VIRGINIA STANDARDS OF LEARNING

Released Test

ALGEBRA I

2009 Mathematics Standards of Learning

Released Spring 2014

Property of the Virginia Department of Education

SAMPLE A

What is the solution to $3(2x-1)=3$?

- **A** $x=\frac{1}{3}$
- **B** $x=\frac{2}{3}$
- **C** $x=1$
- **D** $x=5$

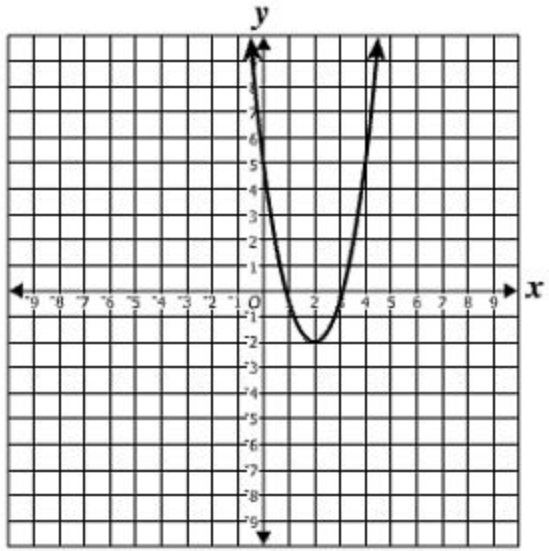
Directions: Type your answer in the box. Your answer must be in the form of a fraction in simplest form. Use "/" for the fraction bar.

SAMPLE B

What is the value of $\frac{3}{x+2}$ when $x = 4$?

Your answer must be in the form of a fraction in simplest form.

Look at the graphed function shown.



Based on the zeros, which best represents the graphed function?

- **A** $y = (x - 3)(2x + 2)$
- **B** $y = (2x + 6)(x + 1)$
- **C** $y = 2(x + 3)(x - 1)$
- **D** $y = 2(x - 3)(x - 1)$

Travis would like to buy some toys to donate to charity. He plans to buy 9 dolls at d dollars each, 2 toy cars at c dollars each, and 3 train sets at t dollars each. Which expression represents the total cost, in dollars, of these items that Travis wants to buy?

- **A** $9c + 2t + 3d$
- **B** $9d - 2c - 3t$
- **C** $9d + 2c + 3t$
- **D** $9c - 2t - 3d$

Which expression is equivalent to $\frac{18c^8d^9}{9c^3d^6}$? Assume the denominator does not equal zero.

- **A** $2c^5d^3$
- **B** $9c^5d^3$
- **C** $2c^{11}d^{15}$
- **D** $9c^{11}d^{15}$

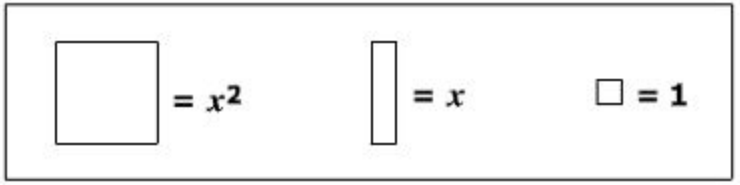
Directions: Click on a box to choose each expression you want to select. You must select all correct expressions.

Identify each expression that is a factor of this polynomial.

$$4x^2 - 2x - 2$$

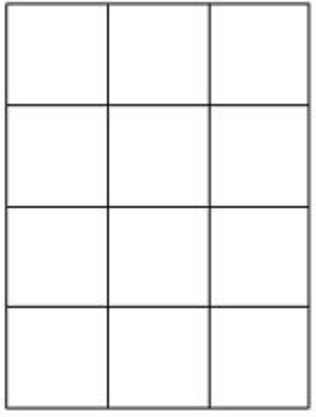
$2x+1$	2	$x-1$	$2x-1$	$4x-1$

Look at this key.

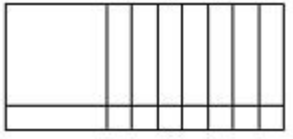


Which model correctly represents the product of $(x+3)$ and $(x+4)$?

