

VIRGINIA STANDARDS OF LEARNING

TEST ITEM SET

Algebra I

2009 Mathematics Standards of Learning

Released Spring 2015

Property of the Virginia Department of Education

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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.

Which expression represents four less than half a number, n ?

A $4 - \frac{1}{2}n$

B $\frac{1}{2}n - 4$

C $\frac{1}{2}(4 - n)$

D $\frac{1}{2}(n - 4)$

Which of the following binomials is a factor of $x^2 - x - 6$?

- A $x - 1$
- B $x - 2$
- C $x - 3$
- D $x - 6$

Directions: Click on all the correct answers.

Identify each expression that is in simplest radical form.

$x\sqrt{50y}$

$64\sqrt{x}$

$7x^2y\sqrt{2xy}$

$\sqrt{12x^3y^4}$

Which expression is equivalent to $\frac{1}{6}(30x - 24y) - \frac{1}{8}(32x - 16y)$?

- A $x - 6y$
- B $x - 2y$
- C $2x - 4y$
- D $9x - 6y$

Which is equivalent to $\sqrt[3]{48}$ in simplest form?

- A $2\sqrt[3]{6}$
- B $6\sqrt[3]{2}$
- C 16
- D 24

What is the value of $\sqrt{128}$ in simplest radical form?

- A $8\sqrt{2}$
- B $64\sqrt{2}$
- C $4\sqrt{8}$
- D $16\sqrt{8}$

Which polynomial is equivalent to this expression if $n \neq -1$?

$$\frac{3 + n - 2n^2}{1 + n}$$

- A $2n - 3$
- B $3 - 2n$
- C $3 - 2n^2$
- D $4 - 2n^2$

Which is a factor of $2n^2 - 5n - 42$?

- A $2n - 7$
- B $2n - 6$
- C $n - 7$
- D $n - 6$

Which of the following is equivalent to $\frac{a^{12}b^2}{a^3b^6}$?

A $\frac{a^9}{b^4}$

B $\frac{b^4}{a^9}$

C $\frac{a^4}{b^3}$

D a^9b^4

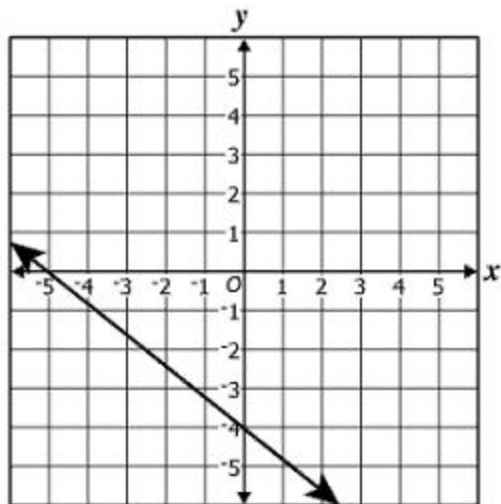
What is the value of this expression when $n = -15$?

$$-2|n + 6|$$

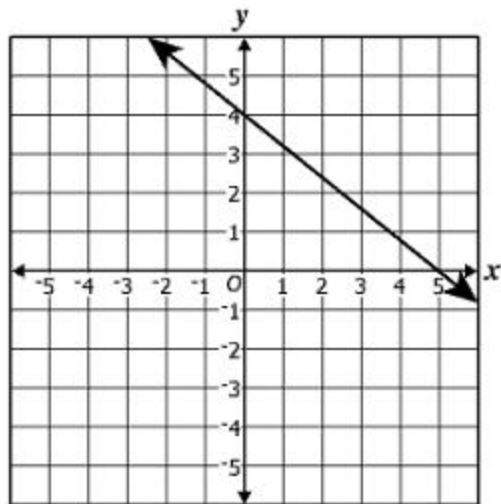
- A -42
- B -18
- C 18
- D 42

Which graph best represents the equation $4x + 5y = -20$?

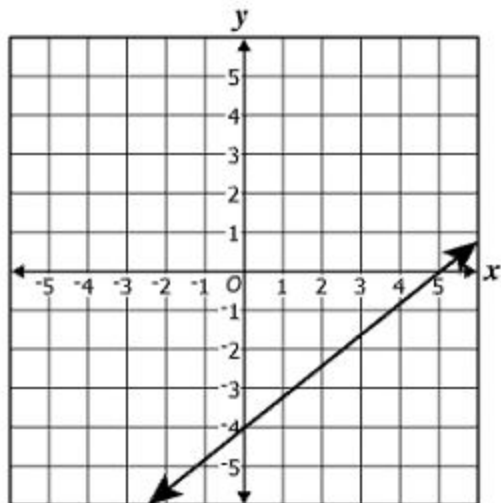
A



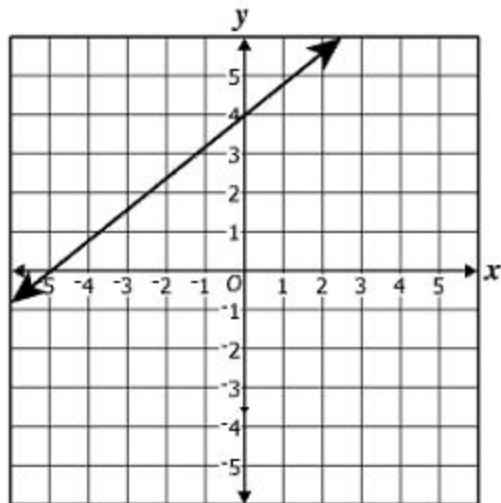
C



B



D



A formula to find the angle measures of an isosceles triangle is shown.

$$180 = 2x + y$$

Which equation can be used to find x ?

