1. An expression is shown below:

$3\sqrt{58x}$

Which value of x makes the expression equivalent to $6\sqrt{29}$?

A. 2
B. 3
C. 4
D. 9

$6\sqrt{29}$
$2 \cdot 3\sqrt{29}$
$3 \cdot \sqrt{4} \cdot \sqrt{29}$
$3 \cdot \sqrt{4 \cdot 29}$
$3 \cdot \sqrt{2 \cdot 2 \cdot 29}$
$3 \cdot \sqrt{2} \cdot 58$

2. Simplify: $4(3\sqrt{16})^{-1}$

A. $\frac{1}{8}$
B. $\frac{1}{3}$
C. 48
D. 96

$4(3(4))^{-1}$
$4(12)^{-1}$
$\frac{4}{12}$
$\frac{1}{3}$

3. A polynomial expression is shown below.

$(mx^4 - 3)(4x^2 - 3x + 4) - (12x^6 - 9x^5)$

The expression is simplified to $12x^4 - 12x^2 + 9x - 12$. What is the value of m?

A. -12
B. -3
C. 3
D. 12

$4mx^6 - 3mx^5 + 4mx^4 - 12x^2 + 9x - 12 \quad -12x^6 + 9x^5$
$4mx^6 - 12x^6 - 3mx^5 + 9x^5 + 4mx^4 - 12x^2 + 9x - 12$
$4 \cdot ? = 12$
3
$12x^2 - 12x^2 + 9x - 12$

Answer

4. Which is a factor of the trinomial $x^2 - 5x + 6$?

A. (x – 1)
B. (x – 6)
C. (x – 3)
D. (x + 2)

$(x-2)(x-3)$

5. Simplify:

$$\frac{x^2 + x - 6}{x^2 - 5x + 6}; x \neq 2, 3$$

A. $-\frac{1}{5}x - 1$
B. $x^2 - \frac{1}{5}x - 1$
C. -1
D. $\frac{x+3}{x-3}$

$\frac{(x+3)(x-2)}{(x-3)(x-2)} = \frac{x+3}{x-3}$

6. Anna burned 25 calories per minute running for x minutes and 15 calories per minute hiking for y minutes. She spent a total of 35 minutes running and hiking and burned 675 calories. The system of equations shown below can be used to determine how much time Anna spent on each exercise.

$25x + 15y = 675$

$-15(x + y = 35)$

$25x + 15y = 675$

$-15x - 15y = -525$

$10x = 150$

$\frac{10x}{10} = \frac{150}{10}$

$x = 15$

What is the value of x, the minutes Anna spent running?

A. 10
B. 15
C. 20
D. 25

7. Samantha and Maria purchased flowers. Samantha purchased 3 roses for x dollars each and 4 daisies for y dollars each and spent $27 on the flowers. Maria purchased 2 roses for x dollars each and 5 daisies for y dollars each and spent $25. The system of equations shown below represents this situation.

$-2(3x + 4y = 27) \Rightarrow$

$3(2x + 5y = 25)$

$-6x - 8y = -54$

$6x + 15y = 75$

$7y = 21$

$\frac{7y}{7} = \frac{21}{7}$

$y = 3$

$3x + 4y = 27$

$3x + 4(3) = 27$

$3x + 12 = 27$

$-12 \quad -12$

$\frac{3x}{3} = \frac{15}{3}$

$x = 5$

x = roses cost $5

y = daisies cost $3

Which statement is true?

A. A rose costs $2 more than a daisy
B. Samantha spent $5 on each daisy
C. Both girls spent more on daisies than they did on roses.
D. Samantha spent over 5 times as much on daisies as she did on roses.

8. A baseball team had $1,500 to spend on supplies. The team spent $255 on a new bat. New baseballs cost $6 each. The inequality $255 + 6b \leq 1{,}500$ can be used to determine the number of new baseballs (b) that the team can purchase. Which statement about the number of new baseballs that can be purchased is true?

A. The team can purchase 185 new baseballs.
B. The minimum number of new baseballs than can be purchased is 207.
C. The maximum number of new baseballs that can be purchased it 208.
D. The team can purchase 210 new baseballs, but this number is neither the maximum nor the minimum.

$255 + 6b \leq 1500$

$-255 \quad -255$

$\frac{6b}{6} \leq \frac{1245}{6}$

$b \leq 207.5$

can only purchase at most 207 baseballs

9. Tyreke always leaves a tip of between 10% and 25% for the server when he pays for his dinner. This can be represented by the system of inequalities shown below, where y is the amount of tip and x is the cost of dinner.