A

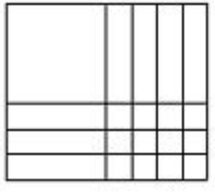


C



B

D



What is $\sqrt{18}$ written in simplest radical form?

- **A** $2\sqrt{3}$
- **B** $3\sqrt{2}$
- **C** $3\sqrt{6}$
- **D** $6\sqrt{3}$

Which binomial is a factor of $c^2 - 12c + 32$?

- **A** $c - 12$
- **B** $c - 8$
- **C** $c - 2$
- **D** $c - 1$

What is the value of this expression when $x = \frac{2}{3}$?

$$x^2+3x-2$$

- A $\frac{16}{3}$
- B $\frac{40}{9}$
- C $\frac{4}{3}$
- D $\frac{4}{9}$

Which expression is equivalent to $(3x^{-4})^2 (5x^{-2})$?

- A $\frac{30}{x^{10}}$
- B $30x^{14}$
- C $\frac{45}{x^{10}}$
- D $45x^{14}$

Which polynomial is equivalent to $(18n^2 - 9n + 1) \div (3n - 1)$? Assume the divisor is not equal to zero.

- **A** $6n - 1$
- **B** $6n + 1$
- **C** $6n^2 - 3$
- **D** $18n^2 - 3$

Directions: Type your answer in the box.

What is the value of this expression when $a = 64$ and $b = -5$?

$$-2\sqrt[3]{a} + b^2$$

When $n > 0$, which expression is equivalent to $\sqrt{42n^9}$ in simplest form?

- A $n^3\sqrt{42}$
- B $n^4\sqrt{42n}$
- C $6n^3\sqrt{7}$
- D $6n^4\sqrt{7n}$

Look at the system of equations.

$$\begin{cases} y = -x + 2 \\ 7x + 4y = -1 \end{cases}$$

What is the value of x for the solution to this system of equations?

- **A** -5
- **B** -3
- **C** 3
- **D** 5

Pierre solved an inequality as shown.

Step 1: $-8 \geq n + 3$
Step 2: $-8 + (-3) \geq n + 3 + (-3)$
Step 3: $-11 \geq n + 0$
Step 4: $-11 \geq n$

What property justifies the work between Step 3 and Step 4 ?

- **A** Inverse property of addition
- **B** Identity property of addition
- **C** Addition property of inequality
- **D** Commutative property of addition

Which property of real numbers justifies the work shown?

$$13x - 1 = (12x + 15) + 7x$$
$$13x - 1 = 7x + (12x + 15)$$

- **A** Commutative property of addition
- **B** Associative property of addition
- **C** Identity property of addition
- **D** Distributive property

What is the slope of the line represented by $\frac{1}{8}x + 3y = 3$?

- **A** $\frac{-1}{8}$
- **B** $\frac{-1}{24}$
- **C** $\frac{1}{24}$
- **D** $\frac{1}{8}$

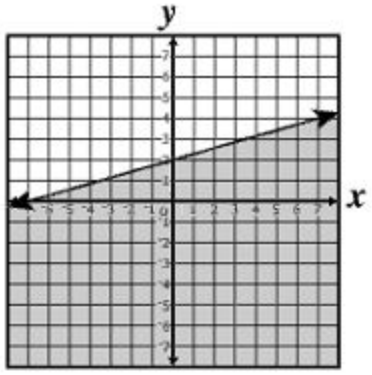
Directions: Type an inequality in the box. Use the < or > for the inequality sign.

Solve for x:

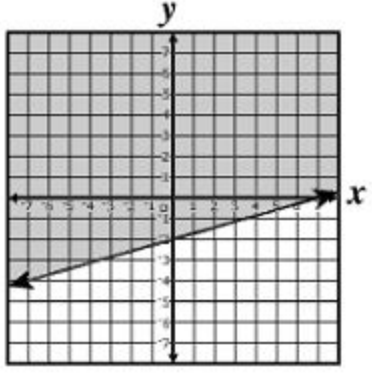
$$-2x + 6 < x - 6$$

Which graph best models $y \leq \frac{2}{7}x - 2$?

