VIRGINIA STANDARDS OF LEARNING

**TEST ITEM SET**

# Algebra I

## 2009 Mathematics Standards of Learning

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Released Spring 2015

**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.**

**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 $a^9b^4$

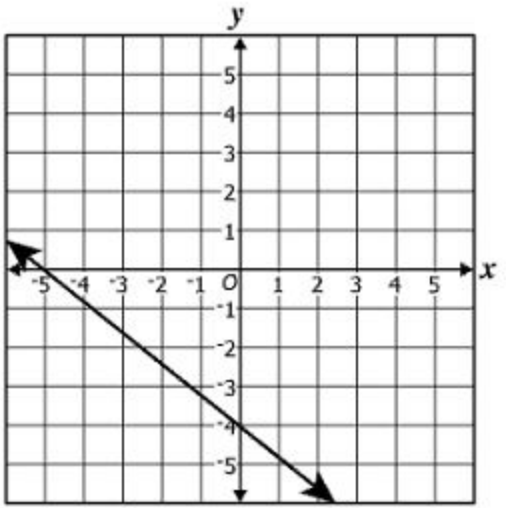
**What is the value of this expression when $n = -15$ ?**

$$-2|n + 6|$$

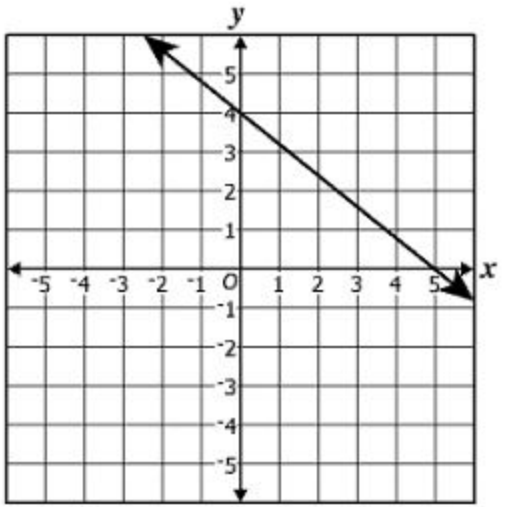
- **A** $-42$
- **B** $-18$
- **C** 18
- **D** 42