- A** $x = \frac{180 - y}{2}$
- B** $x = \frac{180 + y}{2}$
- C** $x = 90 - y$
- D** $x = 90 + y$

Which equation represents the line that passes through the points $(-4, 4)$ and $(8, -2)$?

A $y = -2x + 14$

B $y = -2x - 4$

C $y = \frac{-1}{2}x + 2$

D $y = \frac{-1}{2}x - 2$

For which system of inequalities is $(-3, 1)$ a solution?

- A $\begin{cases} x + y < -2 \\ 2x - 3y < -9 \end{cases}$
- B $\begin{cases} x + y < -2 \\ 2x - 3y \leq -9 \end{cases}$
- C $\begin{cases} x + y \leq -2 \\ 2x - 3y < -9 \end{cases}$
- D $\begin{cases} x + y \leq -2 \\ 2x - 3y \leq -9 \end{cases}$

What is the solution to this system of equations?

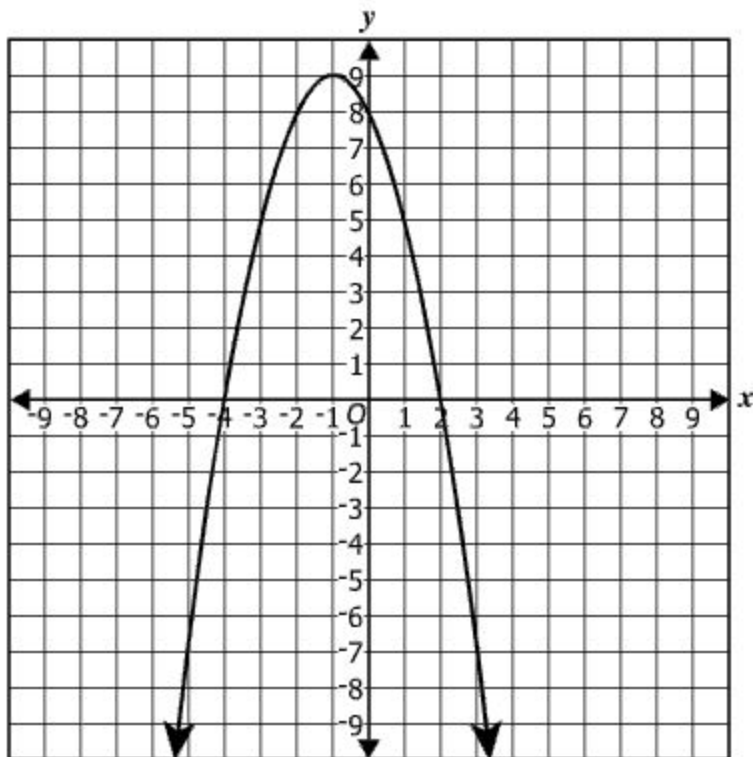
$$\begin{cases} 2x + 4y = 22 \\ 7x + y = 12 \end{cases}$$

- A (3, 4)
- B (2, -2)
- C (1, 5)
- D (-1, 6)

Directions: Click on the grid to plot each of the solutions. You must plot all solutions.

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

On the grid, identify each of the solutions to $-x^2 - 2x + 8 = 0$.

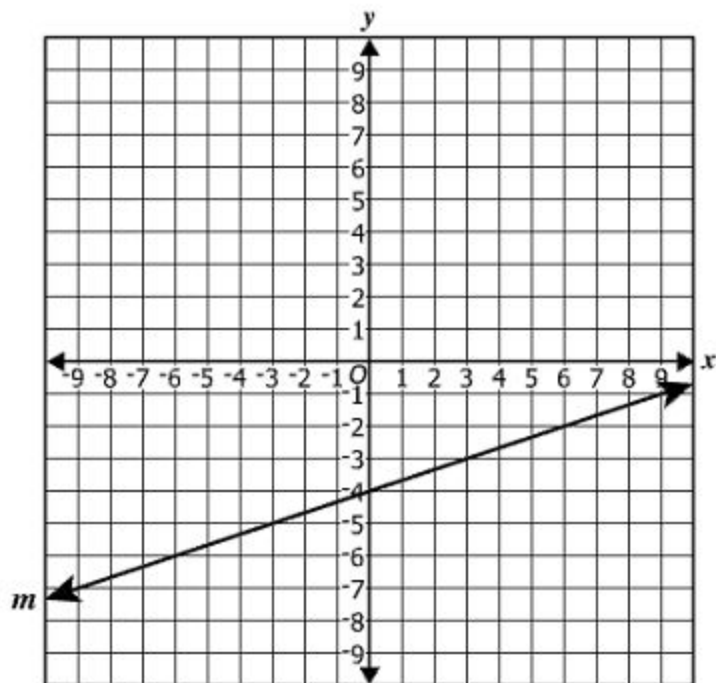


What value of x makes this equation true?

$$3x - 20 = -2x$$

- A -20
- B -4
- C 4
- D 20

Which equation best represents line m ?



- A $y = -3x - 4$
- B $y = -\frac{1}{3}x - 4$
- C $y = \frac{1}{3}x - 4$
- D $y = 3x - 4$

Directions: Click and drag the answers to the correct boxes.

Christopher incorrectly solved an inequality as shown.

Step 1: $-4(x - 7) + 1 \leq -3$

Step 2: $-4(x - 7) \leq -4$

Step 3: $-4x + 28 \leq -4$

Step 4: $-4x \leq -32$

Step 5: $x \leq 8$

Between which two consecutive steps did Christopher make a mistake?

and

Step 1
Step 2
Step 3
Step 4
Step 5

Directions: Type your answer in the box.