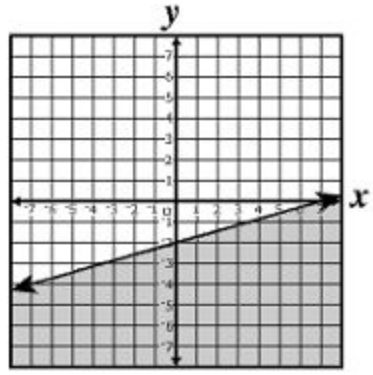
A



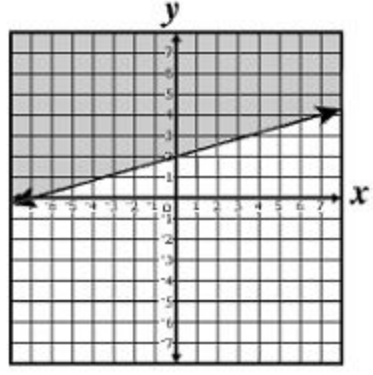
B



C



D



Which inequality represents all the solutions of $9(4x-8)<4(6x+9)$?

- **A** $x<-3$
- **B** $x>-3$
- **C** $x<9$
- **D** $x>9$

A total of 243 adults and children are at a movie theater. There are 109 more adults than children in the theater. If a represents the number of adults and b represents the number of children, which system of equations could be used to find the number of adults and the number of children in the theater?

- **A** $\begin{cases} a+b=243 \\ a=109b \end{cases}$
- **B** $\begin{cases} a+b=243 \\ b=109a \end{cases}$
- **C** $\begin{cases} a+b=243 \\ a=b+109 \end{cases}$
- **D** $\begin{cases} a+b=243 \\ b=a+109 \end{cases}$

Directions: Click on a box to choose each point you want to select. You must select all correct points.

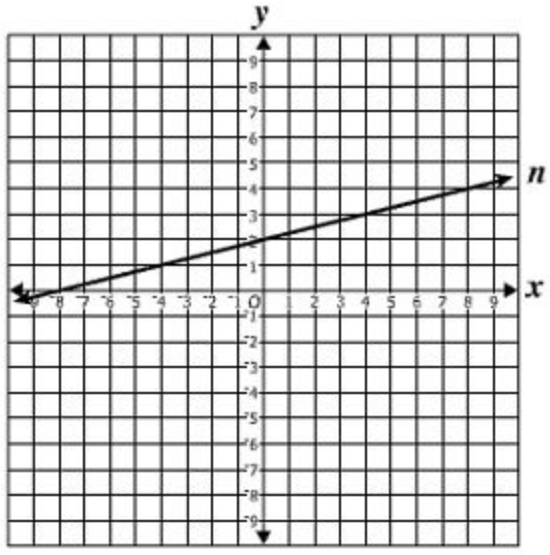
A system of inequalities is shown.

$$\begin{cases} y > \frac{1}{2}x + 1 \\ y + 3x \leq 6 \end{cases}$$

From the given points, select each point that is a solution to this system of inequalities.

$(^{-}1, ^{-}3)$	(1, 2)	(2, 0)	(4, 6)

The graph of line n is shown.



Which number is closest in value to the slope of line n ?

- **A** -4
- **B** $-\frac{1}{4}$
- **C** $\frac{1}{4}$
- **D** 4

The formula shown can be used to find A, the amount of money Raul has in his savings account.

$$A = P + Prt$$

Raul wants to find r, the rate of interest his money earns. Which equation is correctly solved for r ?

- **A** $r = APt$
- **B** $r = A - 2Pt$
- **C** $r = \frac{A}{2Pt}$
- **D** $r = \frac{A - P}{Pt}$

What are the real roots of $x^2 - 7x + 10 = 0$?

