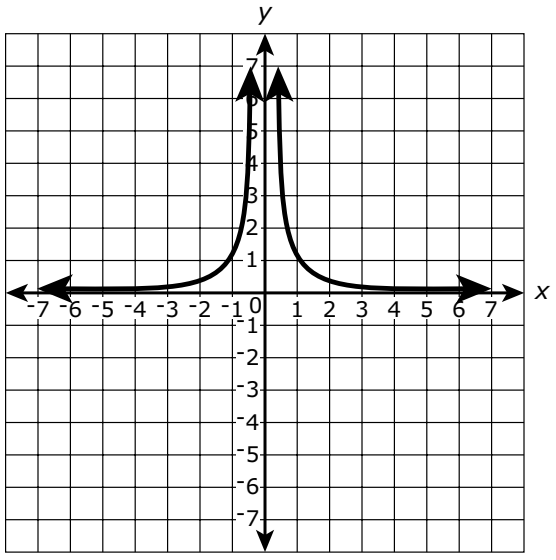
Ⓑ –2

Ⓒ 2

Ⓓ 6

5 Which of the following graphs shows a relationship that is **not** a function?

Ⓐ



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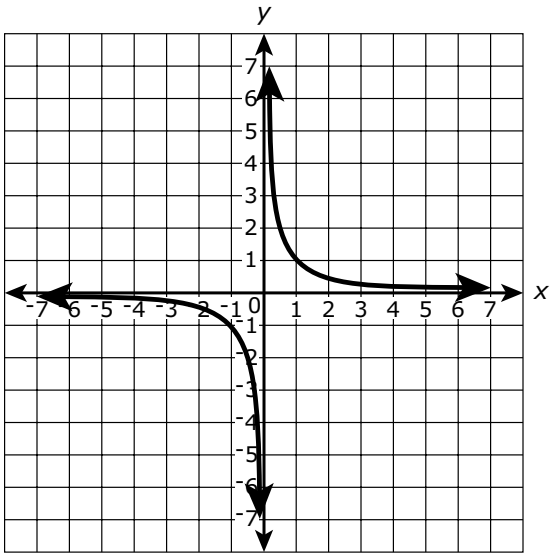

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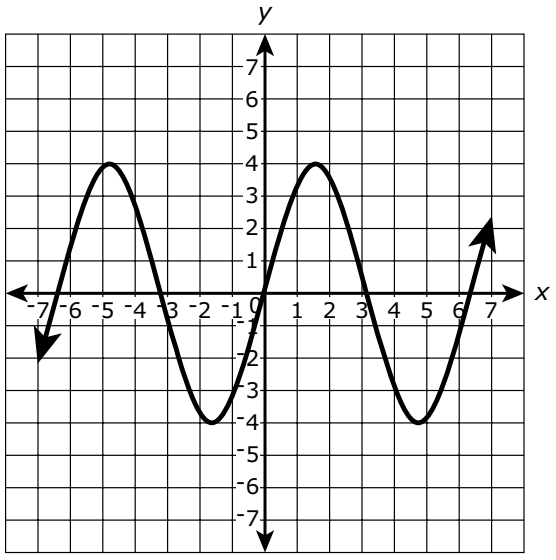
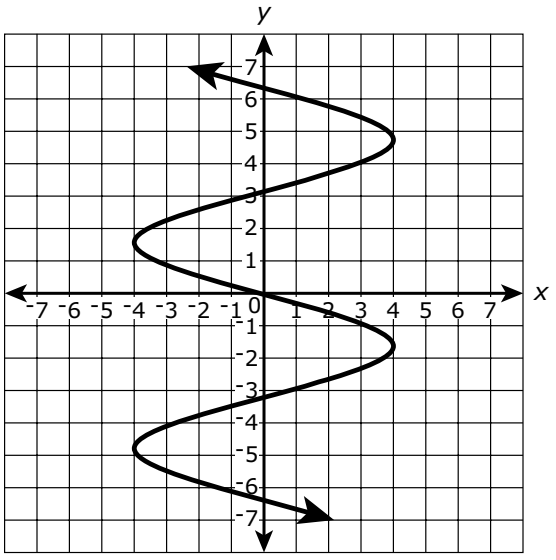


Ⓓ



This question has four parts. Be sure to label each part of your response.

6 A. Consider this equation.

$$x - 4 = 16$$

What is the solution to the equation? Show or explain how you got your answer.

B. Write a linear equation in one variable that has infinitely many solutions. Show the process of simplifying the equation to prove that it has infinitely many solutions.

C. Consider this equation.

$$3(4 + x) = 7x - 2(2x + 3)$$

How many solutions does the equation have? Show or explain how you got your answer.

D. Consider this equation.

$$\frac{3}{8}x - 6 = \frac{1}{2}(4 - x)$$

How many solutions does the equation have? Show or explain how you got your answer.

6

7 Consider this expression.

$$\sqrt{57}$$

Which of the following statements about the expression are true?

Select the **two** correct statements.

Ⓐ On a number line, the expression is located between 6 and 7.

Ⓑ On a number line, the expression is located between 7 and 8.

Ⓒ The approximate value of the expression is **closest** to 6.

Ⓓ The approximate value of the expression is **closest** to 7.

Ⓔ The approximate value of the expression is **closest** to 8.

8 Consider this system of equations.

$$4x - 3y = -7$$
$$-4x + 3y = -7$$

Which of the following statements about the system of equations is true?

Ⓐ The system has no solution.

Ⓑ The system has exactly one solution.

Ⓒ The system has exactly two solutions.

Ⓓ The system has infinitely many solutions.