Solve for n :

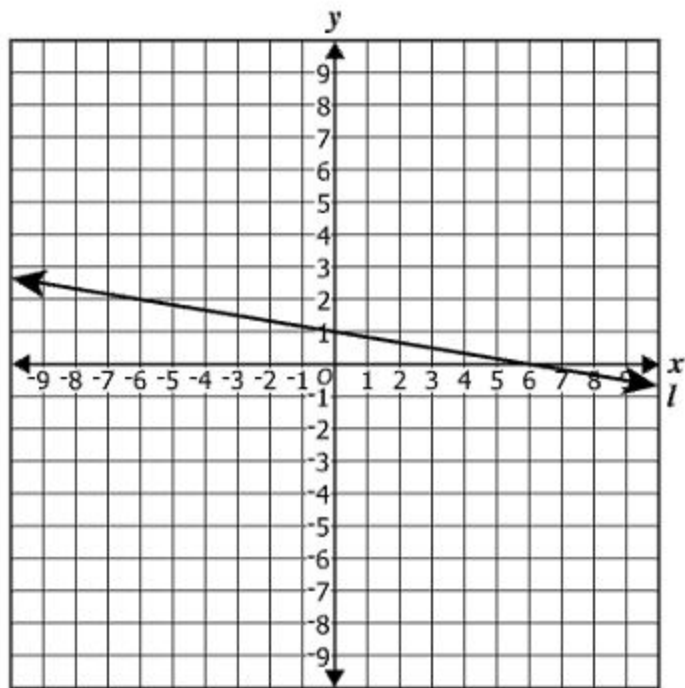
$$\frac{3n-7}{6} = \frac{2n+5}{3}$$

$$n = \boxed{}$$

What values of x are solutions of $3x^2 + 11x = 20$?

- A $-\frac{4}{3}$ and 5
- B $-\frac{5}{3}$ and 4
- C -4 and $\frac{5}{3}$
- D -5 and $\frac{4}{3}$

The graph of line l is shown.



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

- A -6
- B $-\frac{1}{6}$
- C $\frac{1}{6}$
- D 6

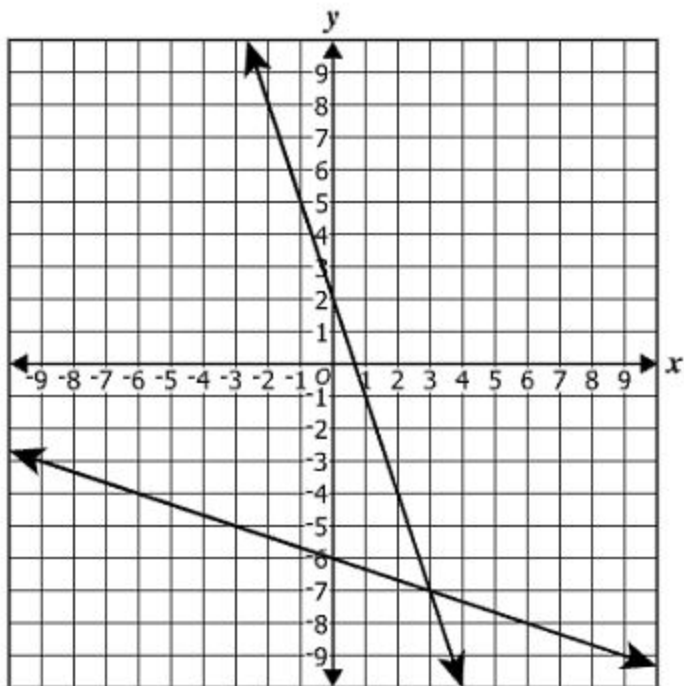
Directions: Type your answer in the box.

Based on the transitive property, complete this statement.

If $2(y - 3) \geq 3x - 4$ and $3x - 4 \geq 6 - y$, then $2(y - 3) \geq \underline{\quad ? \quad}$

This system of linear equations is graphed as shown.

$$\begin{cases} 3x + y = 2 \\ x + 3y = -18 \end{cases}$$



What is the solution to this system of equations?

- A (2, -6)
- B (3, -7)
- C (-6, 2)
- D (-7, 3)

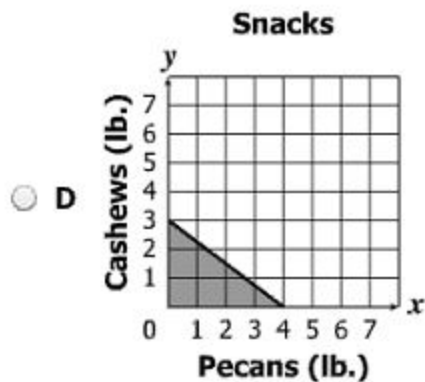
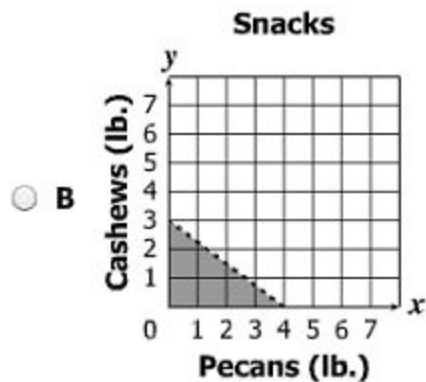
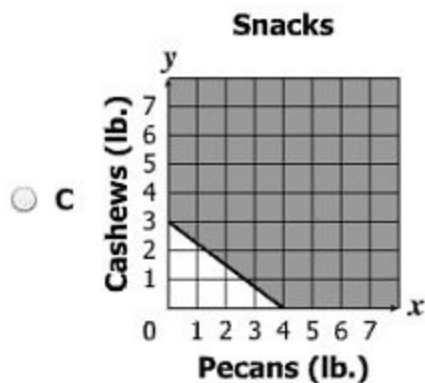
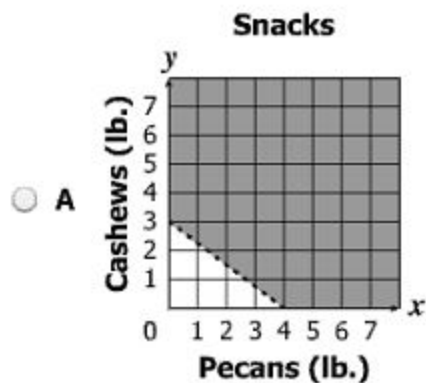
Renee is going bowling.

