

Name: _____ Period: _____

Defeat the EOC

STAAR ALGEBRA I REFERENCE MATERIALS



GENERAL FORMULAS

Slope of a line

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

Pythagorean theorem

$$a^2 + b^2 = c^2$$

Quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

FORMS OF LINEAR EQUATIONS

Slope-intercept form

$$y = mx + b$$

Point-slope form

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

Standard form

$$Ax + By = C$$

Reporting Category	Which units?
1	2, 3, 4, 6, 9, 10
2	1, 2, 3, 5, 6, 7, 8, 9, 10
3	3, 4, 10
4	1, 3, 4, 6
5	7, 8, 9, 10

STAAR ALGEBRA I REFERENCE MATERIALS

CIRCUMFERENCE

Circle	$C = 2\pi r$	or	$C = \pi d$
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AREA

Triangle	$A = \frac{1}{2}bh$
Rectangle or parallelogram	$A = bh$
Rhombus	$A = \frac{1}{2}d_1d_2$
Trapezoid	$A = \frac{1}{2}(b_1 + b_2)h$
Regular polygon	$A = \frac{1}{2}ap$
Circle	$A = \pi r^2$

SURFACE AREA

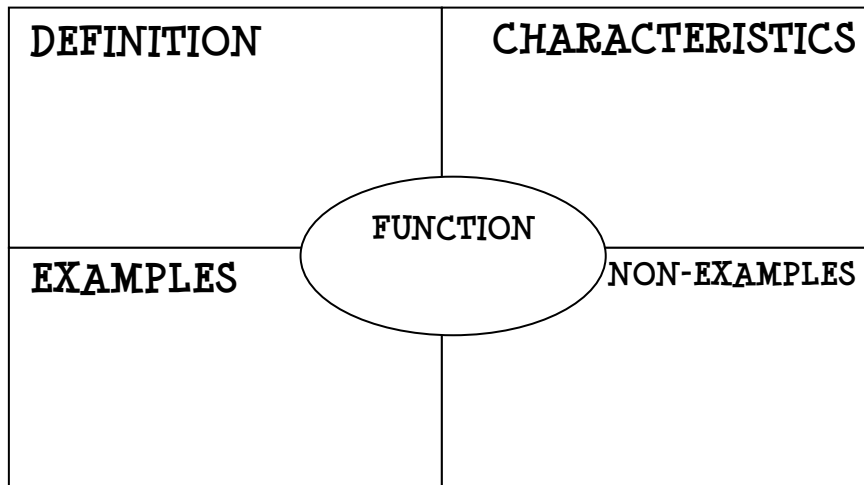
	Lateral	Total
Prism	$S = Ph$	$S = Ph + 2B$
Pyramid	$S = \frac{1}{2}Pl$	$S = \frac{1}{2}Pl + B$
Cylinder	$S = 2\pi rh$	$S = 2\pi rh + 2\pi r^2$
Cone	$S = \pi rl$	$S = \pi rl + \pi r^2$
Sphere		$S = 4\pi r^2$

VOLUME

Prism or cylinder	$V = Bh$
Pyramid or cone	$V = \frac{1}{3}Bh$
Sphere	$V = \frac{4}{3}\pi r^3$

functions

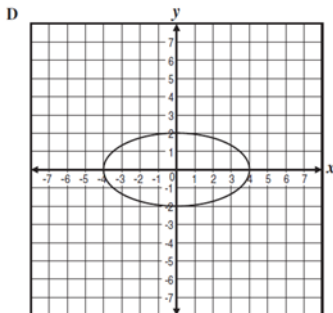
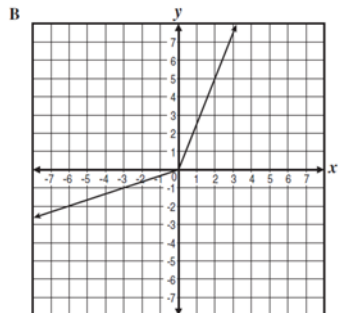
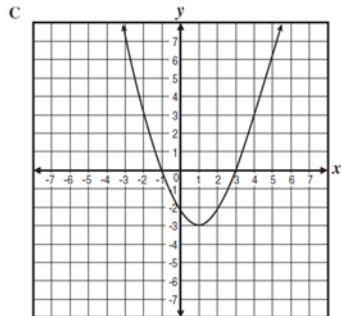
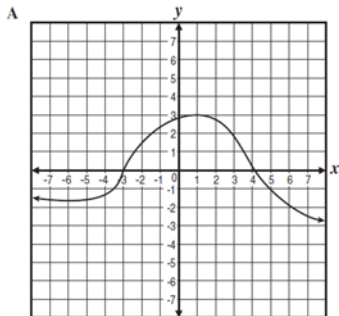
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Vertical Line Test:

- Which relation is a function?
 - $\{(-1, 3), (-2, 6), (0, 0), (-2, -2)\}$
 - $\{(-2, -2), (0, 0), (1, 1), (2, 2)\}$
 - $\{(4, 0), (4, 1), (4, 2), (4, 3)\}$
 - $\{(7, 4), (8, 8), (10, 8), (10, 10)\}$

- Which of the following graphs represents a relation that is not a function of x ?



practice

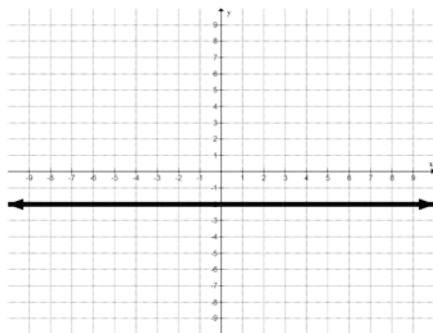
1. Which of the following does not represent a function?

A.

x	-2	0	4	10
y	-1	3	11	23

B $y = x^2 - 3$

C $\{(6, -1), (6, 0), (6, 3), (6, 5)\}$



D

2. If $f(x) = x^2 + 2x + 3$, what is the value of $f(x)$ when $x = 6$?

- A 27
B 42
C 51
D 60

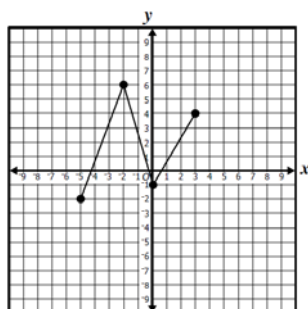
3. What is the value of $\frac{6x - 3y}{xy}$, when $x = 6$ and $y = -4$?

- A -2
B -1
C 2
D 3

4. If $(-4.5, y)$ is a solution to the equation $2x - 5y = 10$, what is the value of y ?

5. What is the domain of the function shown?

- A $-2 \leq x \leq 6$
B $-5 \leq x \leq 3$
C $-2 \leq y \leq 6$
D $-5 \leq y \leq 3$



6. The table below shows a relationship between the total cost of purchasing books through a book club and the number of books purchased.

Total Cost in Terms of Books Purchased

Books Purchased, x	0	1	2
Cost, y	\$10	\$25	\$40

What is the functions' independent variable?

- A \$10
B \$15
C Cost of the club
D Number of books purchased

7. A swordfish travels through the water at a speed of 40 miles per hour. The relationship between the distance traveled, d , and the time traveled, t , is determined by the function $d = 40t$. Which of the following statements is true?

- A The distance a swordfish travels is determined by the size of the swordfish.
B The amount of time a swordfish travels is determined by the size of the swordfish.
C The amount of time a swordfish travels is determined by the distance the swordfish travels.
D The distance a swordfish travels is determined by the amount of time the swordfish travels.

8. Which of the following represents the parent function $y - 2x = 7$?

- A $y = 2x$
B $y = x^2 + 7$
C $y = x$
D $y = \sqrt{x}$

9. If $f(x) = 3x - \frac{1}{2}$, what is the value of $f(-3)$?

- A $-9\frac{1}{2}$
B $2\frac{1}{2}$
C $8\frac{1}{2}$
D $9\frac{1}{2}$

WRiting equations

Standard Form: $Ax + By = C$

**To write an equation
given 2 points:**

Point - Slope: $y - y_1 = m(x - x_1)$

Slope Intercept: $y = mx + b$

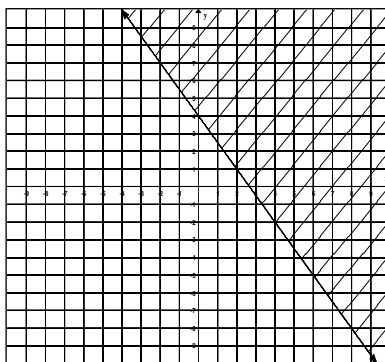
Parallel -

Perpendicular -

- Which of the following is not a correct description of the graph of the equation $2x + y = -7$?
 - The graph of the equation contains the point $(-2, -3)$, and when the value of x increases by 1 unit, the value of y decreases by 2 units.
 - The graph of the equation contains the points $(-1, -5)$, $(2, -11)$, and $(4, -15)$.
 - The graph of the equation is a line that passes through the point $(0, -7)$ with a slope of -2 .
 - The graph of the equation contains the points $(0, -7)$, $(1, -9)$, and $(3, -1)$.