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

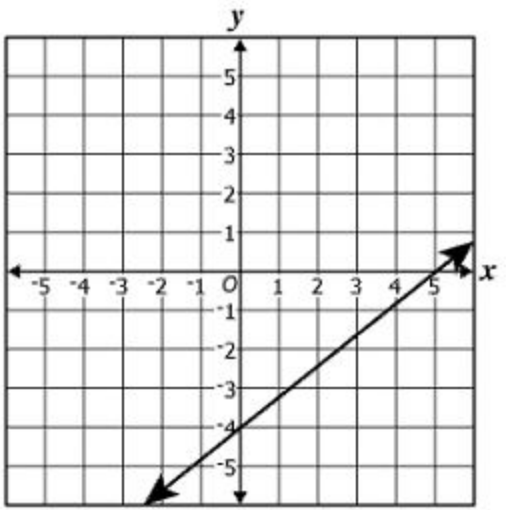
A



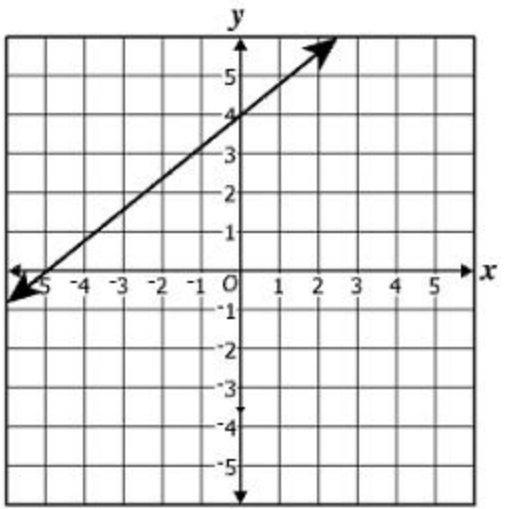

C




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?**

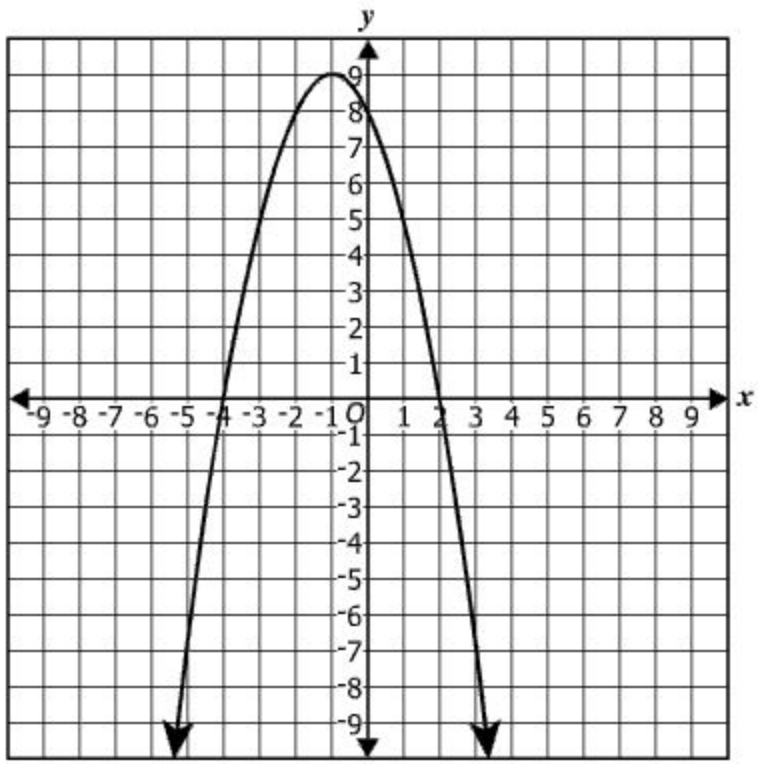
$$\begin{cases} 2x + 4y = 22 \\ 7x + y = 12 \end{cases}$$

- **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 ${}^{-}x^2 - 2x + 8 = 0$.**