- **A** 2 and 5
- **B** 1 and 10
- **C** -1 and -10
- **D** -2 and -5

A data set with an even number of data points is ordered from least to greatest. The middle two data points are represented by x_1 and x_2. This formula can be used to find the median of the data set.

$$m = \frac{x_1 + x_2}{2}$$

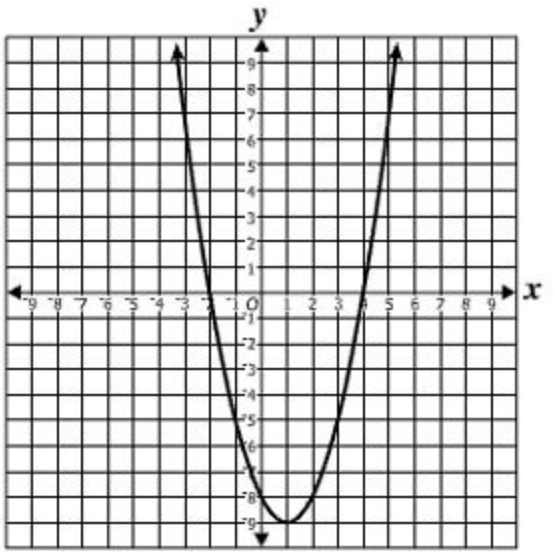
Which shows this formula solved for x_1 ?

- **A** $x_1 = m - \frac{x_2}{2}$
- **B** $x_1 = 2m - x_2$
- **C** $x_1 = 2m - 2x_2$
- **D** $x_1 = m - 2 - x_2$

Which equation represents the horizontal line passing through (7, 5) ?

- **A** $x = 5$
- **B** $y = 5$
- **C** $x = 7$
- **D** $y = 7$

The graph of $y = x^2 - 2x - 8$ is shown.



What are the solutions to $x^2 - 2x - 8 = 0$?

- **A** $x = 1$ and $x = -9$
- **B** $x = 0$ and $x = -8$
- **C** $x = -2$ and $x = 4$
- **D** $x = -4$ and $x = 2$

What value of p will make this equation true?

$$\frac{6p+4}{6} = \frac{4p-8}{3}$$

- **A** -10
- **B** -6
- **C** 2
- **D** 10

Direction: Type your answer in the box.

What is the slope of the line represented by this equation?

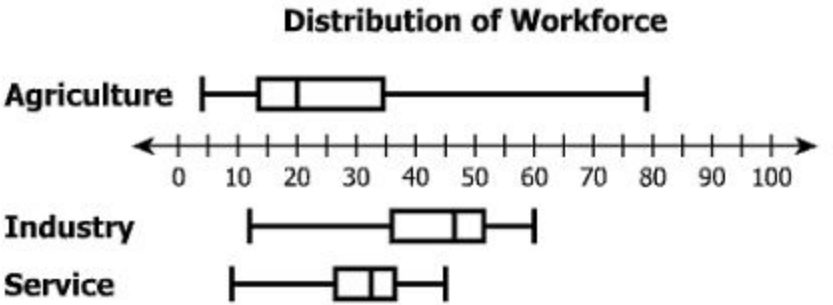
$$3x + 5y = -7$$

Slope =

The length, l, of a rectangle is 3 times its width. The perimeter of the rectangle is greater than 48 centimeters. Which inequality expresses all the possible lengths, in centimeters, of the rectangle?

- **A** $l > 6$
- **B** $l > 12$
- **C** $l > 18$
- **D** $l > 36$

These box-and-whisker plots summarize the percent of the workforce employed in agriculture, industry, and service jobs in twenty towns.



Which statement is NOT true?

- **A** Industry has the greatest median value.
- **B** Service has the range with the least value.
- **C** Agriculture has the range with the greatest value.
- **D** Industry has the interquartile range with the least value.

Directions: Click and drag each selected ordered pair to a box.

Using the ordered pairs shown, create a relation containing three ordered pairs with a domain of $\{-1, 2, 4\}$.

$\{\square, \square, \square\}$

(−3, −1)	(4, −2)
(−1, 0)	(3, 4)
(−2, 2)	(2, 3)

This relation is an inverse variation.

$$\{(-1, 8), (4, -2), (-2, 4)\}$$

Which equation represents this relation?