- Which inequality best describes the graph shown below?

- $y > -\frac{2}{3}x + 5$
- $y < -\frac{3}{2}x + 5$
- $y < -\frac{2}{3}x + 5$
- $y > -\frac{3}{2}x + 5$



- What is the equation in standard form of the line that passes through the point $(1, 24)$ and has a slope of -0.6 ?

- $3x + 5y = 125$
- $3x + 5y = 77$
- $3x + 5y = 123$
- $3x + 5y = 115$

2

practice

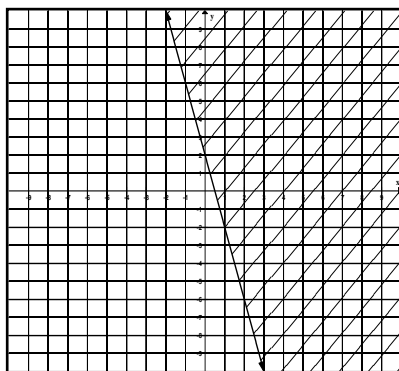
1. Which equation describes the line that passes through the point $(4, 7)$ and is parallel to the line represented by the equation $-3x + y = 4$?

- A $y = -3x + 19$
 B $y = 3x - 5$
 C $y = \frac{1}{3}x + 5\frac{2}{3}$
 D $y = -\frac{1}{3}x + 8\frac{1}{3}$

2. Write a function in slope-intercept form that represents a line that contains the point $(2, 12)$ and has a slope of -3 ?

3. Which inequality best represents the graph shown below?

- A $x + 4y \geq 8$
 B $4x + y \geq 2$
 C $4x + y \leq 2$
 D $x + 4y \leq 8$

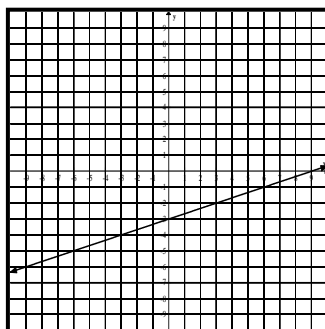


4. Which function includes the data set $\{(-2, 7), (4, 4), (6, 3)\}$?

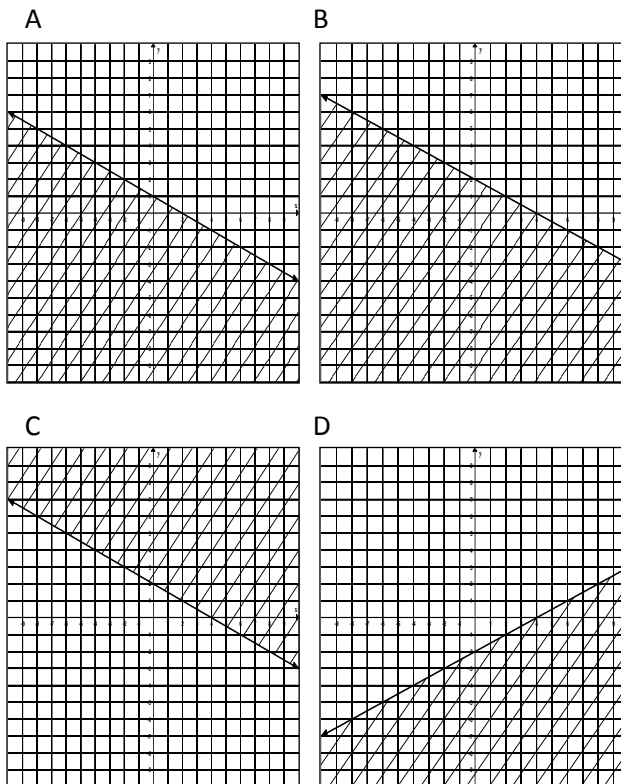
- A $y = -\frac{1}{2}x + 6$ B $y = -2x + 3$
 C $y = \frac{1}{2}x + 8$ D $y = 2x - 4$