9 Which of the following represents the linear relationship with the greatest rate of change?

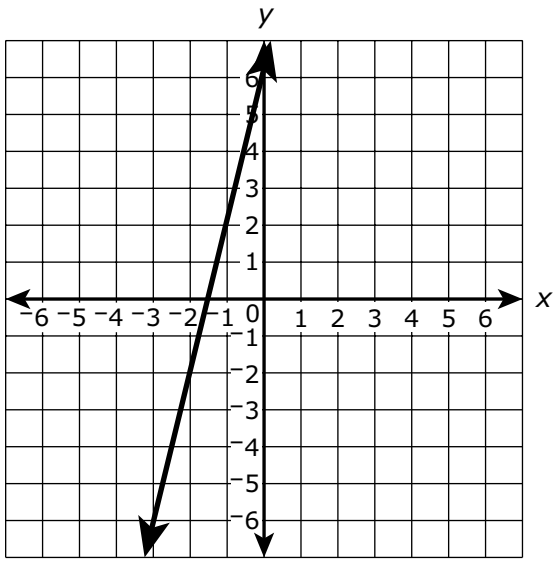
Ⓐ $y = 2x + 7$

Ⓑ

x	y
−2	−13
−1	−8
0	−3
1	2
2	7

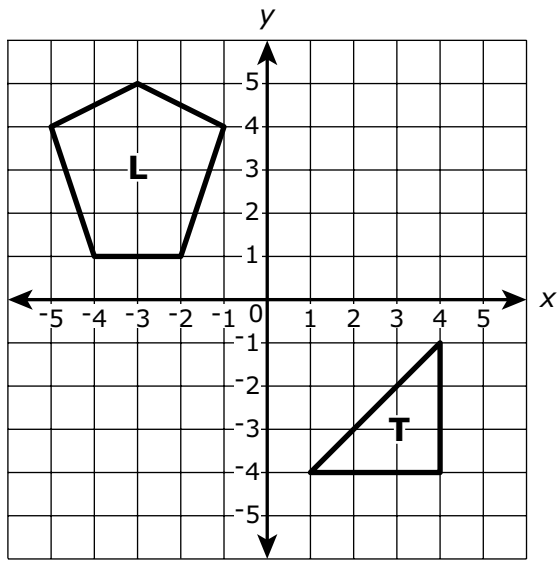
Ⓒ A line rises 9 units for every 3 units it moves to the right.

Ⓓ



This question has two parts.

10 Pentagon L and triangle T are graphed on this coordinate plane.



Part A

Pentagon L will be reflected over the *y*-axis.

Which of the following **must** be true about the image of pentagon L?

Ⓐ It intersects both the *x*-axis and the *y*-axis.

Ⓑ Its area is larger than the area of pentagon L.

Ⓒ Each of the coordinates of its vertices is negative.

Ⓓ Its perimeter is equal to the perimeter of pentagon L.

Part B

Triangle T will be translated 5 units up and 3 units to the left.

Which of the following **must** be true about the image of triangle T?

Ⓐ It intersects the *x*-axis.

Ⓑ It is a reflection of triangle T.

Ⓒ Its area is equal to the area of triangle T.

Ⓓ Each of the coordinates of its vertices is positive.

11 Which of the following statements are true?

Select the **three** correct statements.

Ⓐ $0.\overline{72}$ is equivalent to $\frac{11}{15}$

Ⓑ $0.\overline{72}$ is equivalent to $\frac{8}{11}$

Ⓒ $0.7\overline{3}$ is equivalent to $\frac{11}{15}$

Ⓓ $0.7\overline{3}$ is equivalent to $\frac{26}{33}$

Ⓔ $0.\overline{78}$ is equivalent to $\frac{8}{11}$

Ⓕ $0.\overline{78}$ is equivalent to $\frac{26}{33}$

12 Consider this expression.

$$3^6 \cdot 3^2$$

Which of the following is equivalent to the expression?

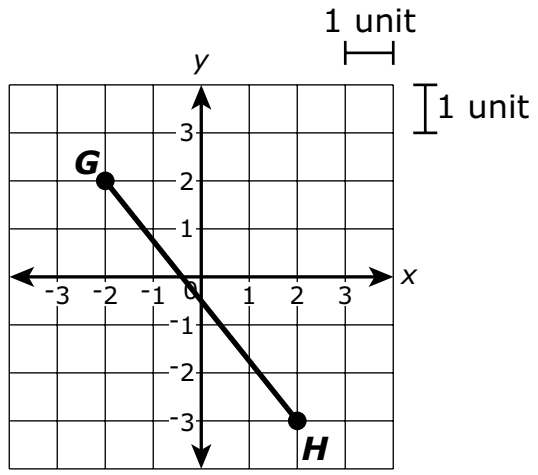
Ⓐ 9^{12}

Ⓑ 9^8

Ⓒ 3^{12}

Ⓓ 3^8

13 Line segment *GH* is graphed on this coordinate plane.



Line segment *GH* has a length of *k* units.

Which of the following equations can be used to determine *k*, the length in units of line segment *GH*?

Ⓐ $2^2 + 3^2 = k^2$

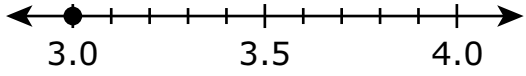
Ⓑ $4^2 + 5^2 = k^2$

Ⓒ $k^2 + 2^2 = 3^2$

Ⓓ $k^2 + 4^2 = 5^2$

14 Which number line shows the plotted value, to the nearest **tenth**, of $\sqrt{11}$?

Ⓐ



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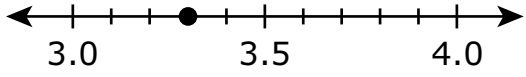

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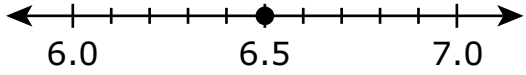
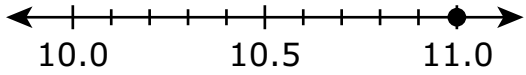


Ⓓ



This question has four parts. Be sure to label each part of your response.

15 A student created this table to represent a linear relationship between x and y.

x	y
−2	10.0
−1	7.5
0	5.0
1	2.5
2	0

A. What is the y-intercept of the line represented by the x and y values shown in the table? Show or explain how you got your answer.

B. What is the slope of the line represented by the x and y values shown in the table? Show or explain how you got your answer.

C. Write an equation of the line represented by the relationship between x and y shown in the table.

D. The student says the point (9, −17.5) lies on the line represented by the relationship between x and y shown in the table.

Is the student correct? Show or explain how you got your answer.

15

16 Consider this equation.

$$x^3 = 27$$

Which of the following values of x makes the equation true?

Ⓐ 3

Ⓑ 9

Ⓒ $\frac{1}{3}$

Ⓓ $\frac{1}{9}$

17 Which of the following is equivalent to $\frac{7}{11}$?

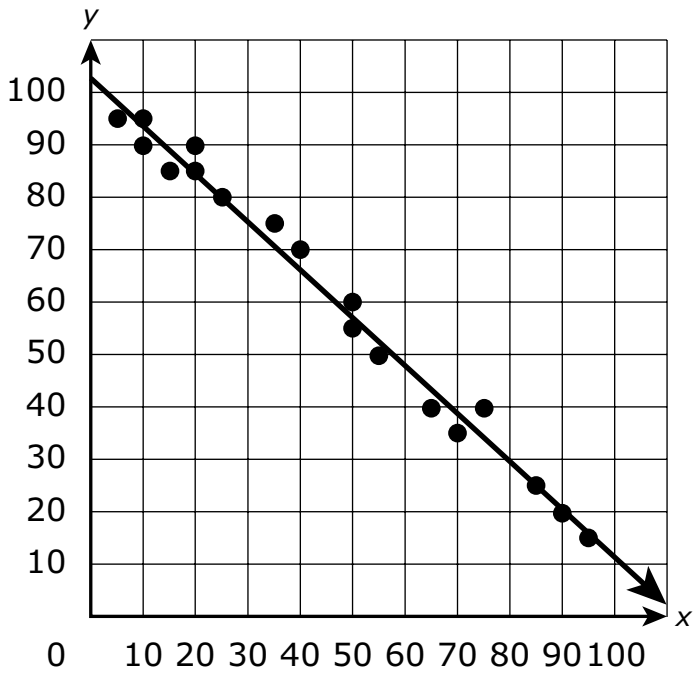
Ⓐ 0.63

Ⓑ $0.6\overline{3}$

Ⓒ $0.\overline{63}$

Ⓓ 0.64

18 A line of best fit is drawn on this scatter plot.



Which statement about the scatter plot is true?