- **The cost per game is \$2.50.**
- **Renee will need to rent a pair of bowling shoes for \$1.50.**
- **She can spend up to \$16.00 to bowl and rent a pair of shoes.**

What is the maximum number of games that Renee can bowl?

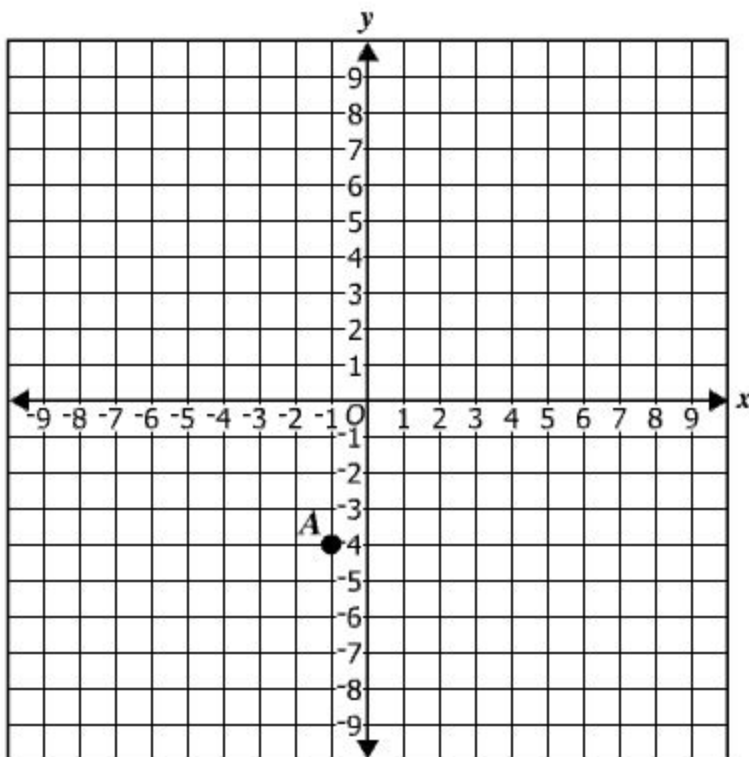
- A 4**
- B 5**
- C 6**
- D 9**

Malik can spend no more than \$24 to buy pecans and cashews. He will pay \$6 per pound for pecans and \$8 per pound for cashews. Which graph best represents the number of pounds of pecans and the number of pounds of cashews Malik can buy?



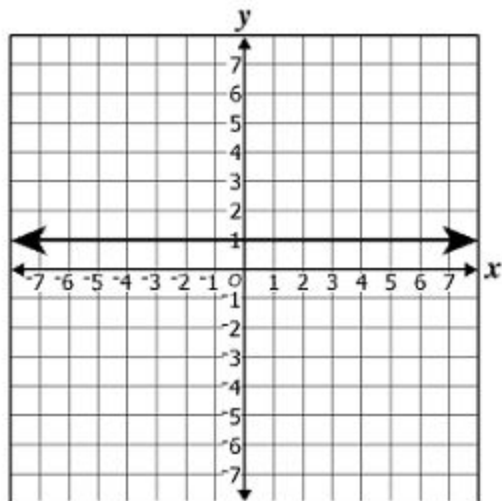
Directions: Click on the grid to plot two points. The coordinates of the points must be integers.

Point A is an element of a direct variation. Plot two points, other than A , that are elements of this direct variation. The coordinates of the points must be integers.

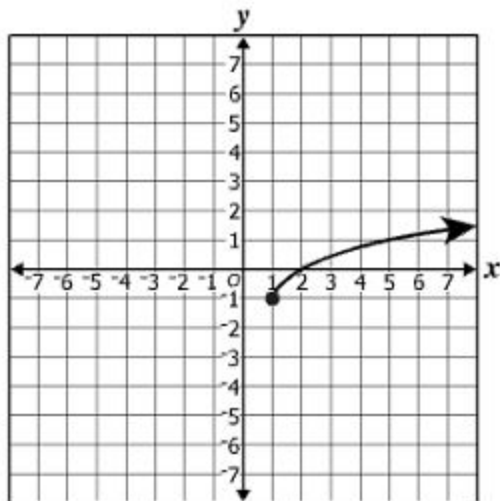


Which graph has exactly one x -intercept and one y -intercept?