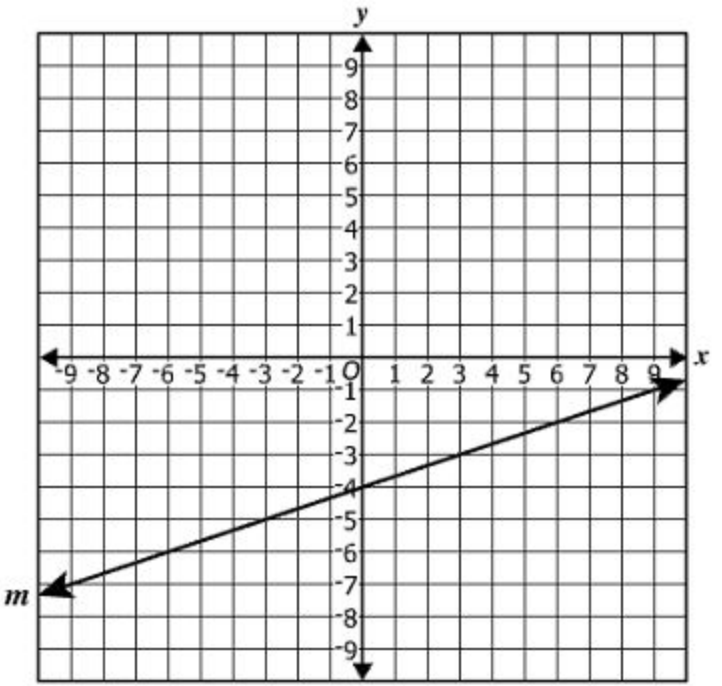


**What value of $x$ makes this equation true?**

$$3x - 20 = {}^{-}2x$$

- **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 $n$:**

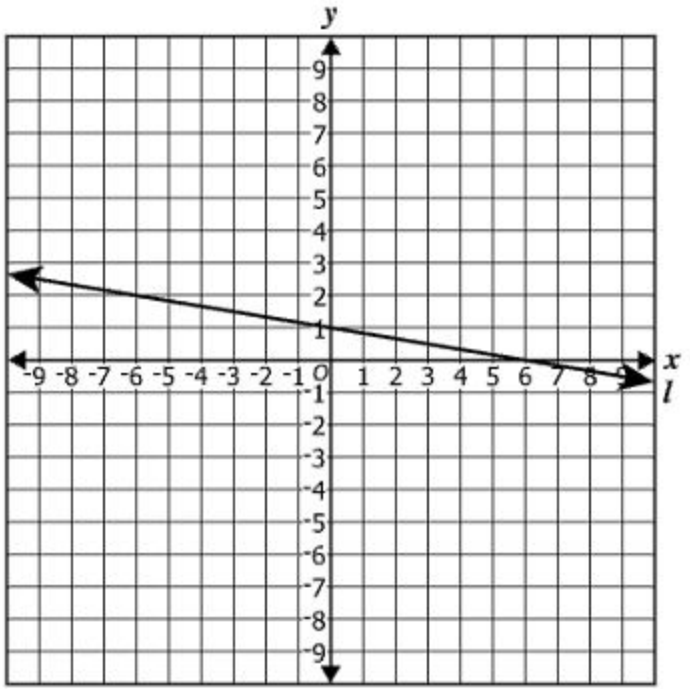
$$\frac{3n-7}{6} = \frac{2n+5}{3}$$

$n =$ ____

**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** $6$

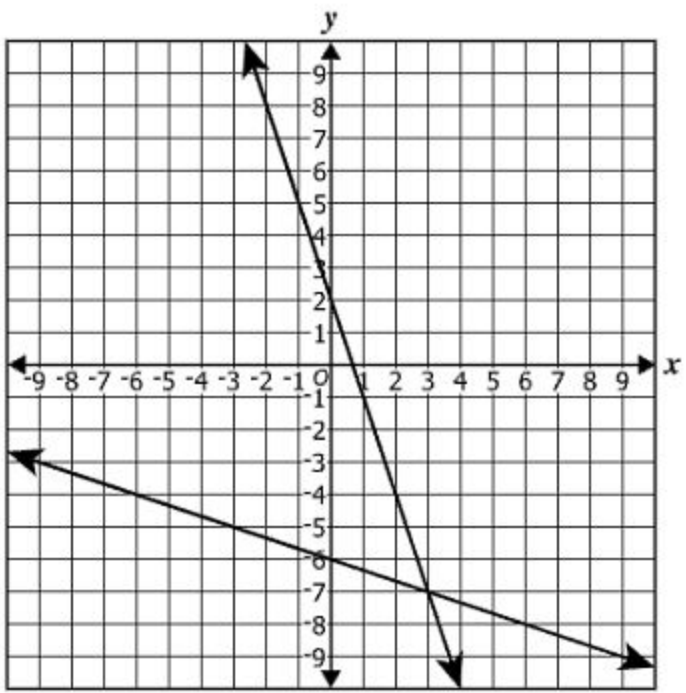
**Directions: Type your answer in the box.**

**Based on the transitive property, complete this statement.**

**If $2(y-3) \geq 3x-4$ and $3x-4 \geq 6-y$, then $2(y-3) \geq$ ?**

**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.**

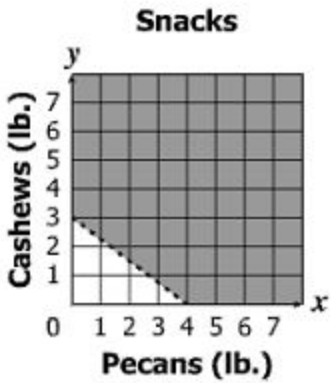
- **The cost per game is $2.50.**
- **Renee will need to rent a pair of bowling shoes for $1.50.**
- **She can spend up to $16.00 to bowl and rent a pair of shoes.**

