

VIRGINIA STANDARDS OF LEARNING

Released Test

ALGEBRA I

2009 Mathematics Standards of Learning

Released Spring 2014

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 $x = 5$

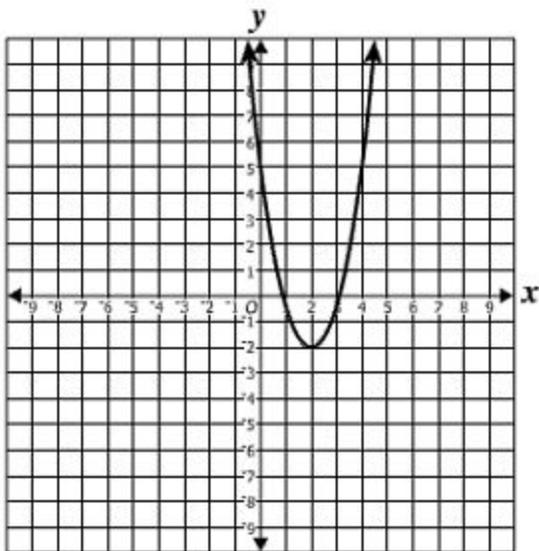
Directions: Type your answer in the box. Your answer must be in the form of a fraction in simplest form. Use "/" for the fraction bar.

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.

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 $9c^{11}d^{15}$

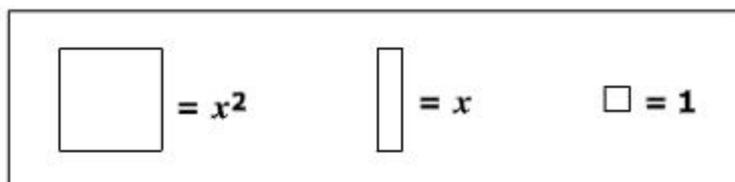
Directions: Click on a box to choose each expression you want to select. You must select all correct expressions.

Identify each expression that is a factor of this polynomial.

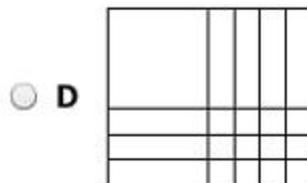
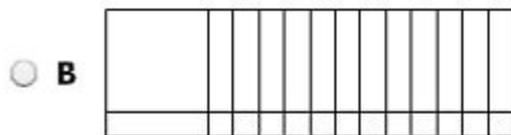
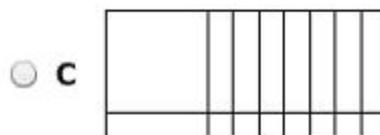
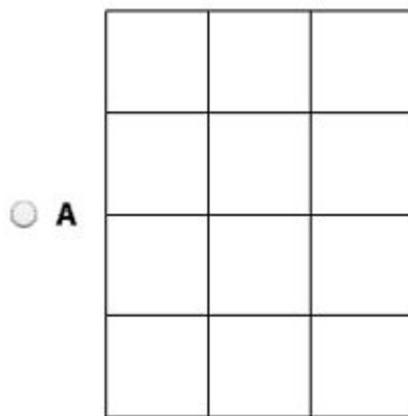
$$4x^2 - 2x - 2$$

$2x + 1$	2	$x - 1$	$2x - 1$	$4x - 1$
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Look at this key.



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



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 $\frac{1}{8}x + 3y = 3$?