- **A** $y = -3x + 5$
- **B** $y = -2x$
- **C** $y = \frac{-x}{8}$
- **D** $y = \frac{-8}{x}$

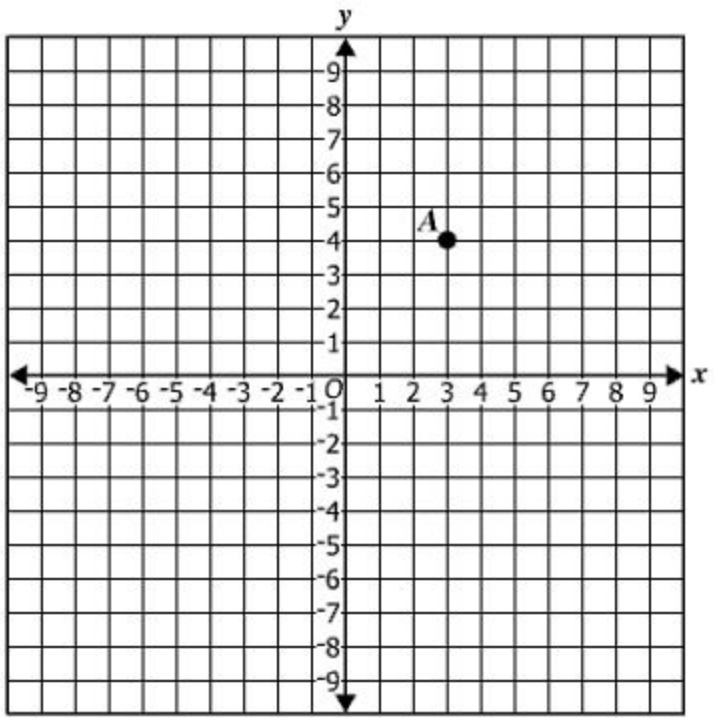
Which equation represents the pattern shown in the table?

x	y
$^{-}3$	$^{-}10$
$^{-}2$	$^{-}7$
$^{-}1$	$^{-}4$
0	$^{-}1$

- **A** $y = {}^{-}3x - 19$
- **B** $y = {}^{-}x - 13$
- **C** $y = x - 1$
- **D** $y = 3x - 1$

Directions: Click on the grid to plot the point you want to select.

The graph of the equation representing a direct variation passes through point A. Locate one additional point that is on the graph of this equation.



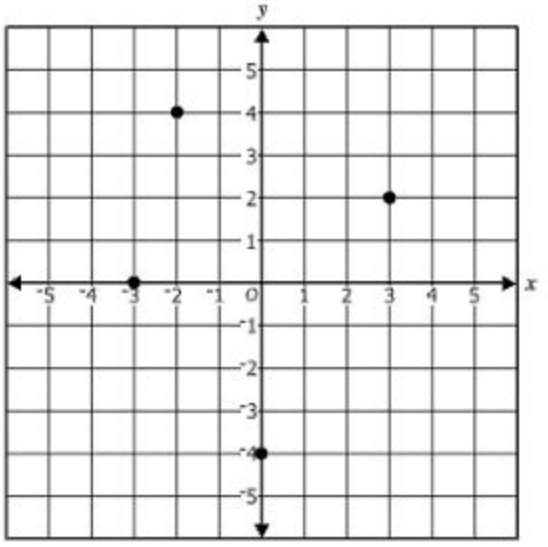
Look at the data in this table.

x	y
1	2
2	4
3	5
4	7
5	9
6	11

Which equation most closely represents the line of best fit for this data?

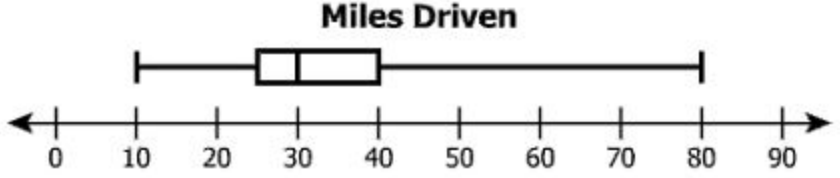
- **A** $y = 1.77x + 0.13$
- **B** $y = 0.56x - 0.05$
- **C** $y = 0.5x$
- **D** $y = 2x$

What is the range of this relation?