Ⓐ The line falls above most of the data points, and the data show a strong positive association.

Ⓑ The line falls above most of the data points, and the data show a strong negative association.

Ⓒ The line falls between most of the data points, and the data show a strong positive association.

Ⓓ The line falls between most of the data points, and the data show a strong negative association.

19 The area of Europe is about 9.938×10^6 square kilometers, and the area of North America is about 2.4256×10^7 square kilometers.

What is the approximate total area, in square kilometers, of Europe and North America combined?

Ⓐ 3.4194×10^6

Ⓑ 3.4194×10^7

Ⓒ 1.23636×10^6

Ⓓ 1.23636×10^7

20 Consider this number.

$$4.0\overline{83}$$

Which of the following statements about the number is true?

Ⓐ It is an integer because the decimal repeats.

Ⓑ It is a whole number because the decimal repeats.

Ⓒ It is a rational number because the decimal repeats.

Ⓓ It is an irrational number because the decimal repeats.

STOP!

Grade 8 Mathematics

PRACTICE TEST

SESSION 2

This session contains 20 questions.

You may use your reference sheet during this session.
You may use a calculator during this session.

Directions

Read each question carefully and then answer it as well as you can. You must record all answers in this Practice Test Booklet.

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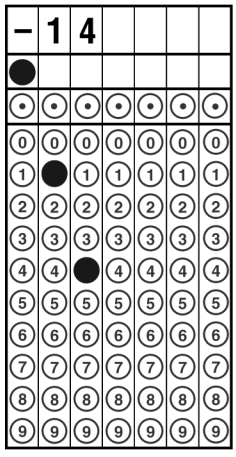
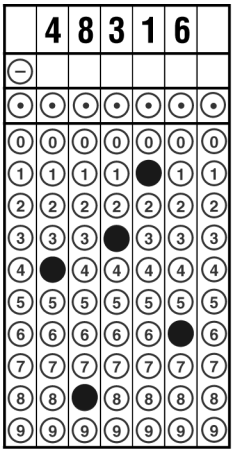
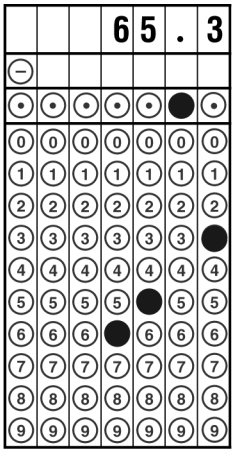
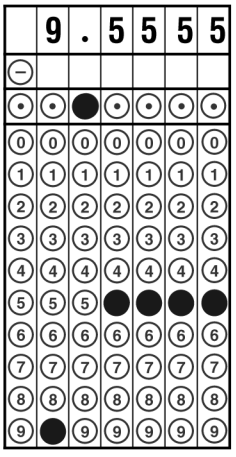
8. See below for e*x*amples of how to correctly complete an answer grid.

E*x*amples





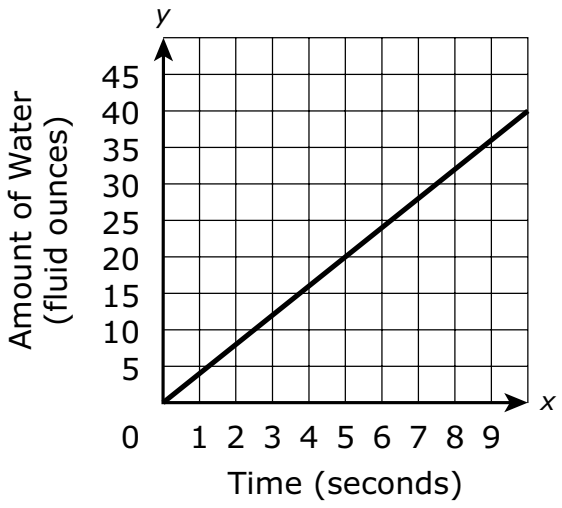




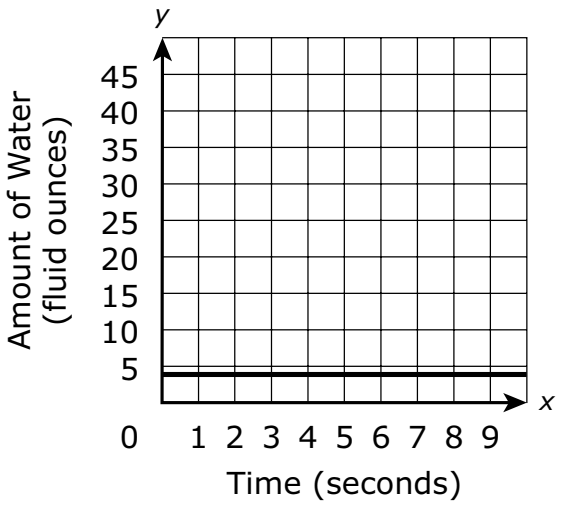
21 Myron is filling an empty teapot with water. The water fills the teapot at a rate of 4 fluid ounces per second.

Which of the following graphs shows how the amount of water, in fluid ounces, in the teapot changes over time?