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

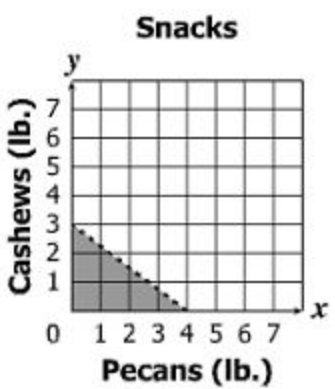
- **A** 4
- **B** 5
- **C** 6
- **D** 9

**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?**

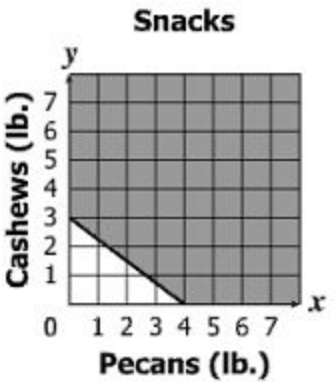
○ **A**



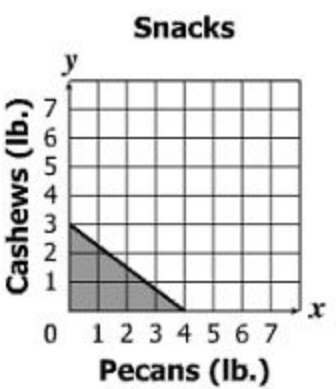

○ **B**




○ **C**

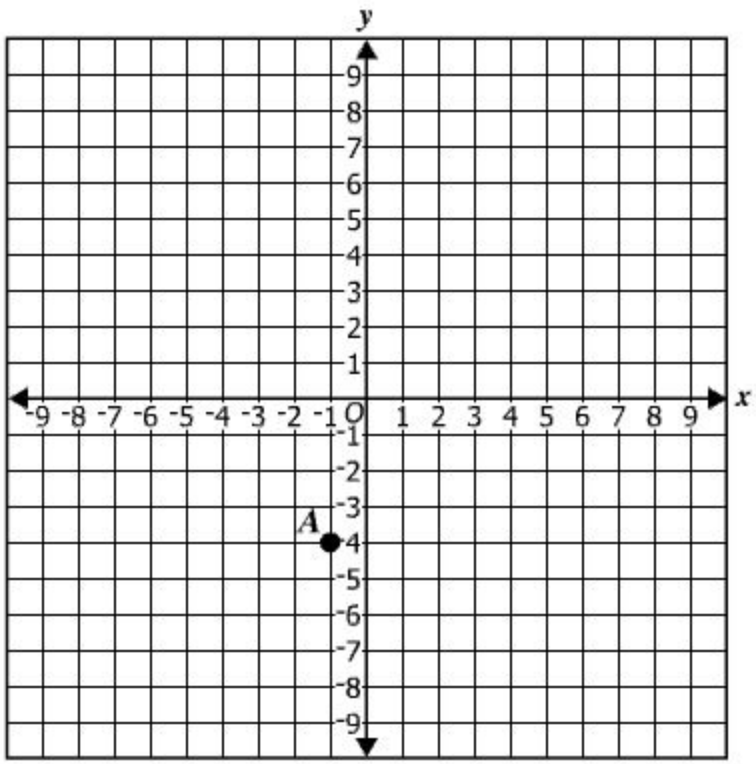



○ **D**



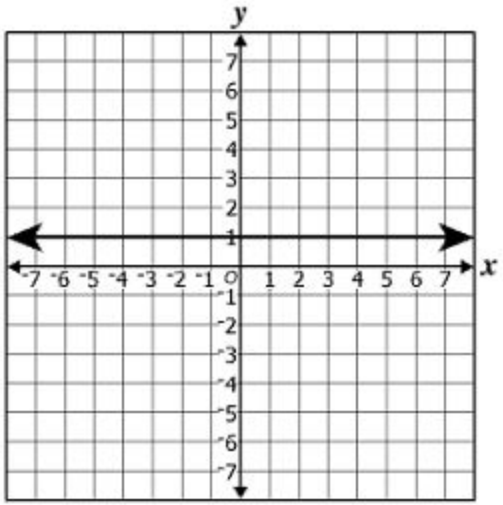
**Directions: Click on the grid to plot two points. The coordinates of the points must be integers.**