5. What are the intercepts of the linear function shown below?

- A $(-3, 0)$ and $(9, 0)$
 B $(-3, 0)$ and $(0, 9)$
 C $(0, -3)$ and $(0, 9)$
 D $(0, -3)$ and $(9, 0)$



6. Which of the graphs below best represent the inequality $x + 2y \leq 4$?



7. The table below shows various values for x and y . Which equation best describes the relationship between x and y ?

- A $y = -3x + 5$
 B $y = -5x - 7$
 C $y = -x + 17$
 D $y = 3x + 41$

x	y
-6	23
-2	3
7	-42
11	-62

8. Which function includes the following set of ordered pairs $\{(1, 3), (2, 0), (3, -3)\}$?

- A $y = -3x$ C $y = -3x + 6$
 B $y = \frac{-x}{3}$ D $y = -\frac{x}{3} - 4$

meaning and changes of m & B

Key words for SLOPE

Key words for y-intercept

PROBLEM	these are WRONG Because...	this is CORRECT Because...
1.		
2.		
3.		
4.		
5.		
6.		

3

practice

1. The business manager at Affordable Plumbing calculates the total cost, c , to a customer by using the equation $c = 62h + 38$, where h is the number of hours of work performed. The business manager at Leak Free Plumbing calculates the total cost, c , to a customer by using the equation $c = 58h + 45$, where h is the number of hours of work performed. How does the graph of the equation used by Affordable Plumbing compare to the graph of the equation used by Leak Free Plumbing?

- A The slope is the same, and the y -intercept is greater.
- B The slope is greater, and the y -intercept is smaller.
- C The slope is smaller, and the y -intercept is the same.
- D The slope is greater, and the y -intercept is greater.

2. Mark and his friends are baking cookies for a bake sale. The graph below shows the total number of cookies they have compared to the number of hours they bake. How would the graph change if Mark and his friends were given 20 cookies when they started baking?

- A The y -value of the y -intercept would increase.
- B The slope would increase.
- C The y -value of the y -intercept would decrease.
- D The slope would decrease.

3. Find the x - and y - intercepts of $2x + y = -5$.

An electrician charges a flat fee of \$50 plus an hourly rate to make a house call. The graph shows the total cost for a job based on the flat fee and the number of hours to complete the job.

4. If the electrician changed his flat fee to \$60, but kept his hourly rate the same, what would be the total charge for a job that took 3 hours?

5. If the electrician left his flat fee at \$50, but changed his hourly rate to \$45, what would be the total charge for a job that took 3 hours?

6. If the electrician changed his flat fee to \$60 and changed his hourly rate to \$45, what would be the total charge for a job that took 3 hours?

7. Which best describes the change in the graph of the function $f(x) = 5x + 4\frac{1}{4}$ if the y -intercept is changed to $7\frac{1}{2}$, while the slope remains constant?

- A The line shifts up $2\frac{1}{2}$ units
- B The line shifts to the right $3\frac{1}{4}$ units
- C The line shifts up $3\frac{1}{4}$ units
- D The line shifts down $2\frac{1}{2}$ units.

Systems

Types of systems

Methods to solve

Problem 1: A truck is carrying 1500 pounds of cargo that occupies 138 cubic feet of space. A television weighs 50 pounds and occupies a space of 4 cubic feet. A microwave oven weighs 30 pounds and occupies a space of 3 cubic feet.

4

Problem 2: Mark has \$4.95 in quarters and dimes. He has 3 times as many dimes as quarters.

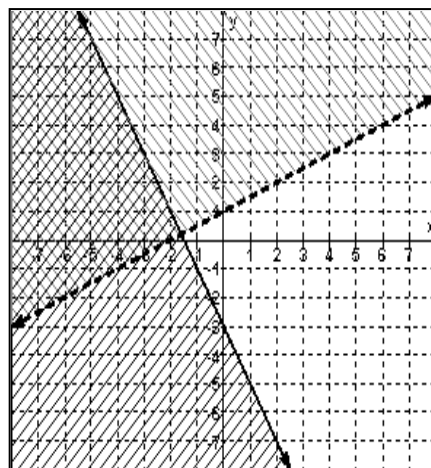
Problem 3:

Inequality 1:

Inequality 2:

Give 3 solutions

Give 3 non solutions



practice

1. Which ordered pair is the solution to the system of equations below?

$$x + 3y = 7$$

$$x + 2y = 10$$

- A $\left(\frac{7}{2}, \frac{13}{4}\right)$ B $\left(\frac{7}{2}, -3\right)$
C $(-2, 3)$ D $(16, -3)$

2. Members of a senior class held a car wash to raise funds for their senior prom. They charged \$3 to wash a car and \$5 to wash a pick-up truck or a sport utility vehicle. If they earned a total of \$275 by washing a total of 75 vehicles, how many cars did they wash?