$y > 0.1x$

$y < 0.25x$

$x = \$$ cost of dinner

$y = \$$ tip

Which of the following is a true statement?

A. When the cost of dinner (x) is \$10, the amount of tip (y) must be between \$1 and \$8.

B. When the cost of dinner (x) is \$15, the amount of tip (y) must be between \$1.50 and \$3.75

C. When the amount of tip (y) is \$3, the cost of dinner (x) must be between \$10 and \$30.

D. When the amount of tip (y) is \$2.40, the cost of dinner (x) must be between \$3 and \$6.

A) dinner = 10 = x

$y > 0.1x$ $y < 0.25x$

$y > 0.1(10)$ $y < 0.25(10)$

$y > 1.00$ $y < 2.5$

tip between \$1 and \$2.50

B) dinner = 15 = x ★

$y > 0.1x$ $y < 0.25x$

$y > 0.1(15)$ $y < 0.25($

$y > 1.5$ $y < 3.75$

tip between \$1.50 and \$3.75

C) tip = 3 = y

$y > 0.1x$ $y < 0.25x$

$\frac{3}{0.1} > \frac{0.1x}{0.1}$ $\frac{3}{0.25} < \frac{0.25x}{0.25}$

$30 > x$ $12 < x$

$x < 30$ $x > 12$

dinner is between \$12 and \$30

D) tip = 2.40 = y

$y > 0.1x$ $y < 0.25x$

$\frac{2.40}{0.1} > \frac{0.1x}{0.1}$ $\frac{2.40}{0.25} < \frac{0.25x}{0.25}$

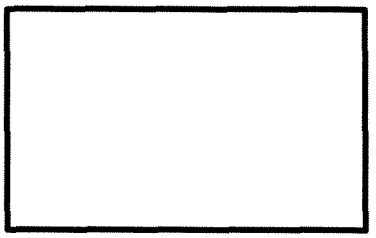
$24 > x$ $9.6 < x$

$x < 24$ $x > 9.6$

dinner is between \$9.60 and \$24.

Algebra 1 Keystone Open-ended questions

1. Keng creates a painting on a rectangular canvas with a width that is five inches longer than the height, as shown in the diagram below.



A. Write a polynomial expression, in simplified form, that represents the area of the canvas.

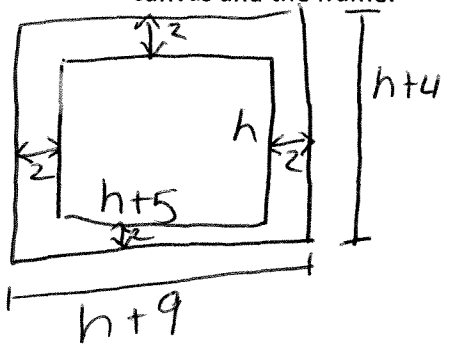
$A = l \cdot w$

$h(h+5)$

h^2+5h $in.^2$

Keng adds a 2-inch-wide frame around all sides of his canvas.

B. Write a polynomial expression, in simplified form, that represents the total area of the canvas and the frame.



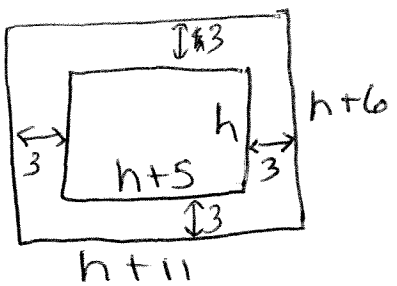
$(h+4)(h+9)$

$h^2+9h+4h+36$

$h^2+13h+36$ in^2

Keng is unhappy with his 2-inch-wide frame, so he decides to put a frame with a different width around his canvas. The total area of the canvas and the new frame is given by the polynomial $h^2 + 17h + 66$, where h represents the height of the canvas.

C. Determine the width of the new frame. Show all your work. Explain why you did each step.

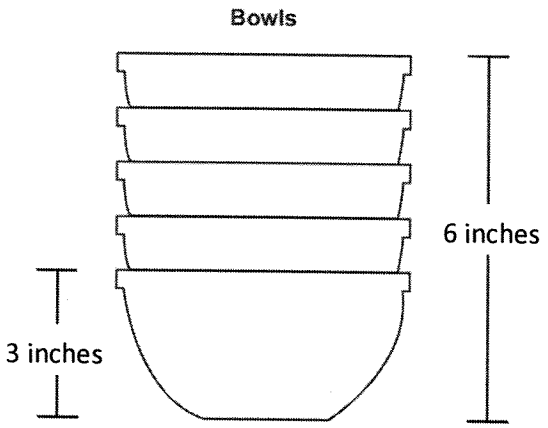


$h^2+17h+66$

$(h+6)(h+11)$

3-in frame

2. The diagram below shows 5 identical bowls stacked one inside the other.



(1, 3) (5, 6)

The height of 1 bowl is 3 inches. The height of a stack of 5 bowls is 6 inches.