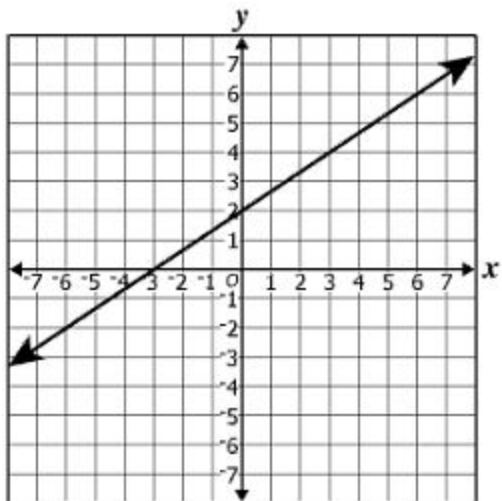
A



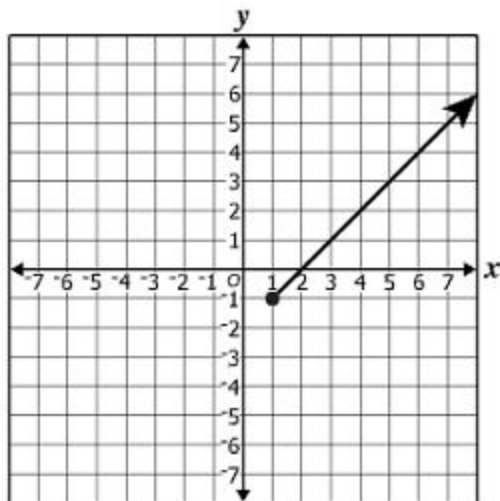
C



B



D



Which equation best represents this data set?

$$\{(-4, -4.8), (-3, -8.2), (-2, -9.1), (-1, -8.1), (0, -4.7), (1, 0.3)\}$$

- A $y = 1.1x^2 + 4.2x + 4.9$
- B $y = 1.1x^2 + 4.2x - 4.9$
- C $y = 1.1x - 4.2$
- D $y = 1.1x + 4.2$

A relationship between x and y is shown in this table.

x	y
0	1
1	2
2	5
3	10

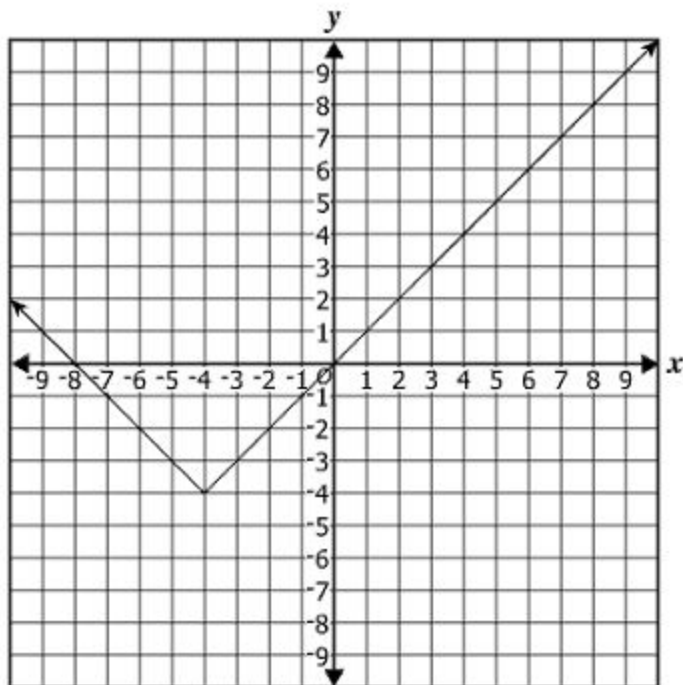
Which equation represents this relationship?

- A $y = 2x + 1$
- B $y = 5x - 5$
- C $y = x^2 + 1$
- D $y = (x + 1)^2$

Ms. Scott will pay \$2,000 to have her house painted. The amount each painter earns, A , varies inversely for the number of painters, n , that will paint the house. Which equation best represents this situation?

- A $A = 2,000 + n$
- B $2,000 = A + n$
- C $A = 2,000n$
- D $2,000 = An$

The following graph shows a relation.



Which of the following best describes the range of this relation?

- A All real numbers
- B All real numbers between -10 and 10
- C All real numbers less than or equal to -4
- D All real numbers greater than or equal to -4

Directions: Click and drag the answers to the correct boxes.

Each of these data sets has a mean of 20.

Set 1: { 18, 19, 20, 21, 22 }

Set 2: { 20, 20, 20, 20, 20 }

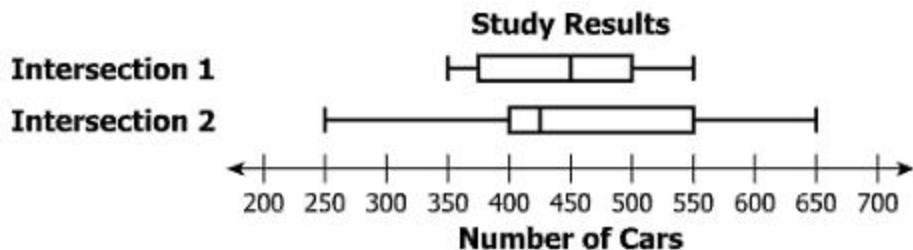
Set 3: { 16, 18, 20, 21, 25 }

Order the sets from greatest standard deviation to least standard deviation.

<input type="text"/>	<input type="text"/>	<input type="text"/>
Greatest	→	Least

Set 1
Set 2
Set 3

A study was conducted to determine the number of cars that passed through two intersections each day for 20 days. The results are summarized in these box-and-whisker plots.



Which statement is best supported by these data?

- A The range of the data for Intersection 2 is twice the range of the data for Intersection 1.
- B The lower quartile for Intersection 1 is greater than the lower quartile for Intersection 2.
- C The interquartile range for Intersection 1 is the same as the interquartile range for Intersection 2.
- D The total number of vehicles that passed through Intersection 2 is greater than the total number of vehicles that passed through Intersection 1.

Which of these functions has exactly two different zeros?