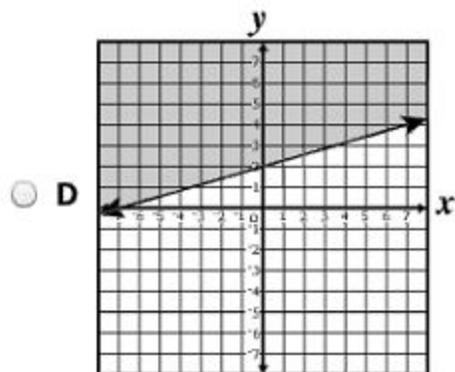
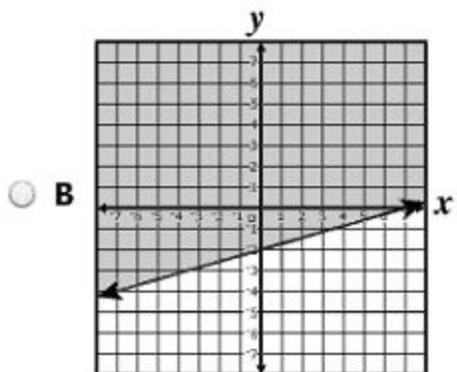
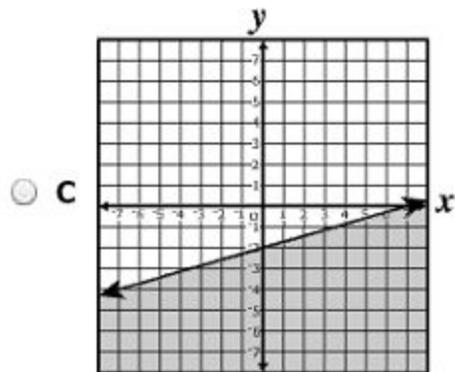
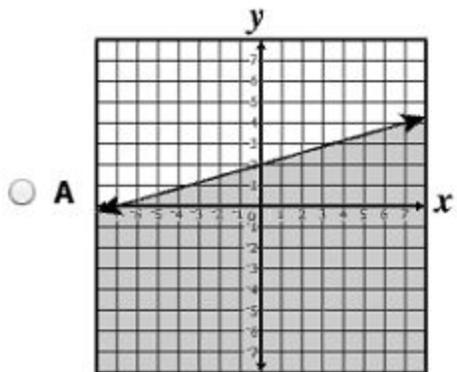
- A $-\frac{1}{8}$
- B $-\frac{1}{24}$
- C $\frac{1}{24}$
- D $\frac{1}{8}$

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 $y \leq \frac{2}{7}x - 2$?



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.

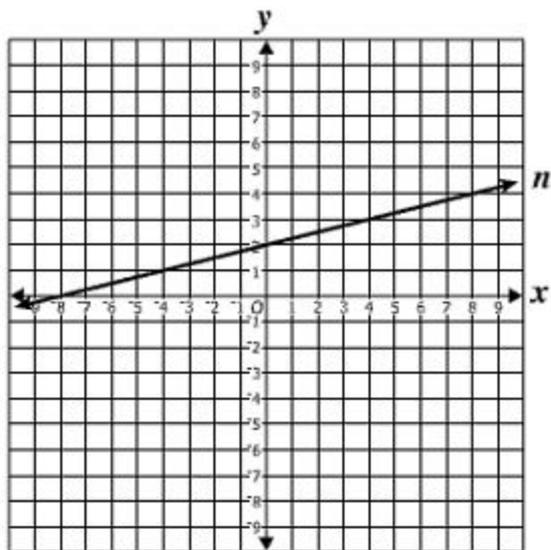
(-1, -3)

(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.

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

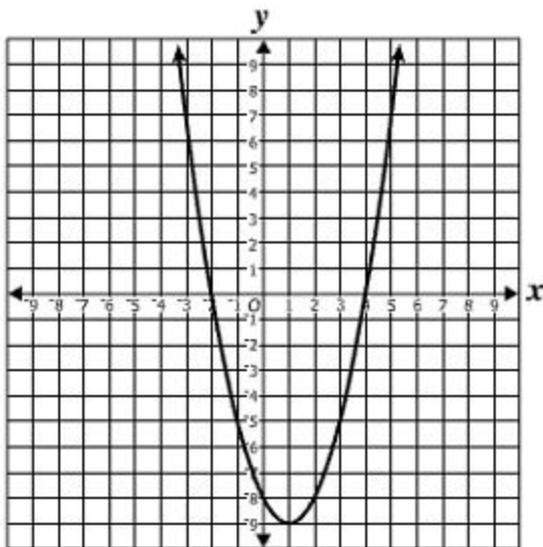
Which shows this formula solved for x_1 ?

- 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?