Ⓐ



Ⓑ



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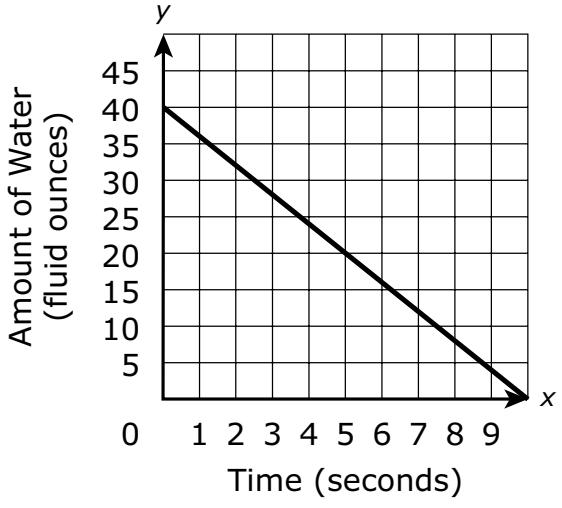

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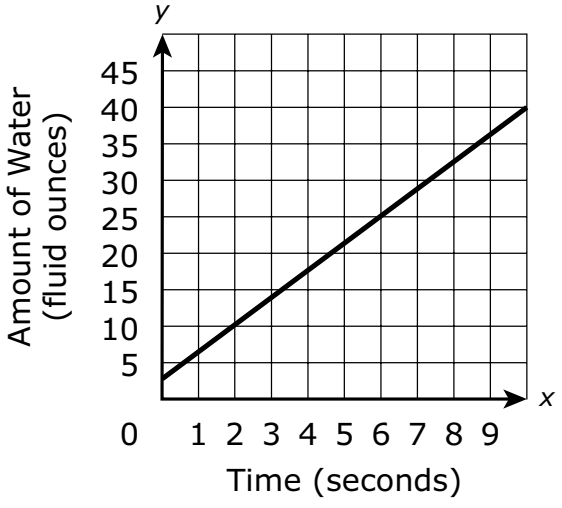
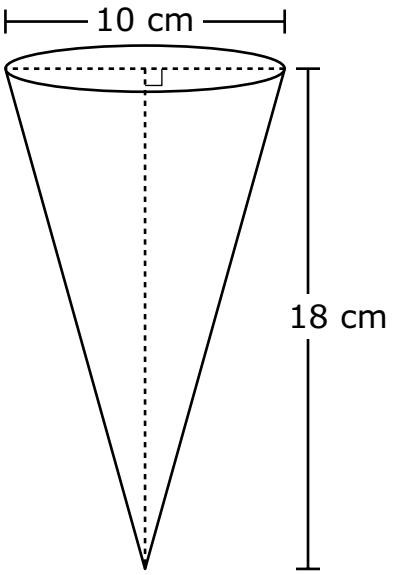


22 A cone and some of its dimensions are shown.



What is the volume, in cubic centimeters, of the cone?

Ⓐ 30π

Ⓑ 150π

Ⓒ 450π

Ⓓ 600π

23 A student will perform a sequence of transformations on triangle *ABC* on a coordinate plane. Which of the following transformations will result in an image that is **not** congruent to triangle *ABC*?

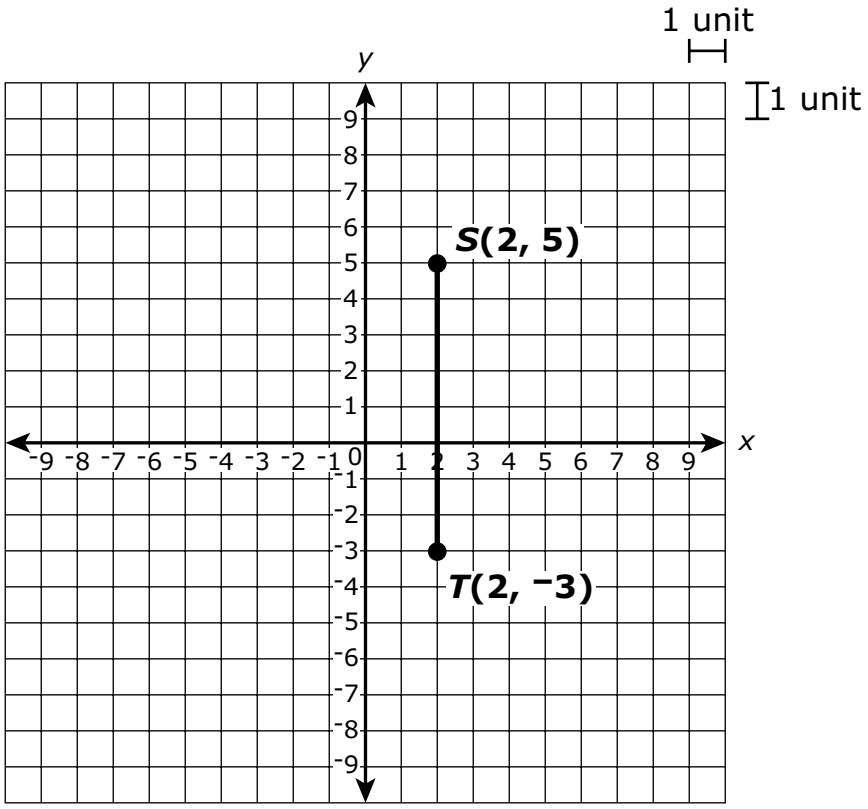
Ⓐ translate 4 units down, and then reflect over the *x*-axis

Ⓑ translate 4 units to the right, and then reflect over the *y*-axis

Ⓒ rotate 90° counterclockwise about the origin, and then reflect over the line $y = x$

Ⓓ rotate 180° clockwise about the origin, and then dilate by a scale factor of 3 with the center at the origin

24 Corine drew line segment *ST* on a coordinate plane, as shown.



Corine will translate line segment *ST* 4 units to the right and then 4 units down. After the transformations, what will be the length, in units, of the image of line segment *ST*?

Enter your answer in the answer boxes at the top of the answer grid **and** completely fill the matching circles.

⊖						
⊙	⊙	⊙	⊙	⊙	⊙	⊙
0	0	0	0	0	0	0
1	1	1	1	1	1	1
2	2	2	2	2	2	2
3	3	3	3	3	3	3
4	4	4	4	4	4	4
5	5	5	5	5	5	5
6	6	6	6	6	6	6
7	7	7	7	7	7	7
8	8	8	8	8	8	8
9	9	9	9	9	9	9

25 A principal surveyed 75 seventh-grade and eighth-grade students. She asked them if they prefer to obtain news from the Internet or to obtain news from television. She created a table to display the data, as shown.

		News Preference	
		Internet	**Television**
Students	**Seventh Grade**	16	34
	Eighth Grade	10	15

Based on the table, which of the following statements are true?

Select the **three** correct statements.

Ⓐ 49 eighth-grade students participated in the survey.

Ⓑ 50 seventh-grade students participated in the survey.

Ⓒ 26 out of 49 students prefer to obtain news from the Internet.

Ⓓ 3 out of 5 eighth-grade students prefer to obtain news from television.