- **A** $\{x \mid -3 \leq x \leq 3\}$
- **B** $\{-3, -2, 0, 3\}$
- **C** $\{y \mid -4 \leq y \leq 4\}$
- **D** $\{-4, 0, 2, 4\}$

Katie recorded the number of miles she drove for each of 9 days. She drove a different number of miles each day. This box-and-whisker plot summarizes her information.



Katie drove 30 miles on each of two additional days. She redrew the box-and-whisker plot to include this data. Which statement must be true?

- **A** The value of the range decreased.
- **B** The value of the mean remained the same.
- **C** The value of the median remained the same.
- **D** The value of the interquartile range increased.

Two relationships are described.

Relationship S: Karen drove 160 miles in 4 hours, and then she drove 80 miles in 2 hours.

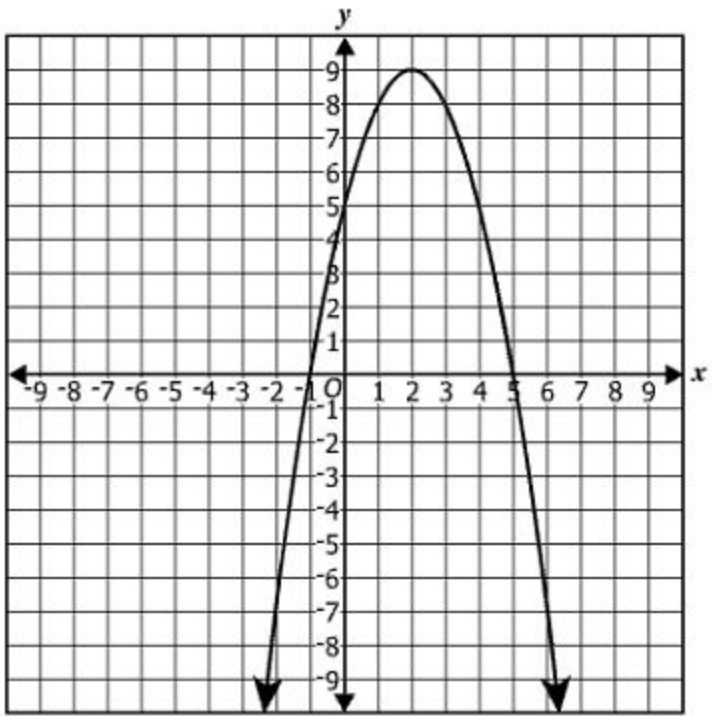
Relationship T: Vernon cooked 6 hamburgers in 10 minutes, and then he cooked 9 hamburgers in 15 minutes.

Which statement is true about these relationships?

- **A** Neither relationship is a direct variation.
- **B** Both relationships are direct variations.
- **C** Only Relationship S is a direct variation.
- **D** Only Relationship T is a direct variation.

Directions: Click on the grid to plot each point you want to select. You must select all correct points.

Identify each of the x- and y-intercepts of the relation shown.



What is $f(-8)$ for the function f ?

$$f(x) = \frac{11(x-24)}{2}$$

- **A** -56
- **B** -88
- **C** -176
- **D** -352

The number of complaints a company received at the end of each of six weeks is shown in this table.

Company's Complaints

Week	Number of Complaints
1	225
2	205
3	187
4	169
5	147
6	130

Based on the line of best fit, how many complaints should the company expect at the end of week 8 ?