A $f(x) = \frac{1}{10}x + 4$

B $g(x) = \frac{3x - 10}{3}$

C $h(x) = x^2 - 4x + 4$

D $k(x) = x^2 + 11x + 24$

In which table does y vary directly with x ?

A

x	y
1	3
2	3
3	3

C

x	y
1	5
2	7
3	9

B

x	y
1	4
2	8
3	12

D

x	y
1	9
2	7
3	5

Which equation could represent a graph with x -intercepts of $(4, 0)$ and $(-7, 0)$?

A $y = x^2 + 3x - 28$

B $y = x^2 - 3x - 28$

C $y = x^2 + 3x + 28$

D $y = x^2 - 3x + 28$

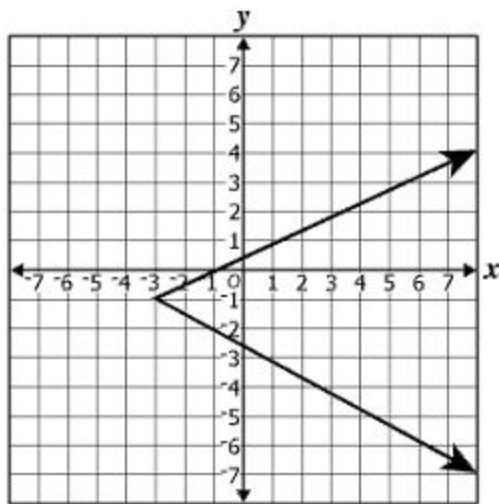
Which number is a zero of the function h ?

$$h(x) = x^2 + 3x - 18$$

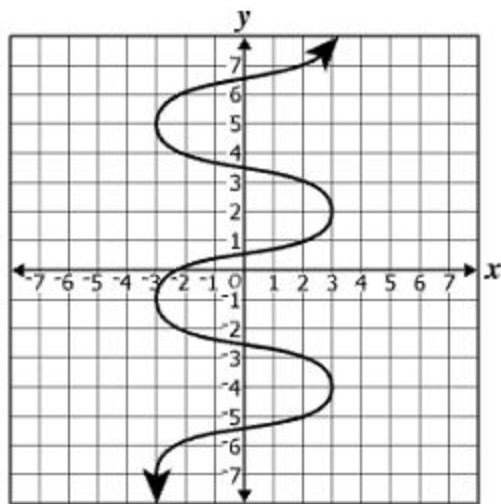
- A -6
- B -3
- C 0
- D 6

Which of the following graphs appears to be a function?

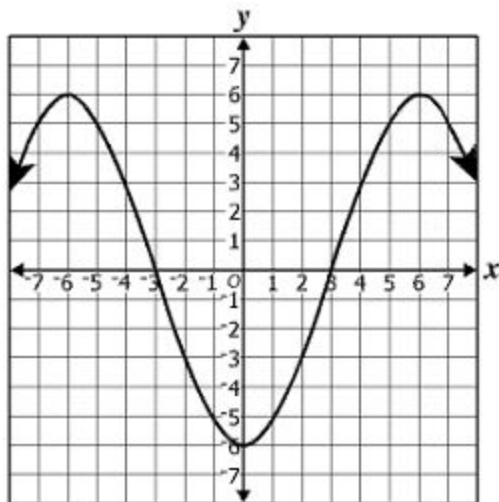
A



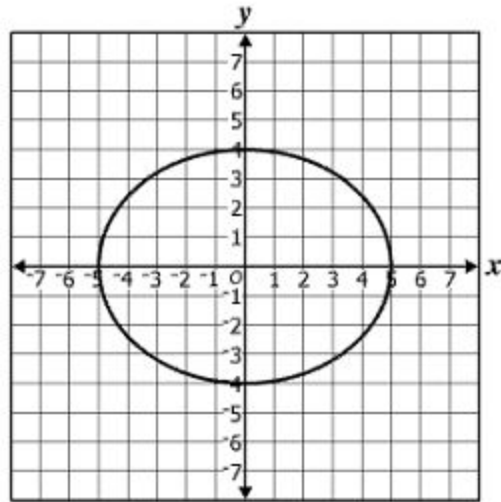
C



B



D



If $f(x) = (x - 3)^2 + 1$, what is $f(6)$?

- A -2
- B 7
- C 10
- D 16

Which number is NOT an element in the domain of this relation?