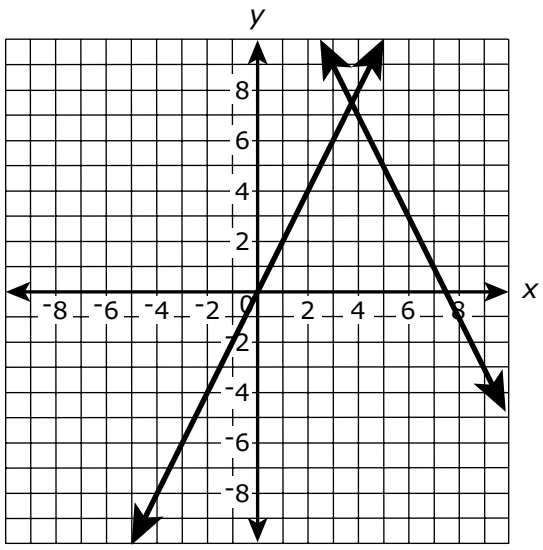
Ⓔ 8 out of 25 seventh-grade students prefer to obtain news from the Internet.

26 Consider this system of equations.

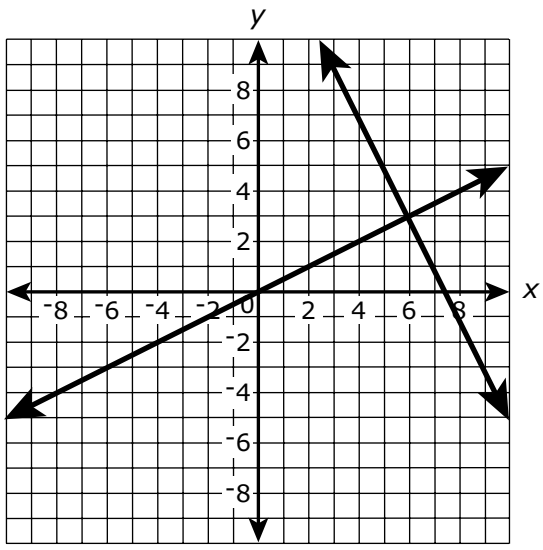
$$y = 2x$$
$$x + 2y = 15$$

Which of the following shows the system of equations graphed on a coordinate plane?

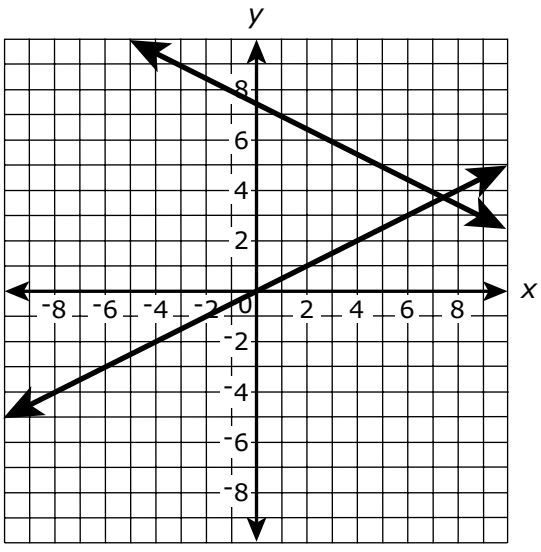
Ⓐ



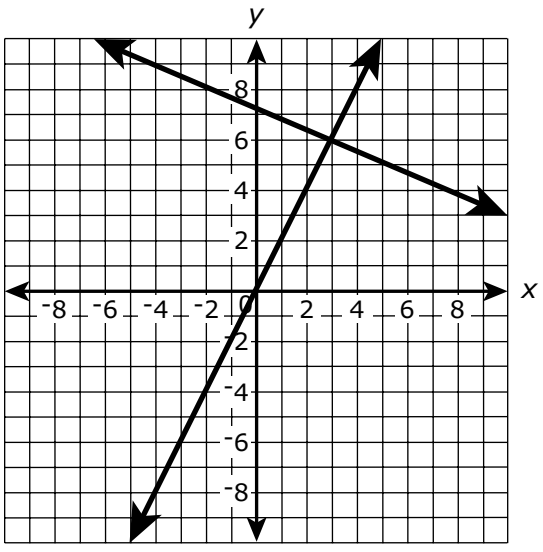
Ⓑ



Ⓒ

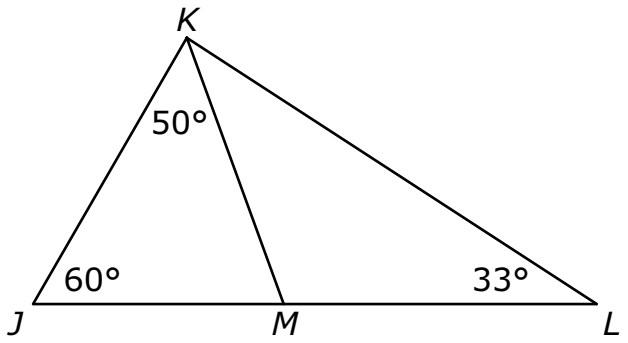


Ⓓ



This question has four parts. Be sure to label each part of your response.

27 This figure is composed of triangles *JKL*, *JKM*, and *KML*.



In the figure,

- point *M* lies on side *JL*,
- the measure of $\angle JKM$ is 50°,
- the measure of $\angle KJM$ is 60°, and
- the measure of $\angle KLM$ is 33°.

A. What is the measure, in degrees, of $\angle JMK$? Show or explain how you got your answer.

B. What is the sum of the measures, in degrees, of $\angle JMK$ and $\angle KML$? Show or explain how you got your answer.

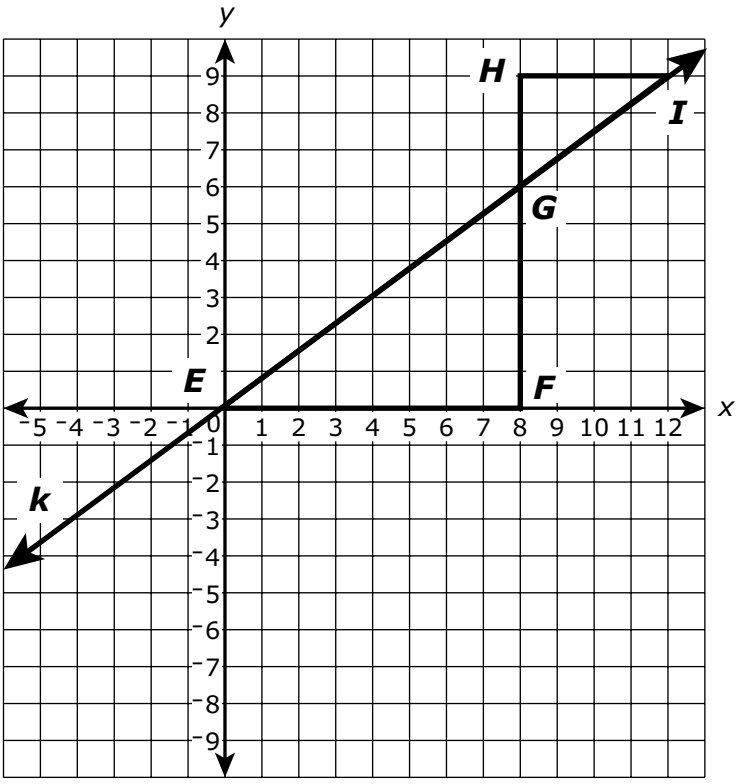
C. What is the measure, in degrees, of $\angle MKL$? Show or explain how you got your answer.