- **A** 75
- **B** 91
- **C** 96
- **D** 110

The table shows the relationship between corresponding values of x and y.

x	y
−6	−3
−3	−2
3	0
6	1
9	2

To determine the y-value —

- **A** add 3 to the x-value
- **B** subtract 3 from the x-value
- **C** divide the x-value by 3 and add 1
- **D** divide the x-value by 3 and subtract 1

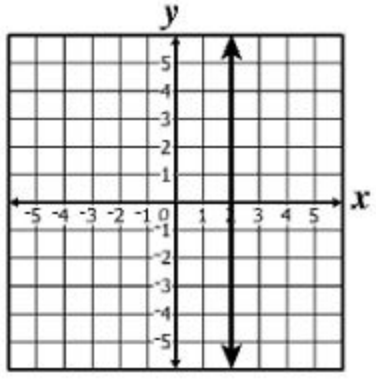
Which relation is a function?

A $\{(-3, 3), (5, 5), (-3, 2), (5, 3)\}$

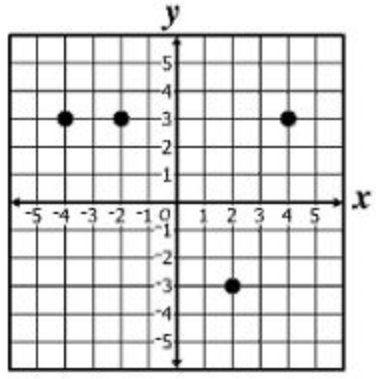
C

Domain	Range
4	3
5	4
2	5
4	6

B



D



The manager of a company recorded the number of hours his employees worked during each of two weeks. The following statistics were calculated.

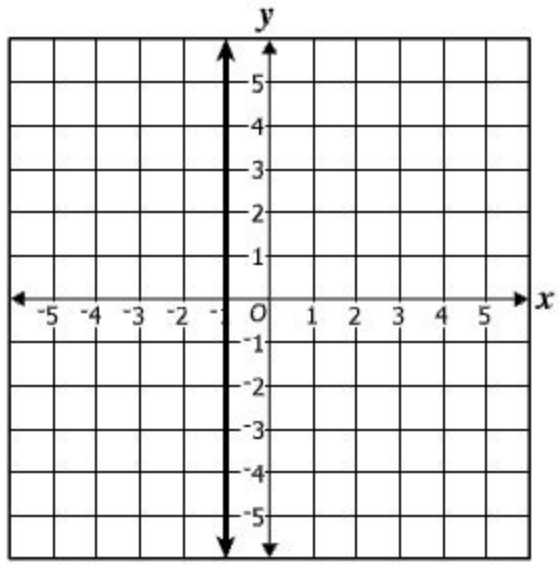
- **Week 1: The mean was 35 hours with a standard deviation of 1.5 hours.**
- **Week 2: The mean was 40 hours with a standard deviation of 2.0 hours.**

The manager concluded that there was more variation in the number of hours worked for Week 2 than for Week 1. The manager's conclusion was —

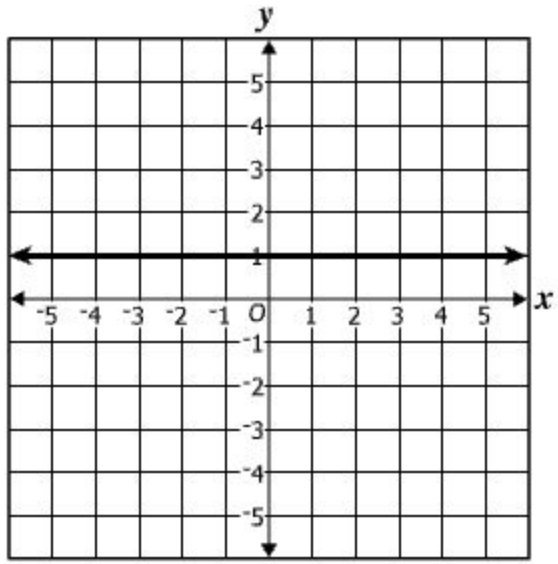
- **A** valid because the mean for Week 2 was greater than the mean for Week 1
- **B** valid because the standard deviation for Week 2 was greater than the standard deviation for Week 1
- **C** invalid because the mean for Week 1 was less than the mean for Week 2
- **D** invalid because the standard deviation for Week 1 was less than the standard deviation for Week 2

Which graph appears to show a relation that is NOT a function?