A. Write an equation using x and y to find the height of a stack of bowls based on any number of bowls.

$y - y_1 = m(x - x_1)$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{6-3}{5-1}$

$= \frac{3}{4}$

$y - 3 = \frac{3}{4}(x - 1)$

$y - 3 = \frac{3}{4}x - \frac{3}{4}$

$+3 \qquad +3$

$y = \frac{3}{4}x + 2\frac{1}{4}$

B. Describe what the x and y variable represent.

x = number of bowls

y = height of the stack of bowls

C. What is the height, in inches, of a stack of 10 bowls?

x

$y = \frac{3}{4}x + 2\frac{1}{4}$

$y = \frac{3}{4}(10) + 2\frac{1}{4}$

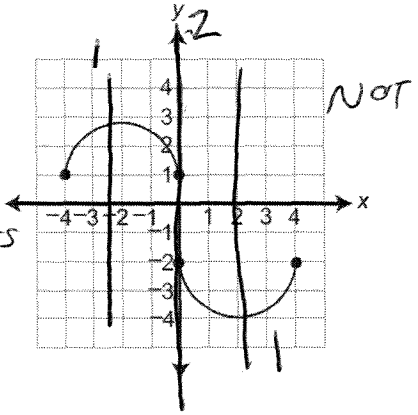
$y = 7\frac{1}{2} + 2\frac{1}{4}$

$y = 9\frac{3}{4}$ in

Vertical line test

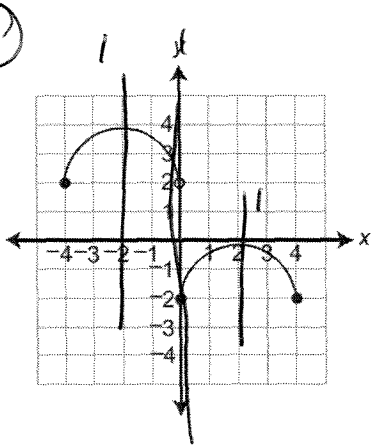
1. Which graph shows y as a function of x?

A.



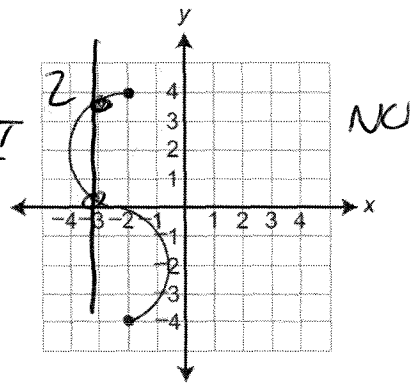
if vertical line intersects once, it is a function

B.

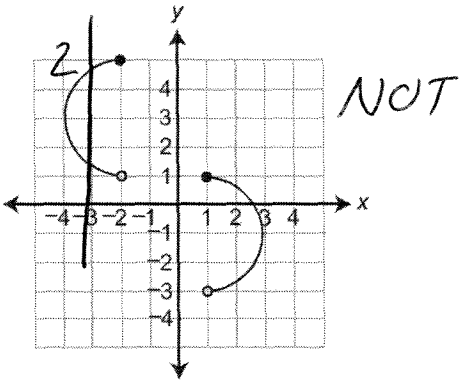


intersects more than once, NOT a function

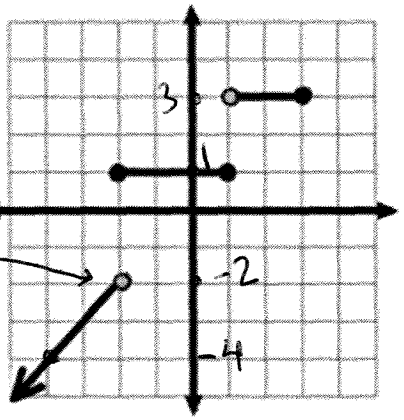
C.



D.