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

- A 4
- B 1
- C 0
- D -2

$$\{(-5, 9), (2, 31), (9, 143), (11, 151), (0, 42), (5, 97)\}$$

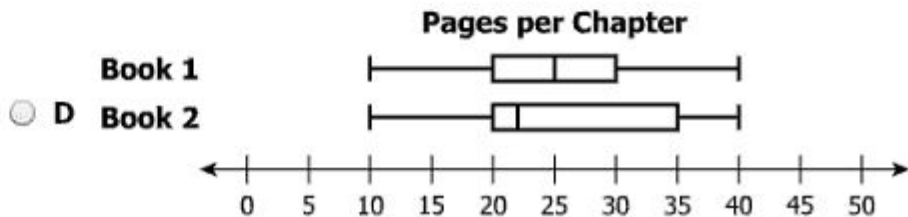
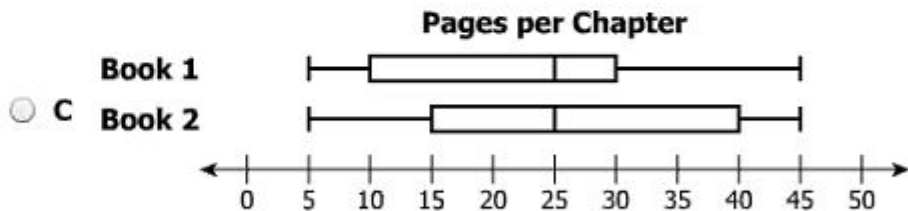
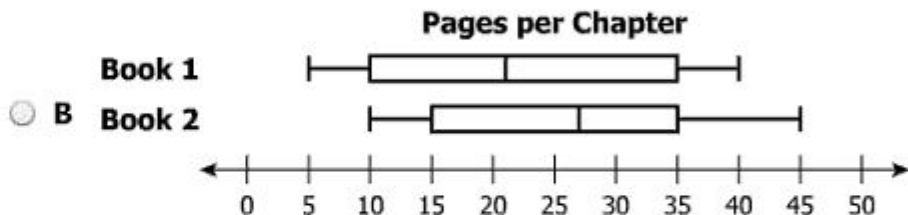
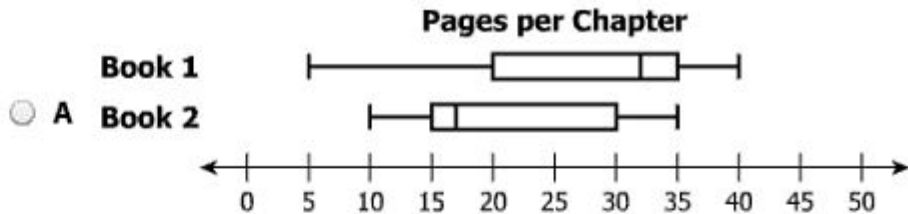
Using the equation of the line of best fit, which number is the best prediction of the output when the input is 13 ?

- A 127
- B 159
- C 170
- D 178

A data set has a mean of 720 and a standard deviation of 6. Which is closest to the z-score for an element of this data set with a value of 709 ?

- A 11.00
- B 1.83
- C -11.00
- D -1.83

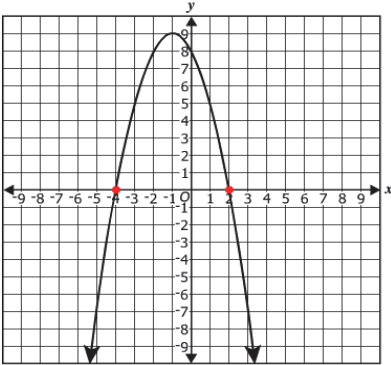
Ramon drew box-and-whisker plots to summarize the number of pages in each chapter of two books. The values of the interquartile ranges for these box-and-whisker plots are the same. Which box-and-whisker plots could represent these data?



Algebra I
Released Test Item Set Spring 2015
Answer Key

Sequence Number	Item Type: Multiple Choice (MC) or Technology-Enhanced Item (TEI)	Correct Answer	Reporting Category	Reporting Category Description
1	MC	B	001	Expressions and Operations
2	MC	C	001	Expressions and Operations
3	TEI	<p>$64\sqrt{x}$ (second from left) & $7x^2y\sqrt{2xy}$ (third from left)</p> <p>Both of these answers, and only these answers, must be selected.</p> <div style="border: 1px solid gray; padding: 10px; margin: 10px 0;"> <p>Directions: Click on all the correct answers.</p> <p style="text-align: center;">Identify each expression that is in simplest radical form.</p> <div style="display: flex; justify-content: center; gap: 10px; margin: 10px 0;"> <div style="border: 1px solid gray; padding: 5px;">$x\sqrt{50y}$</div> <div style="border: 2px solid orange; padding: 5px;">$64\sqrt{x}$</div> <div style="border: 2px solid orange; padding: 5px;">$7x^2y\sqrt{2xy}$</div> <div style="border: 1px solid gray; padding: 5px;">$\sqrt{12x^3y^4}$</div> </div> </div>	001	Expressions and Operations
4	MC	B	001	Expressions and Operations
5	MC	A	001	Expressions and Operations

Sequence Number	Item Type: Multiple Choice (MC) or Technology-Enhanced Item (TEI)	Correct Answer	Reporting Category	Reporting Category Description
6	MC	A	001	Expressions and Operations
7	MC	B	001	Expressions and Operations
8	MC	D	001	Expressions and Operations
9	MC	A	001	Expressions and Operations
10	MC	B	001	Expressions and Operations
11	MC	A	002	Equations and Inequalities
12	MC	A	002	Equations and Inequalities
13	MC	C	002	Equations and Inequalities
14	MC	D	002	Equations and Inequalities
15	MC	C	002	Equations and Inequalities

Sequence Number	Item Type: Multiple Choice (MC) or Technology-Enhanced Item (TEI)	Correct Answer	Reporting Category	Reporting Category Description
16	TEI	<p>Both of these points, and only these points, must be plotted on the coordinate plane: $(-4,0)$ and $(2,0)$.</p> <p>Directions: Click on the grid to plot each of the solutions. You must plot all solutions.</p> <p>The graph of $y = -x^2 - 2x + 8$ is shown.</p> <p>On the grid, identify each of the solutions to $-x^2 - 2x + 8 = 0$.</p> 	002	Equations and Inequalities
17	MC	C	002	Equations and Inequalities
18	MC	C	002	Equations and Inequalities