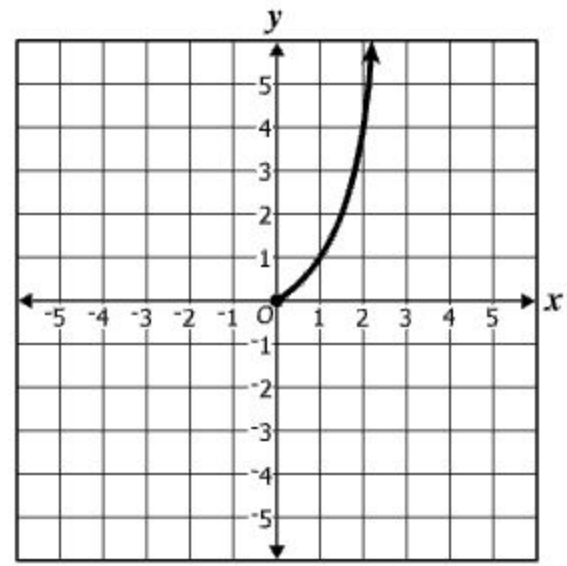
A



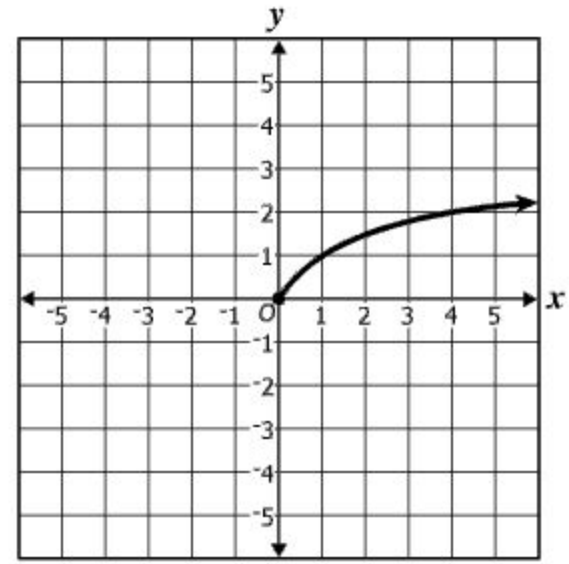
B



C



D



A scientist dropped an object from a height of 200 feet. She recorded the height of the object in 0.5-second intervals. Her data is shown.

Height of Dropped Object

Time (seconds)	Height (feet)
0.0	200
0.5	195
1.0	185
1.5	165
2.0	135
2.5	100

Based on a quadratic model, which best approximates the height at 3 seconds?

- **A** 52 feet
- **B** 55 feet
- **C** 65 feet
- **D** 80 feet

Look at function g.

$$g(x) = 9x^2 - 16$$

Which set contains only the zeros of function g ?

- A $\left\{\frac{-4}{3}, \frac{4}{3}\right\}$
- B $\left\{\frac{-4}{3}, 0, \frac{4}{3}\right\}$
- C $\{-16, 9\}$
- D $\{-16, 0, 9\}$

Statistical information for a data set is given.

- **The mean is 18.1.**
- **The z-score for 13.0 is -1.7.**

What is the standard deviation for this data set?

- **A** 1.7
- **B** 3.0
- **C** 3.4
- **D** 5.1

A representation of a function is shown.

$$f(x) = -4x + 2$$

What are the x-intercept and the y-intercept of this function?

- **A** x-intercept of $(0, -2)$ and y-intercept of $\left(\frac{-1}{2}, 0\right)$
- **B** x-intercept of $(0, 2)$ and y-intercept of $\left(\frac{1}{2}, 0\right)$
- **C** x-intercept of $\left(\frac{-1}{2}, 0\right)$ and y-intercept of $(0, -2)$
- **D** x-intercept of $\left(\frac{1}{2}, 0\right)$ and y-intercept of $(0, 2)$