D. Is triangle *JKL* similar to triangle *KML*? Explain your reasoning.

27

Go On ➡

28 Kelly drew line *k*, and triangles *EGF* and *IGH*, on a coordinate plane, as shown.



Based on what Kelly drew, which of the following statements **must** be true?

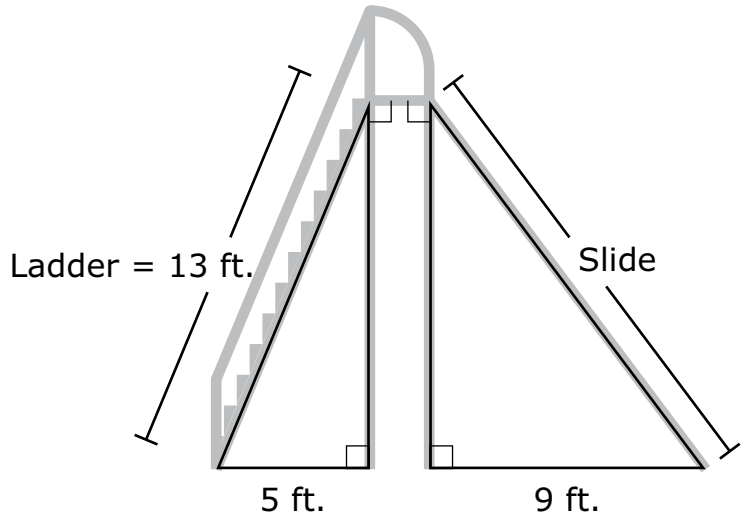
Ⓐ $FG = HG$

Ⓑ $EG = IG$

Ⓒ Angle *FEG* is congruent to angle *HGI*.

Ⓓ The slope of $\overline{EG}$ is equal to the slope of $\overline{IG}$.

29 A slide has a ladder that is 13 feet long. This diagram shows the ladder, the slide, and some dimensions.



What is the length, in feet, of the slide?

Ⓐ 12.0 feet

Ⓑ 15.0 feet

Ⓒ 15.8 feet

Ⓓ 19.1 feet

This question has two parts.

30 **Part A**

A student graphed an equation of this form on a coordinate plane.

$$y = mx + b$$

Which of the following statements about the graph is **not** true?

Ⓐ The graph is a straight line.

Ⓑ The slope of the graph is m.

Ⓒ The graph crosses the x-axis at $(0, b)$.

Ⓓ The graph crosses the y-axis at $(0, b)$.

Part B

Which of the following equations are linear functions?

Select the **two** correct answers.

Ⓐ $y = x^2$

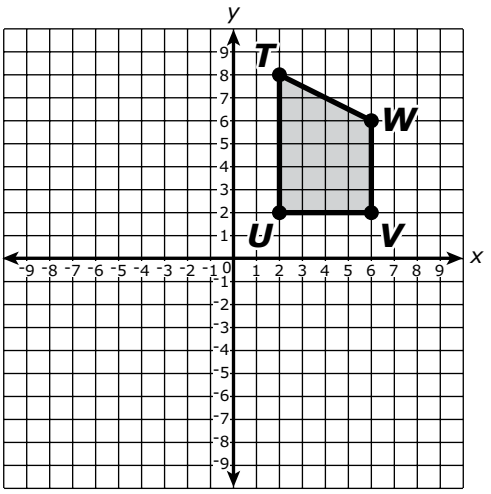
Ⓑ $y = -x$

Ⓒ $y = \frac{-2}{x}$

Ⓓ $y = -3x$

Ⓔ $y = 3\sqrt{x}$

31 Quadrilateral *TUVW* is shown on this coordinate plane.



Quadrilateral *TUVW* will be rotated 180° clockwise about the origin.

What will be the coordinates of the image of point *V* after the rotation?

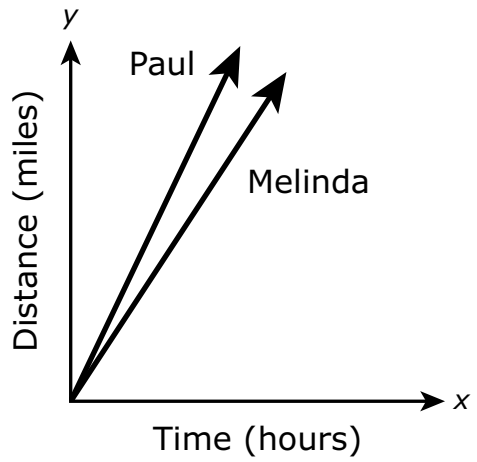
Ⓐ (–6, –2)

Ⓑ (6, –2)

Ⓒ (2, –6)

Ⓓ (2, 6)

32 Melinda and Paul ran in a marathon. This graph shows the relationship between the distance and the time they each ran.



Melinda ran at a constant speed of 5 miles per hour.

Which of the following is true?

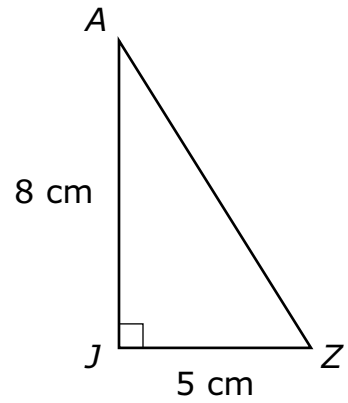
Ⓐ Paul ran at a slower constant speed than Melinda. An equation that could represent the relationship between Paul's distance and his time is $y = 1x$, where x is the time in hours, and y is the distance in miles Paul ran.

Ⓑ Paul ran at a slower constant speed than Melinda. An equation that could represent the relationship between Paul's distance and his time is $y = 3x$, where x is the time in hours, and y is the distance in miles Paul ran.