Sequence Number	Item Type: Multiple Choice (MC) or Technology-Enhanced Item (TEI)	Correct Answer	Reporting Category	Reporting Category Description
19	TEI	<p>Step 4 and Step 5 must be placed into the boxes. The order in which they are placed into the boxes does not matter.</p> <div style="border: 1px solid gray; padding: 10px;"> <p>Directions: Click and drag the answers to the correct boxes.</p> <p>Christopher incorrectly solved an inequality as shown.</p> <p>Step 1: $-4(x - 7) + 1 \leq -3$</p> <p>Step 2: $-4(x - 7) \leq -4$</p> <p>Step 3: $-4x + 28 \leq -4$</p> <p>Step 4: $-4x \leq -32$</p> <p>Step 5: $x \leq 8$</p> <p>Between which two consecutive steps did Christopher make a mistake?</p> <div style="display: flex; align-items: center; justify-content: center; margin-top: 20px;"> <div style="border: 1px solid gray; padding: 2px 10px; margin-right: 5px;">Step 4</div> and <div style="border: 1px solid gray; padding: 2px 10px; margin-right: 20px;">Step 5</div> <div style="border: 1px solid gray; padding: 5px; display: flex; flex-direction: column; align-items: center;"> <div style="border: 1px solid gray; padding: 2px 5px; margin-bottom: 2px;">Step 1</div> <div style="border: 1px solid gray; padding: 2px 5px; margin-bottom: 2px;">Step 2</div> <div style="border: 1px solid gray; padding: 2px 5px; margin-bottom: 2px;">Step 3</div> <div style="background-color: gray; width: 100%; height: 20px;"></div> </div> </div> </div>	002	Equations and Inequalities

Sequence Number	Item Type: Multiple Choice (MC) or Technology-Enhanced Item (TEI)	Correct Answer	Reporting Category	Reporting Category Description
20	TEI	Typed response: -17 (and all equivalent answers) <div style="border: 1px solid black; padding: 10px; margin-top: 10px;"> <p style="background-color: #cccccc; margin: 0; padding: 2px;">Directions: Type your answer in the box.</p> <p style="margin-top: 10px;">Solve for n:</p> $\frac{3n - 7}{6} = \frac{2n + 5}{3}$ <p style="text-align: center; margin-top: 10px;">$n =$ <input style="width: 40px; text-align: center;" type="text" value="-17"/></p> </div>	002	Equations and Inequalities
21	MC	D	002	Equations and Inequalities
22	MC	B	002	Equations and Inequalities

Sequence Number	Item Type: Multiple Choice (MC) or Technology-Enhanced Item (TEI)	Correct Answer	Reporting Category	Reporting Category Description
23	TEI	<p>Typed response: 6-y OR any equivalent expression that does not exceed six characters</p> <div style="border: 1px solid black; padding: 10px;"> <p>Directions: Type your answer in the box.</p> <p>Based on the transitive property, complete this statement.</p> <p>If $2(y - 3) \geq 3x - 4$ and $3x - 4 \geq 6 - y$, then $2(y - 3) \geq \underline{\quad ? \quad}$</p> <p style="text-align: center;"><input style="border: 1px solid black; padding: 2px 10px;" type="text" value="6-y"/></p> </div>	002	Equations and Inequalities
24	MC	B	002	Equations and Inequalities
25	MC	B	002	Equations and Inequalities
26	MC	D	002	Equations and Inequalities

Sequence Number	Item Type: Multiple Choice (MC) or Technology-Enhanced Item (TEI)	Correct Answer	Reporting Category	Reporting Category Description
27	TEI	<p>Any <u>TWO</u> of these points must be plotted on the coordinate plane: $(-2,-8)$, $(0,0)$, $(1,4)$, or $(2,8)$ Two of these points, $(2,8)$ and $(-2,-8)$, are shown on the coordinate plane below.</p> <p>Directions: Click on the grid to plot two points. The coordinates of the points must be integers.</p> <p>Point A is an element of a direct variation. Plot two points, other than A, that are elements of this direct variation. The coordinates of the points must be integers.</p>	003	Functions and Statistics
28	MC	B	003	Functions and Statistics
29	MC	B	003	Functions and Statistics
30	MC	C	003	Functions and Statistics
31	MC	D	003	Functions and Statistics
32	MC	D	003	Functions and Statistics

Sequence Number	Item Type: Multiple Choice (MC) or Technology-Enhanced Item (TEI)	Correct Answer	Reporting Category	Reporting Category Description
33	TEI	<p>Answers must be placed in the correct order from left to right: Set 3; Set 1; Set 2</p> <div style="border: 1px solid black; padding: 10px;"> <p>Directions: Click and drag the answers to the correct boxes.</p> <p>Each of these data sets has a mean of 20.</p> <p>Set 1: { 18, 19, 20, 21, 22 }</p> <p>Set 2: { 20, 20, 20, 20, 20 }</p> <p>Set 3: { 16, 18, 20, 21, 25 }</p> <p>Order the sets from greatest standard deviation to least standard deviation.</p> <div style="text-align: center;"> <div style="display: flex; align-items: center; gap: 20px;"> <div style="border: 1px solid gray; padding: 5px;">Set 3</div> <div style="border: 1px solid gray; padding: 5px;">Set 1</div> <div style="border: 1px solid gray; padding: 5px;">Set 2</div> </div> <div style="display: flex; align-items: center; gap: 10px;"> Greatest → Least </div> <div style="width: 30px; height: 30px; background-color: gray; margin-left: 20px;"></div> </div> </div>	003	Functions and Statistics
34	MC	A	003	Functions and Statistics
35	MC	D	003	Functions and Statistics
36	MC	B	003	Functions and Statistics
37	MC	A	003	Functions and Statistics
38	MC	A	003	Functions and Statistics
39	MC	B	003	Functions and Statistics
40	MC	C	003	Functions and Statistics

Sequence Number	Item Type: Multiple Choice (MC) or Technology-Enhanced Item (TEI)	Correct Answer	Reporting Category	Reporting Category Description
41	MC	A	003	Functions and Statistics
42	MC	C	003	Functions and Statistics
43	MC	D	003	Functions and Statistics
44	MC	A	003	Functions and Statistics