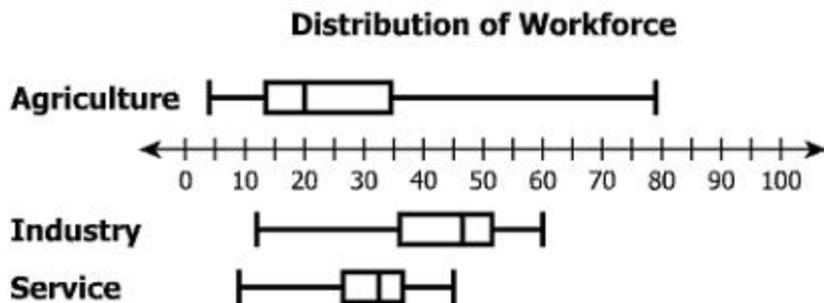
$$3x + 5y = -7$$

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 $\{-1, 2, 4\}$.

{ , , }

$(-3, -1)$	$(4, -2)$
$(-1, 0)$	$(3, 4)$
$(-2, 2)$	$(2, 3)$

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 $y = \frac{-8}{x}$

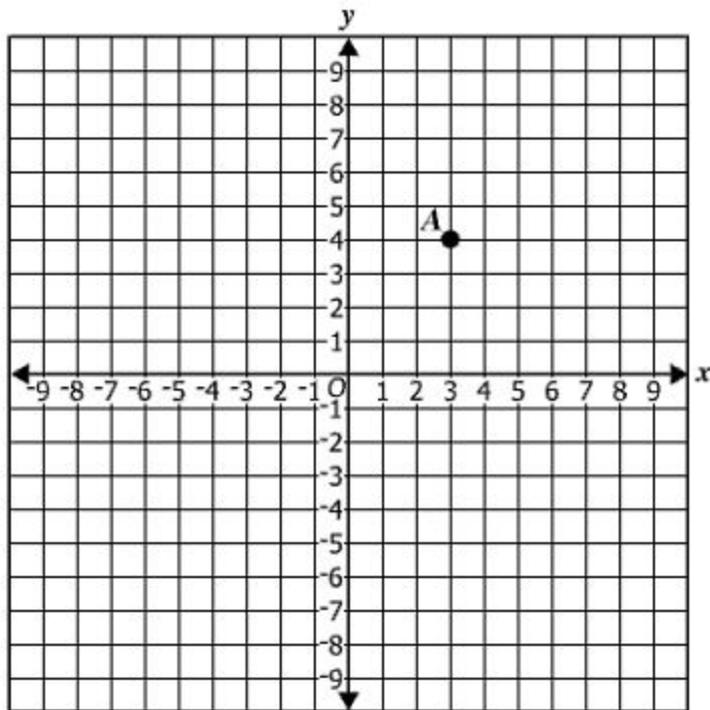
Which equation represents the pattern shown in the table?

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.



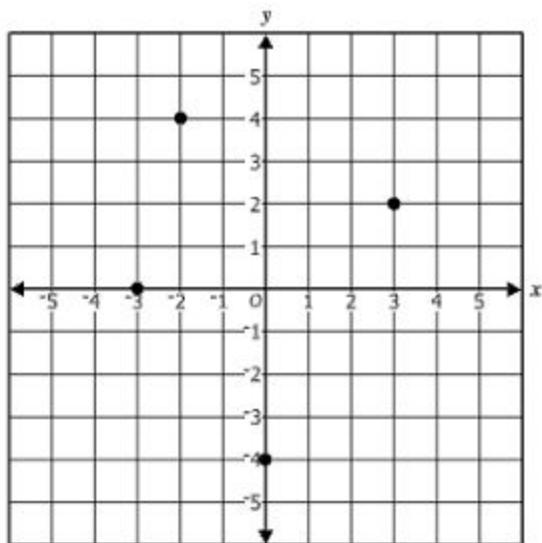
Look at the data in this table.

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?

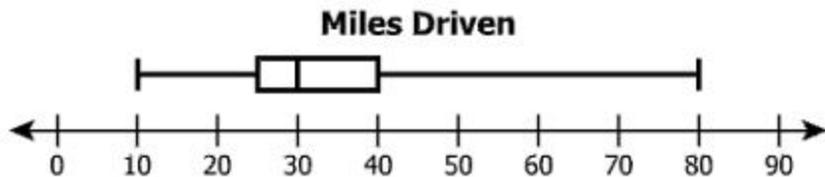
- A $y = 1.77x + 0.13$
- B $y = 0.56x - 0.05$
- C $y = 0.5x$
- D $y = 2x$

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.