2. The graph of a function is shown below.



open circle, does not include -2

Which value is **not** in the range of the function?

y-values

~~A. -4~~

B. -2

C. 1

D. 3

3. A pizza restaurant charges for pizza and adds a delivery fee. The cost (c), in dollars, to have any number of pizzas (p) delivered to a home is described by the function $c = 10p + 4$. Which statement is true?

cost per pizza

pizzas

delivery fee only charged once

A. The cost of 4 pizzas is $10.
B. The cost of 3 pizzas is $24
C. Each pizza costs $10 and the delivery fee is $4.
D. Each pizza costs $4 and the delivery fee is $10.

4. The table below shows values of y as a function of x.

x	Y
2	7
6	13
14	25
26	43
34	55

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{13-7}{6-2} = \frac{6}{4} = 1.5$

$y - 7 = 1.5(x-2)$

$y - 7 = 1.5x - 3$

$+7 \quad +7$

$y = 1.5x + 4$ OR

Which linear equation best describes the relationship between x and y?

A. $y = 3x + 1$
B. $y = 4.5x + 3.5$
C. $y = 1.5x + 4$
D. $y = 3.5x$

5. Jeff's restaurant sells hamburgers. The amount charged for a hamburger (h) is based on the cost for a plain hamburger plus an additional charge for each topping (t) as shown in the equation below.

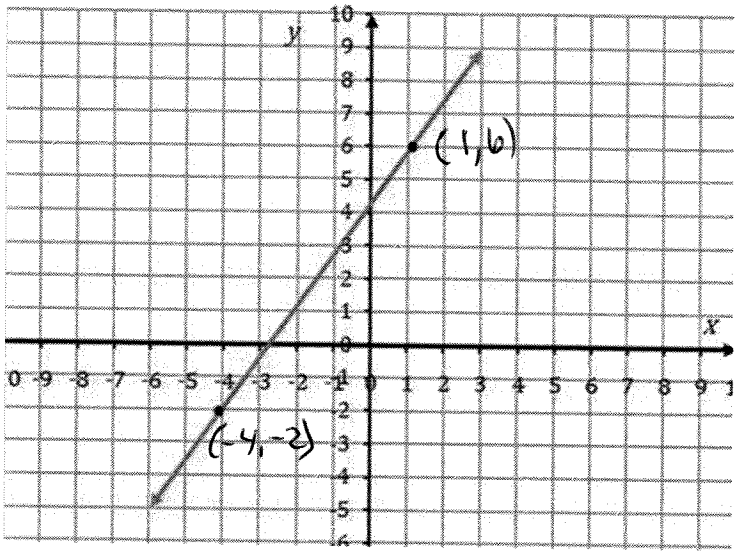
$h = 0.75t + 6$ ← cost of plain hamburger

# of toppings → $0.75t$

What does the number 6 represent in the equation?

A. The number of toppings
B. The cost of a plain hamburger
C. The additional cost for each topping
D. The cost of a hamburger with 1 topping

6. A graph of a linear equation is shown below.



Which equation describes the graph?

A. y = 0.625x + 5

B. y = -1.6x + 4.4

C. y = 1.6x + 4.4

D. y = 0.625x + 4.4

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2-6}{-4-1} = \frac{-8}{-5} = \frac{8}{5}$ OR 1.6

$y - y_1 = m(x - x_1)$

$y - (-2) = \frac{8}{5}(x - (-4))$

$y + 2 = \frac{8}{5}(x + 4)$

$y + 2 = \frac{8}{5}x + 6\frac{2}{5}$

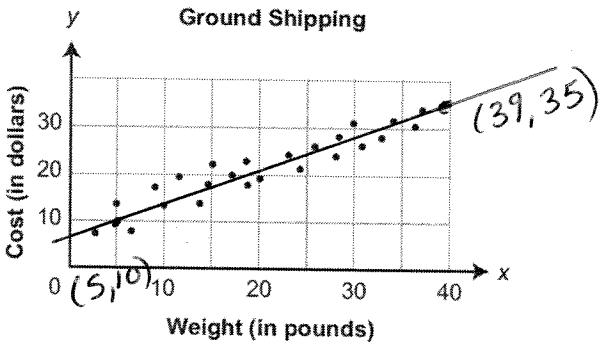
$-2 \qquad\qquad -2$

$y = \frac{8}{5}x + 4\frac{2}{5}$

OR

$y = 1.6x + 4.4$

7. The scatter plot below shows the cost (y) of ground shipping packages from Brodheadsville, PA, to Minneapolis, MN, based on the package weight (x).



Which equation **best** describes the line of best fit?