**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.**

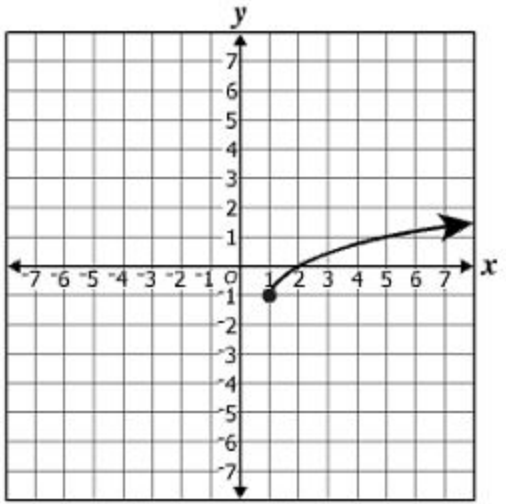


**Which graph has exactly one $x$-intercept and one $y$-intercept?**

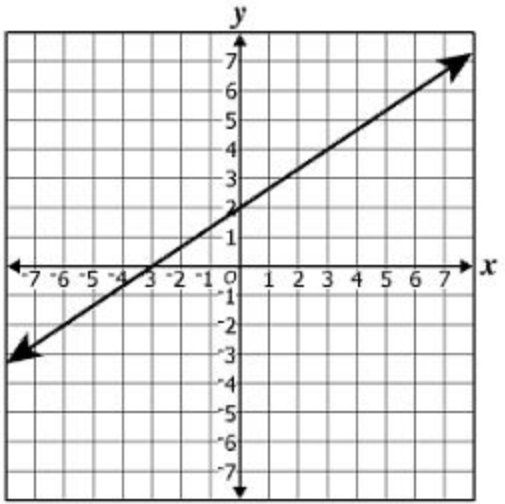
A



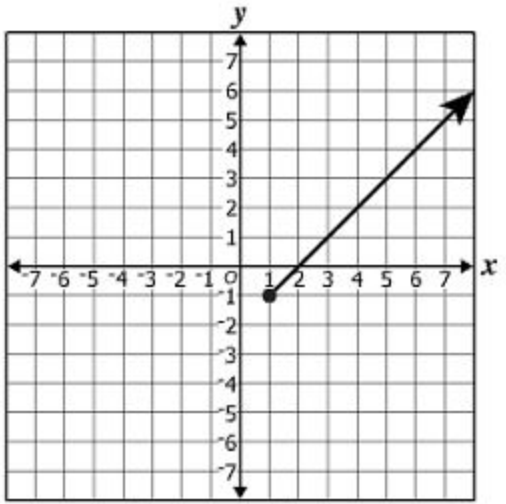
C



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 |

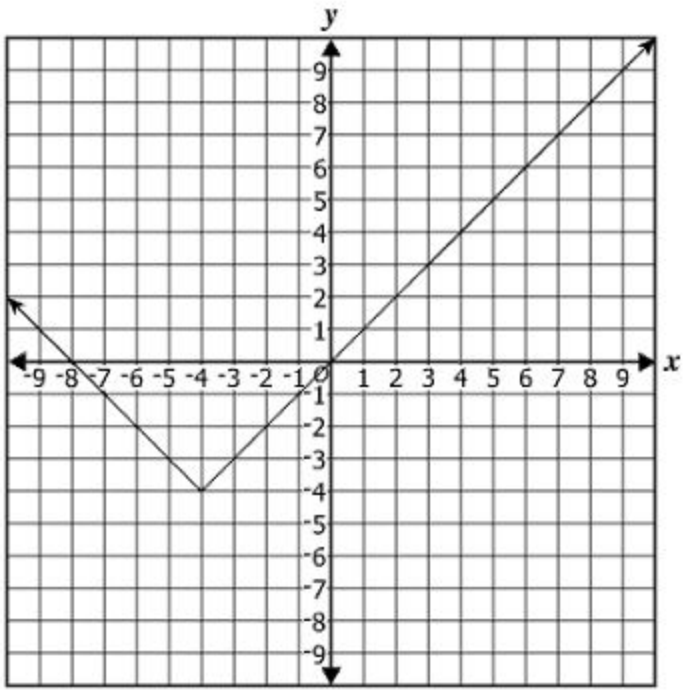
**Which equation represents this relationship?**