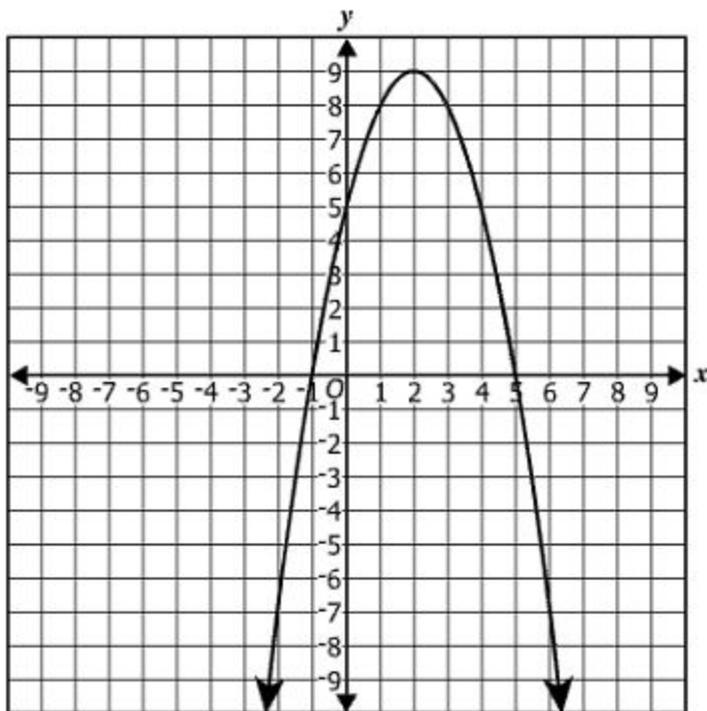
Relationship T: Vernon cooked 6 hamburgers in 10 minutes, and then he cooked 9 hamburgers in 15 minutes.

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

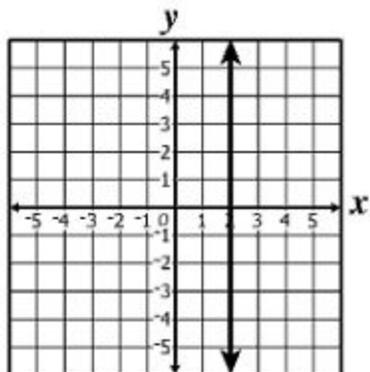
Which relation is a function?

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

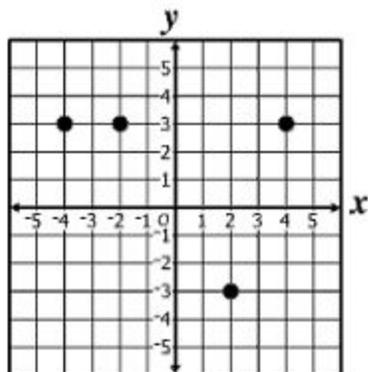
C

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.

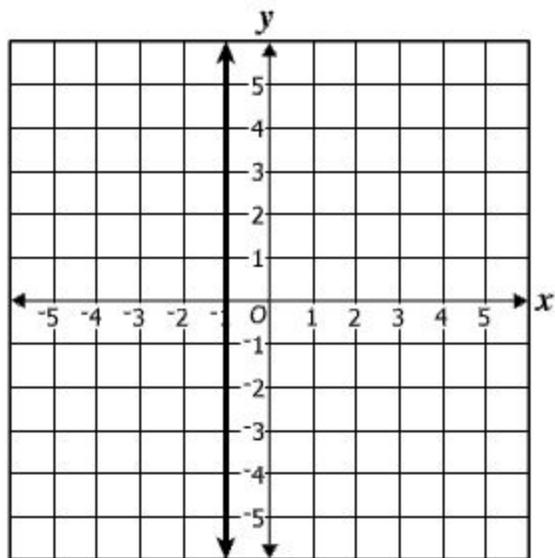
- **Week 1:** The mean was 35 hours with a standard deviation of 1.5 hours.
- **Week 2:** The mean was 40 hours with a standard deviation of 2.0 hours.