Ⓒ Paul ran at a faster constant speed than Melinda. An equation that could represent the relationship between Paul's distance and his time is $y = 5x$, where x is the time in hours, and y is the distance in miles Paul ran.

Ⓓ Paul ran at a faster constant speed than Melinda. An equation that could represent the relationship between Paul's distance and his time is $y = 7x$, where x is the time in hours, and y is the distance in miles Paul ran.

33 Right triangle *JAZ* has a base of 5 centimeters and a height of 8 centimeters, as shown.



Which of the following pairs of dimensions could represent a triangle that is similar to triangle *JAZ*?

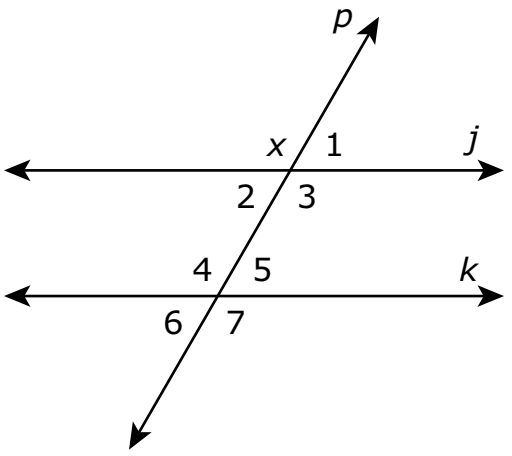
Ⓐ base = 9 cm
height = 12 cm

Ⓑ base = 8 cm
height = 11 cm

Ⓒ base = 10 cm
height = 8 cm

Ⓓ base = 15 cm
height = 24 cm

34 Parallel lines j and k are cut by transversal line p, creating the angles shown.



Which of the numbered angles must be congruent to angle x?

Select **all** the angles that must be congruent to angle x.

Ⓐ angle 1

Ⓑ angle 2

Ⓒ angle 3

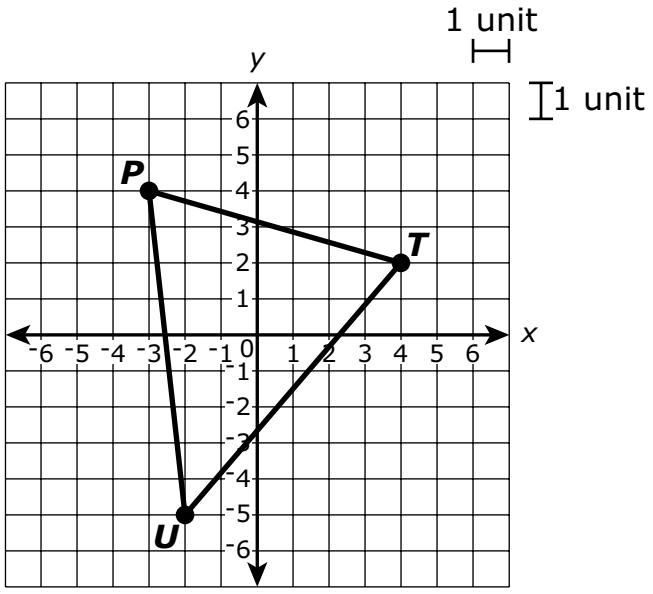
Ⓓ angle 4

Ⓔ angle 5

Ⓕ angle 6

Ⓖ angle 7

35 Triangle *PTU* is shown on this coordinate plane.



What is the length, to the nearest unit, of $\overline{TU}$?

Ⓐ 6

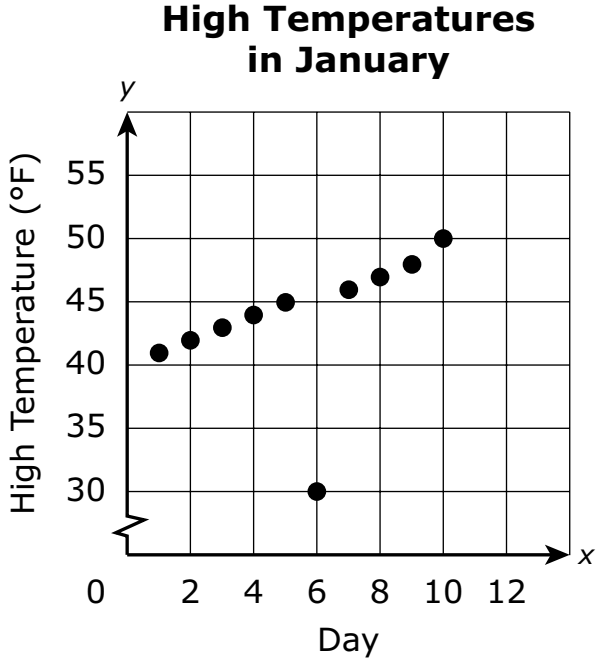
Ⓑ 7

Ⓒ 9

Ⓓ 13

This question has four parts. Be sure to label each part of your response.

36 A student recorded the high temperature, in degrees Fahrenheit, in his town on each day for the first 10 days in January. This scatter plot shows the data the student recorded.



A. Based on the scatter plot, what was the high temperature, in degrees Fahrenheit, on day 5?

B. Based on the scatter plot, on which day does the high temperature seem to be an outlier? Explain your reasoning.

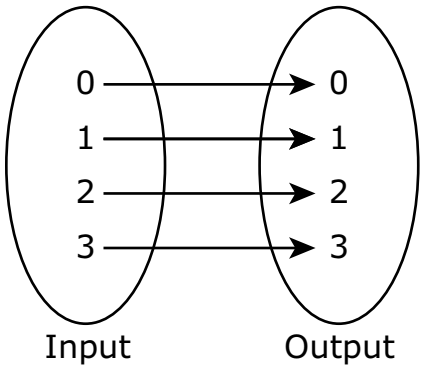
C. Determine whether the data in the scatter plot have a positive or a negative association. Explain your reasoning.

D. The student says that, based on the trend in the data, the expected high temperature on day 15 will be greater than the high temperature on day 10. Is the student correct? Explain your reasoning.