A. y = 0.37x + 10.11

B. y = 0.37x + 1.57

C. y = 0.68x + 6.61

D. y = 0.68x + 2.32

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{35-10}{39-5} = \frac{25}{34} \approx .74$

A + B are eliminated the slope is too low

$y - y_1 = m(x - x_1)$

$y - 10 = \frac{25}{34}(x - 5)$

$y - 10 = \frac{25}{34}x - 3\frac{23}{34}$

$+10 \qquad\qquad +10$

$y = \frac{25}{34}x + 6\frac{11}{34}$

OR

$y = .74x + 6.32$

C is the closest

Algebra 1 Keystone Open-ended questions

1. Hector's family is on a car trip.
When they are 94 miles from home, Hector begins recording their distance driven (d), in miles, after h hours in the table below.

Distance by Hour	
Time in hours (h)	Distance in Miles (d)
0	94
1	162
2	230
3	298

The pattern continues.

A) $m = \frac{162-94}{1-0} = \frac{68}{1} = 68$

(0, 94) (1, 162)

$y - y_1 = m(x - x_1)$

$y - 94 = 68(x - 0)$

$y - 94 = 68x$

$+94 \quad +94$

$y = 68x + 94$

A. Write an equation to find the distance driven (d), in miles, after a given number of hours (h).

$y = 68x + 94$

B. Hector also kept track of the remaining gasoline. The equation shown below can be used to find the gallons of gasoline remaining (g) after distance driven (d), in miles.

$$g = 18 - \frac{1}{20}d$$

Use the equation to find the missing values for gallons of gasoline remaining.

Gasoline Remaining by Mile

Distance in Miles (d)	Gallons of Gasoline Remaining (g)
100	13
200	8
300	3

$g = 18 - \frac{1}{20}d$

$g = 18 - \frac{1}{20}(100)$

$g = 18 - 5$

$g = 13$

$g = 18 - \frac{1}{20}d$

$g = 18 - \frac{1}{20}(200)$

$g = 18 - 10$

$g = 8$

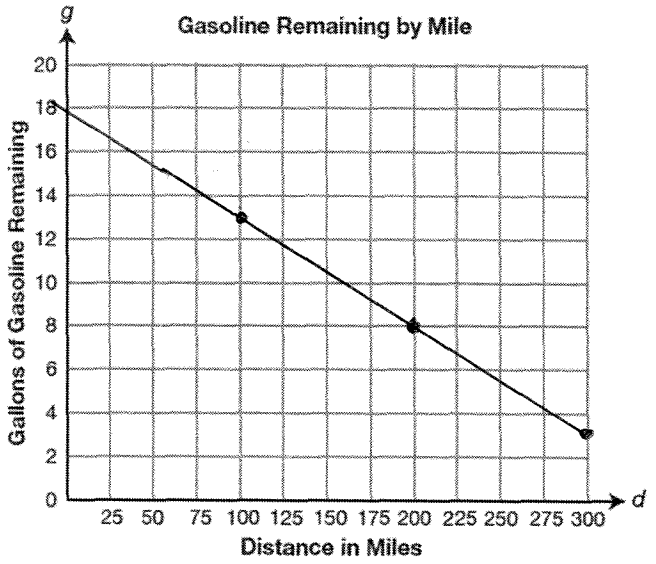
$g = 18 - \frac{1}{20}d$

$g = 18 - \frac{1}{20}(300)$

$g = 18 - 15$

$g = 3$

C. Draw the graph of the line formed by the points in the table from Part B.



D. Explain why the slope of the line drawn in part C must be negative.

As the distance driven increases, the amount of gasoline remaining must decrease.

2. The weight, in pounds, of each wrestler on the high school wrestling team at the beginning of the season is listed below.

188 152 122 160 216 140

A. What is the median weight of the wrestlers?

order least to greatest

122 140 152 | 160 188 216

middle

$\frac{152+160}{2} = 156$

156 pounds

B. What is the mean weight of the wrestlers?

average

$\frac{122+140+152+160+188+216}{6} = \frac{978}{6} = 163$

163 pounds

C. Two more wrestlers join the team during the season. The addition of these wrestlers has no effect on the mean weight of the wrestlers, but the median weight of the wrestlers increases 3 pounds. Determine the weights of the two new wrestlers.

mean = 163

median = 156+3 = 159

the players weigh 158 lbs and 168 lbs.

total weight of the 2 players is 163+163 = 326

median is still the average of the 2 numbers closest to it

$2.\ \frac{x+160}{2} = 159 \cdot 2$

$x + 160 = 318$

$-160 \quad -160$

$x = 158$

$326 - 158 = 168$