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 —

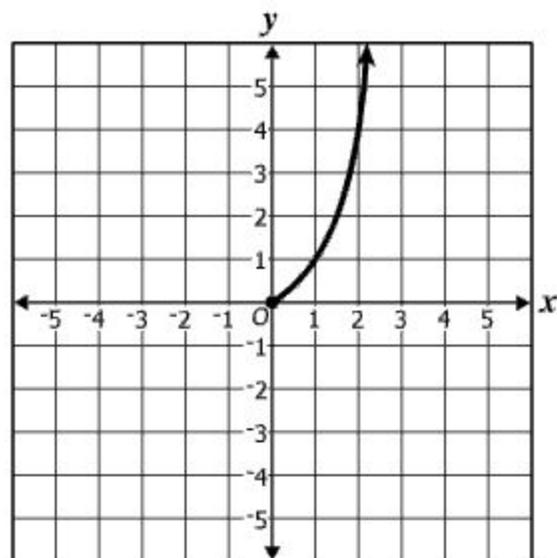
- A** valid because the mean for Week 2 was greater than the mean for Week 1
- B** valid because the standard deviation for Week 2 was greater than the standard deviation for Week 1
- C** invalid because the mean for Week 1 was less than the mean for Week 2
- D** invalid because the standard deviation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

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

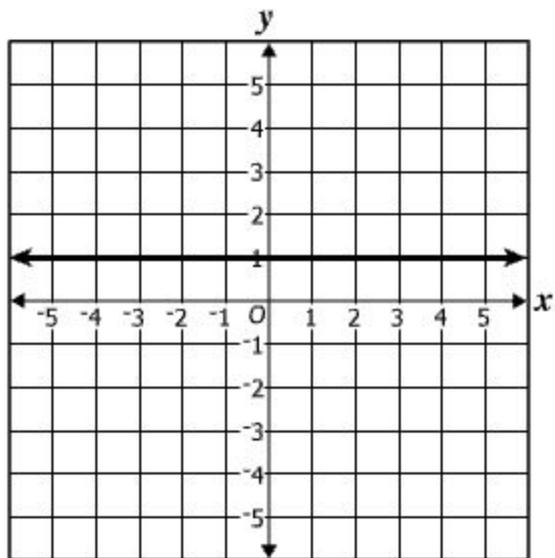
A



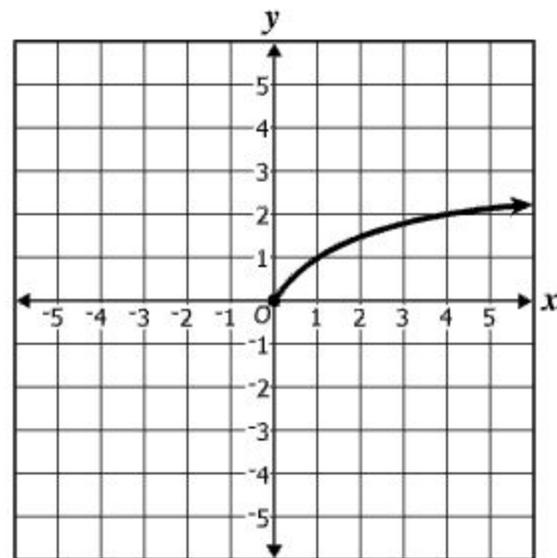
C



B



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 $(0, 2)$

Algebra I
Released Test Spring 2014
Answer Key

Sequence Number	Item Type: Multiple Choice (MC) or Technology-Enhanced Item (TEI)	Correct Answer	Reporting Category	Reporting Category Description
1	MC	D	001	Expressions and Operations
2	MC	C	001	Expressions and Operations
3	MC	A	001	Expressions and Operations
4	TEI	<p>$2x + 1$ (the first box from the left); 2 (the second box from the left); and $x - 1$ (the third box from the left) All three of these answers, and only these answers, must be selected.</p> <div style="border: 1px solid gray; padding: 5px; margin: 5px 0;"> <p style="text-align: center; margin: 0;">Directions: Click on a box to choose each expression you want to select. You must select all correct expressions.</p> <p style="text-align: center; margin: 10px 0;">Identify each expression that is a factor of this polynomial.</p> <p style="text-align: center; margin: 5px 0;">$4x^2 - 2x - 2$</p> <div style="text-align: center; margin: 10px 0;"> <input checked="" type="checkbox"/> $2x + 1$ <input checked="" type="checkbox"/> 2 <input checked="" type="checkbox"/> $x - 1$ <input type="checkbox"/> $2x - 1$ <input type="checkbox"/> $4x - 1$ </div> </div>	001	Expressions and Operations