- **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.**

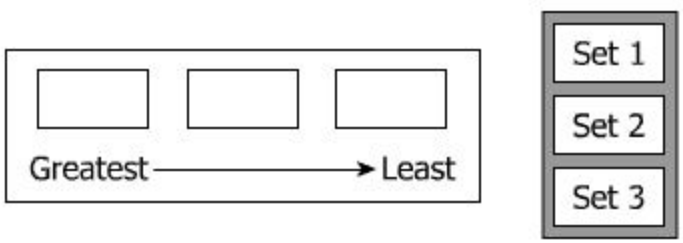
**Each of these data sets has a mean of 20.**

**Set 1:** $\{18, 19, 20, 21, 22\}$

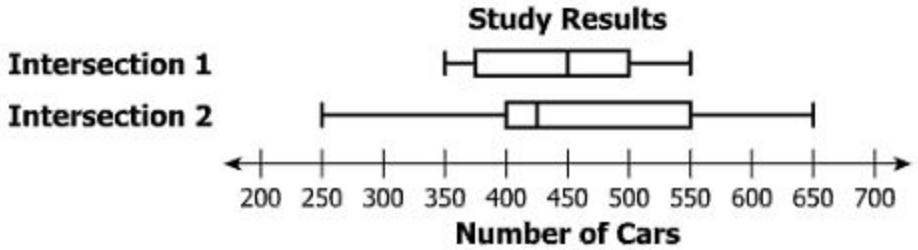
**Set 2:** $\{20, 20, 20, 20, 20\}$

**Set 3:** $\{16, 18, 20, 21, 25\}$

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



**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 |

**B**

| $x$ | $y$ |
|---|---|
| 1 | 4 |
| 2 | 8 |
| 3 | 12 |

**C**

| $x$ | $y$ |
|---|---|
| 1 | 5 |
| 2 | 7 |
| 3 | 9 |

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

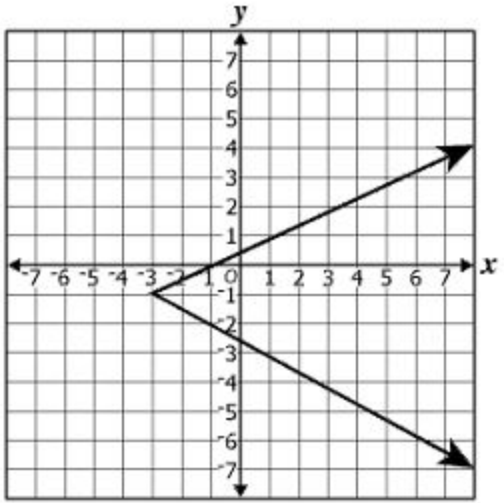
**Which number is a zero of the function $h$ ?**

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

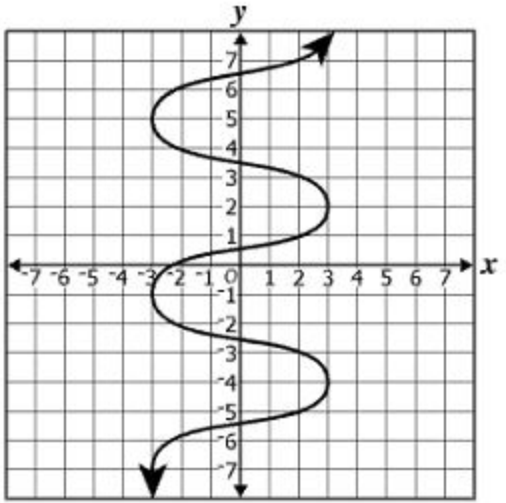
- **A** $-6$
- **B** $-3$
- **C** $0$
- **D** $6$