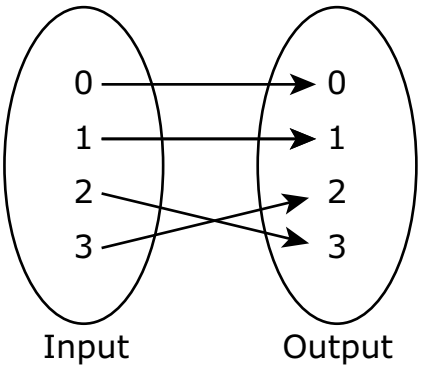
36

37 Which of the following is **not** a function?

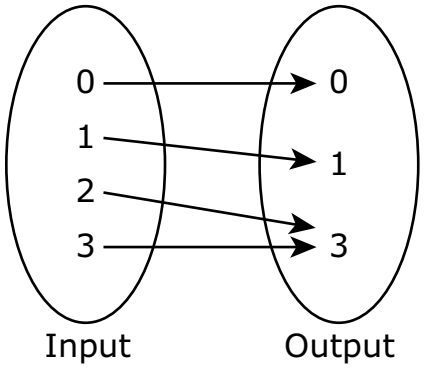
Ⓐ



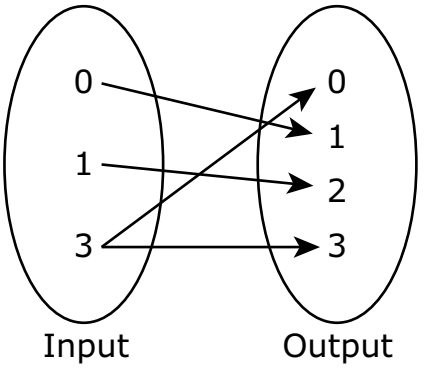
Ⓑ



Ⓒ

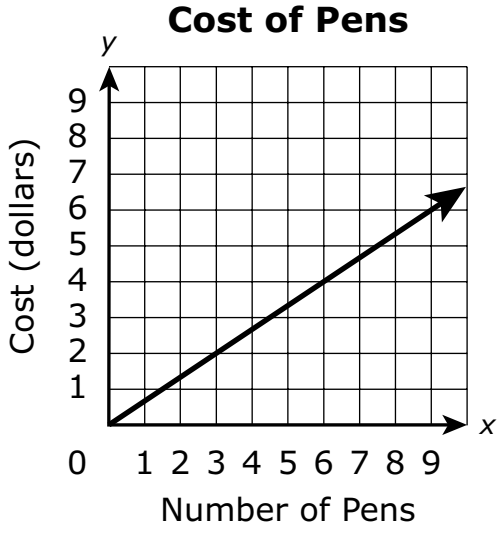


Ⓓ

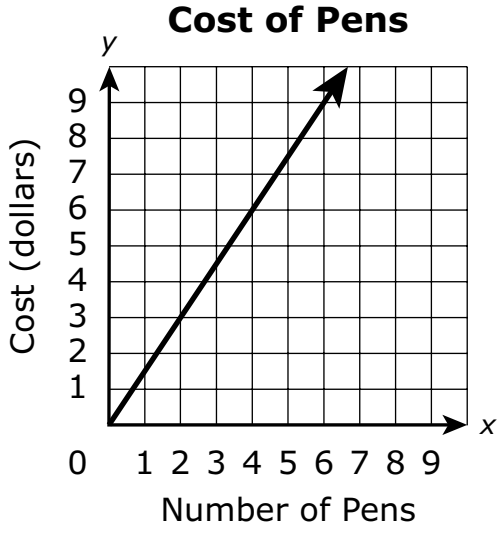


38 Pens cost $1.50 each at a school store. Which graph represents y, the cost, in dollars, of purchasing x pens at the store?

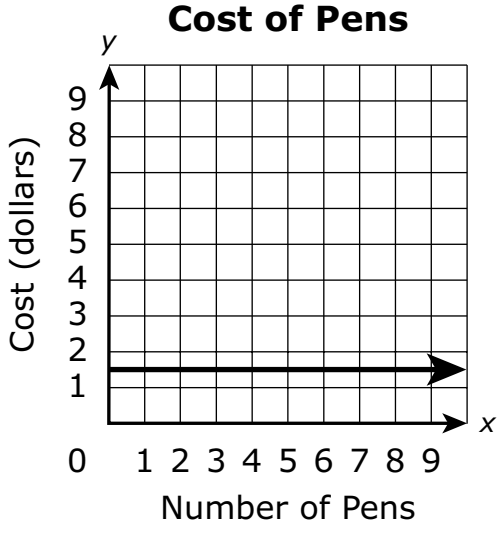
Ⓐ



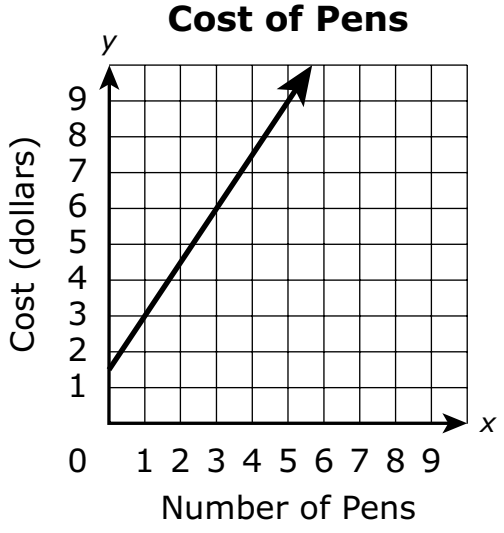
Ⓑ



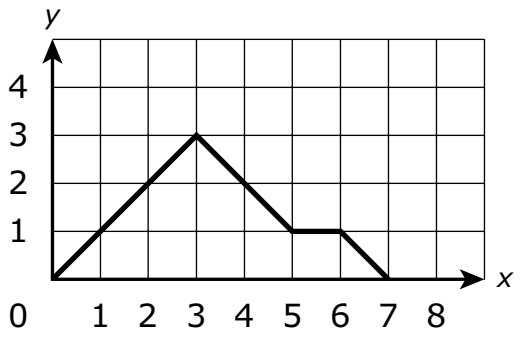
Ⓒ



Ⓓ



39 The graph of a function is shown.



Which of the following statements describes an interval of the function?

Ⓐ The function is decreasing from $x = 5$ to $x = 6$.

Ⓑ The function is decreasing from $x = 2$ to $x = 4$.

Ⓒ The function is increasing from $x = 6$ to $x = 7$.

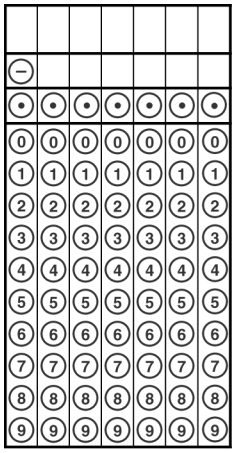
Ⓓ The function is increasing from $x = 0$ to $x = 3$.

40 Glenn bought a game system and 3 video games for $375. Jim bought a game system and 4 video games at the same store for $410.

- Each game system costs the same.
- Each video game costs the same.

What is the cost, in dollars, of one **game system**?

Enter your answer in the answer boxes at the top of the answer grid **and** completely fill the matching circles.



STOP!