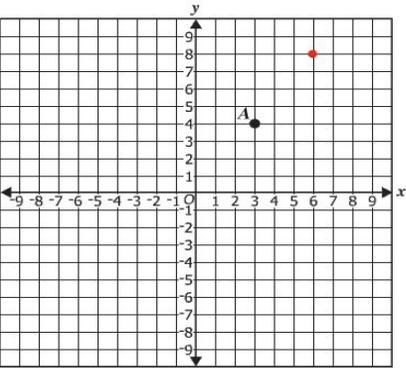
Sequence Number	Item Type: Multiple Choice (MC) or Technology-Enhanced Item (TEI)	Correct Answer	Reporting Category	Reporting Category Description
5	MC	D	001	Expressions and Operations
6	MC	B	001	Expressions and Operations
7	MC	B	001	Expressions and Operations
8	MC	D	001	Expressions and Operations
9	MC	C	001	Expressions and Operations
10	MC	A	001	Expressions and Operations
11	TEI	<p>Typed Response: 17 (and all equivalent answers)</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>Directions: Type your answer in the box.</p> <p>What is the value of this expression when $a = 64$ and $b = -5$?</p> $-2\sqrt[3]{a} + b^2$ <div style="border: 1px solid gray; display: inline-block; padding: 2px 5px; margin: 5px 0;">17</div> </div>	001	Expressions and Operations
12	MC	B	001	Expressions and Operations
13	MC	B	002	Equations and Inequalities

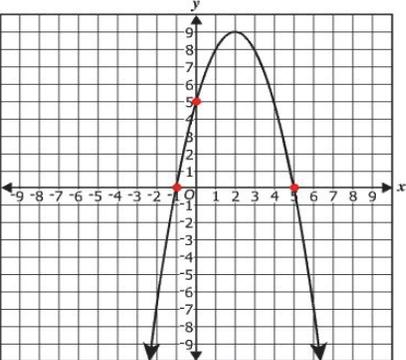
Sequence Number	Item Type: Multiple Choice (MC) or Technology-Enhanced Item (TEI)	Correct Answer	Reporting Category	Reporting Category Description
14	MC	B	002	Equations and Inequalities
15	MC	A	002	Equations and Inequalities
16	MC	B	002	Equations and Inequalities
17	TEI	<p>Any <u>ONE</u> of these typed responses: $x > 4$, $1x > 4$, $4 < x$, OR $4 < 1x$ (All answers may also include a decimal point, i.e. $x > 4.0$)</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>Directions: Type an inequality in the box. Use the < or > for the inequality sign.</p> <p>Solve for x:</p> $-2x + 6 < x - 6$ <div style="border: 1px solid gray; display: inline-block; padding: 2px 5px; margin: 5px;"> $x > 4$ </div> </div>	002	Equations and Inequalities
18	MC	C	002	Equations and Inequalities
19	MC	C	002	Equations and Inequalities
20	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
21	TEI	<p>The ordered pair (1, 2), located in the second box from the left, and only that ordered pair, must be selected.</p> <div style="border: 1px solid gray; padding: 10px;"> <p>Directions: Click on a box to choose each point you want to select. You must select all correct points.</p> <p>A system of inequalities is shown.</p> $\begin{cases} y > \frac{1}{2}x + 1 \\ y + 3x \leq 6 \end{cases}$ <p>From the given points, select each point that is a solution to this system of inequalities.</p> <div style="display: flex; justify-content: center; gap: 10px; margin-top: 10px;"> <div style="border: 1px solid gray; padding: 2px 10px;">(-1, -3)</div> <div style="border: 1px solid gray; padding: 2px 10px; background-color: #fff9c4;">(1, 2)</div> <div style="border: 1px solid gray; padding: 2px 10px;">(2, 0)</div> <div style="border: 1px solid gray; padding: 2px 10px;">(4, 6)</div> </div> </div>	002	Equations and Inequalities
22	MC	C	002	Equations and Inequalities
23	MC	D	002	Equations and Inequalities
24	MC	A	002	Equations and Inequalities
25	MC	B	002	Equations and Inequalities
26	MC	B	002	Equations and Inequalities
27	MC	C	002	Equations and Inequalities
28	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
29	TEI	<p>Typed Response: $-3/5$ or -0.6 (and all equivalent answers)</p> <div style="border: 1px solid black; padding: 10px;"> <p style="background-color: #cccccc; margin: 0; padding: 2px;">Direction: Type your answer in the box.</p> <p style="text-align: center; margin: 10px 0;">What is the slope of the line represented by this equation?</p> <p style="text-align: center; margin: 5px 0;">$3x + 5y = -7$</p> <p style="text-align: center; margin: 5px 0;">Slope = <input style="width: 50px; border: 1px solid black;" type="text" value="-3/5"/></p> </div>	002	Equations and Inequalities
30	MC	C	002	Equations and Inequalities
31	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
32	TEI	<p>The ordered pairs $(-1, 0)$, $(2, 3)$, and $(4, -2)$ must be placed into the set. The order in which they are placed into the set does not matter.</p> <p>Directions: Click and drag each selected ordered pair to a box.</p> <p>Using the ordered pairs shown, create a relation containing three ordered pairs with a domain of $\{-1, 2, 4\}$.</p> <p>$\{ (-1, 0) , (2, 3) , (4, -2) \}$</p> <div style="border: 1px solid gray; padding: 5px; display: inline-block;"> $(-3, -1)$ $(3, 4)$ $(-2, 2)$ </div>	003	Functions and Statistics
33	MC	D	003	Functions and Statistics
34	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
35	TEI	<p>Any <u>ONE</u> of these points must be plotted on the coordinate plane: $(-6,-8)$, $(-3,-4)$, $(0, 0)$, or $(6, 8)$ One of these points, $(6, 8)$, is shown on the coordinate plane below.</p> <p>Directions: Click on the grid to plot the point you want to select.</p> <p>The graph of the equation representing a direct variation passes through point <i>A</i>. Locate one additional point that is on the graph of this equation.</p> 	003	Functions and Statistics
36	MC	A	003	Functions and Statistics
37	MC	D	003	Functions and Statistics
38	MC	C	003	Functions and Statistics
39	MC	B	003	Functions and Statistics