**Which of the following graphs appears to be a function?**

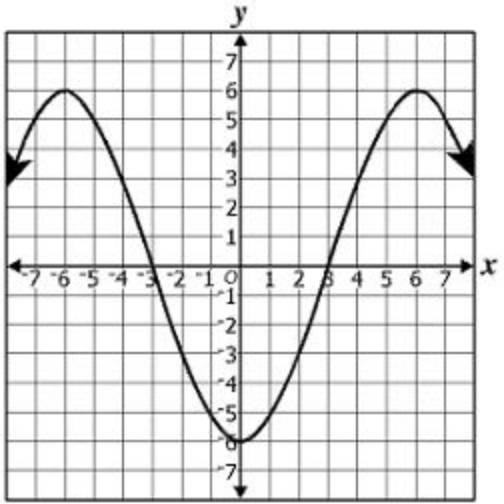
A



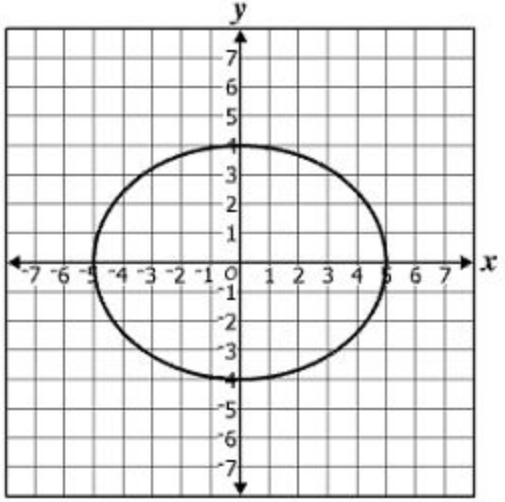
C



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 ?**

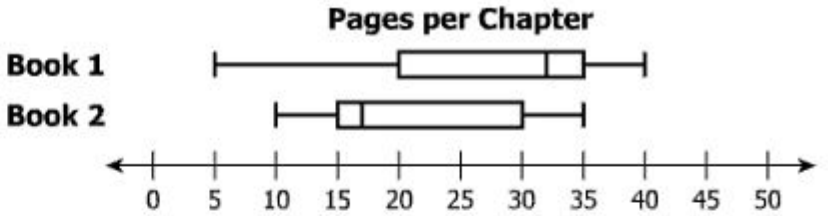
- **A** 127
- **B** 159
- **C** 170
- **D** 178

**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 ?**

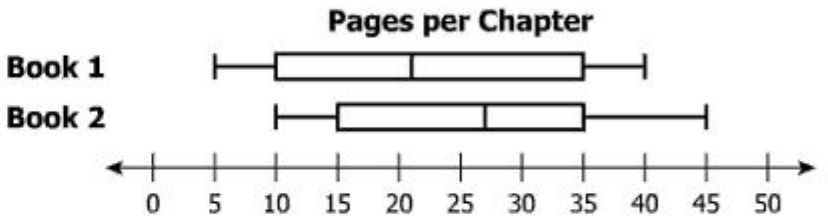
- **A** 11.00
- **B** 1.83
- **C** −11.00
- **D** −1.83

**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?**

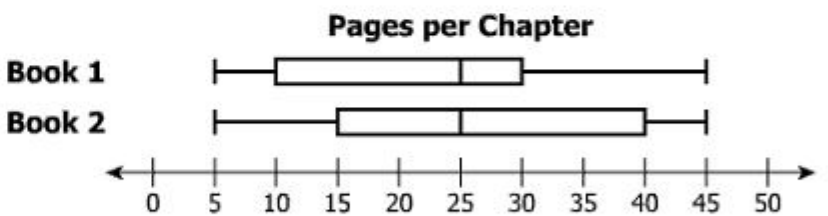
A




B




C

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