Sequence Number	Item Type: Multiple Choice (MC) or Technology-Enhanced Item (TEI)	Correct Answer	Reporting Category	Reporting Category Description
40	TEI	<p>All three of these points, and only these points, must be plotted on the coordinate plane: $(-1, 0)$; $(0, 5)$; and $(5, 0)$.</p> <p>Directions: Click on the grid to plot each point you want to select. You must select all correct points.</p> <p>Identify each of the x- and y-intercepts of the relation shown.</p> 	003	Functions and Statistics
41	MC	C	003	Functions and Statistics
42	MC	B	003	Functions and Statistics
43	MC	D	003	Functions and Statistics
44	MC	D	003	Functions and Statistics
45	MC	B	003	Functions and Statistics
46	MC	A	003	Functions and Statistics

Sequence Number	Item Type: Multiple Choice (MC) or Technology-Enhanced Item (TEI)	Correct Answer	Reporting Category	Reporting Category Description
47	MC	B	003	Functions and Statistics
48	MC	A	003	Functions and Statistics
49	MC	B	003	Functions and Statistics
50	MC	D	003	Functions and Statistics

Spring 2014 Released
Algebra I Standards of Learning Test
Total Raw Score to Scaled Score Conversion Table

Total Raw Score If you get this many items correct:	Total Scaled Score Then your converted scaled score is:
0	0
1	230
2	259
3	277
4	290
5	301
6	310
7	317
8	324
9	330
10	336
11	342
12	347
13	351
14	356
15	360
16	364
17	368
18	372
19	376
20	380
21	384
22	388
23	391
24	395
25	399
26	402
27	406
28	409
29	413
30	417
31	421
32	425
33	428
34	433
35	437
36	441
37	446
38	450
39	455
40	461
41	466
42	473
43	479
44	487
45	496
46	507
47	520
48	538
49	567
50	600

A **total raw score** (left column) is converted to a **total scaled score** (right column). The total scaled score may range from 0 to 600.

A scaled score of 400 or more means the student passed the SOL test, while a scaled score of 399 or less means the student did not pass the test. A scaled score of 500 or more indicates the student passed the SOL test at an advanced level.