- A 25
B 34
C 45
D 50

3. Manuel and Felicia are comparing how much money they have. Manuel states that he has \$250 and saves \$150 per week. Felicia states that she has \$1,650 and spends \$200 per week. Which system of equations can be used to determine x , the number of weeks, and y the amount of money at the end of the week?

- A $y = 250x + 150$ B $y = 250 + 150x$
 $y = 1650x - 200$ $y = 1650 - 200x$
C $y = 250 - 150x$ D $y = 250 - 150x$
 $y = 1650 + 200x$ $y = 1650 - 200x$

4. Given the two equations $2x + 3y = 12$ and $2x - y = 4$, what is the value of $x + y$?

- A -5 B -1 C 1 D 5

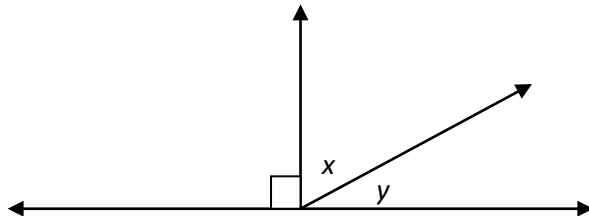
5. To solve the linear system below, which substitution of unknowns is proper?

$$3x - 7y = 12$$

$$5x - y = -16$$

- A Substitute $5x - 16$ for y in the first equation.
B Substitute $5x + 16$ for y in the first equation.
C Substitute $5x + 12$ for y in the first equation.
D Substitute $7y - 4$ for x in the second equation.

6. The measure of angle x is 15° less than twice the measure of angle y .



Which system of equations will determine the measure of each angle?

- A. $x + y = 90$ $x + y = 90$
 $x = y - 15$ C. $x = 2y - 15$
B. $x + y = 90$ $2x = 90$
 $x = 15 - 2y$ D. $x = 2y - 15$

7. Which point is a solution of the system of linear inequalities?

$$y < -2x$$

$$y > 3x + 5$$

- A $(2, -1)$ B $(-4, 1)$
C $(-1, 4)$ D $(1, -2)$

8. At what point do the lines represented by the equations $2x + y + 1 = 0$ and $4x + y - 3 = 0$ intersect?

- A $(2, 5)$
B $(2, -5)$
C $(-1, 1)$
D $(1, -1)$

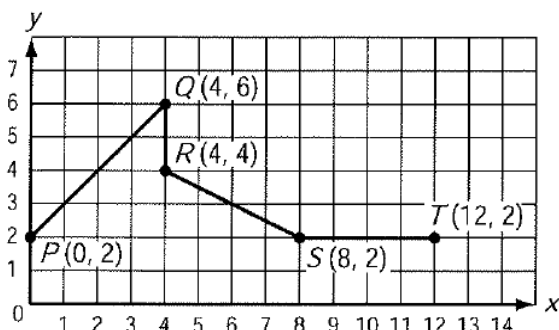
9. Julie is planning to put a fence around a rectangular garden. The length of the garden is 3 feet more than 1.5 times its width. If Julie uses a total of 36 feet of fencing around the edge of the garden, what is the length of the garden?

- A 6 ft
B 13.2 ft
C 12 ft
D 10.5 ft

Interpreting Graphs

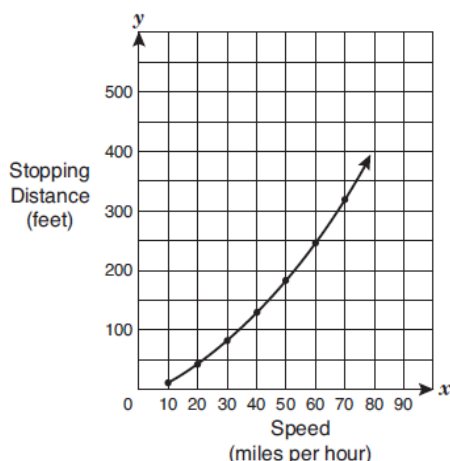
1. Four line segments are shown on the coordinate grid below. Which of the line segments has a slope of 0?

- U \overline{PQ}
V \overline{ST}
W \overline{RS}
X \overline{QR}



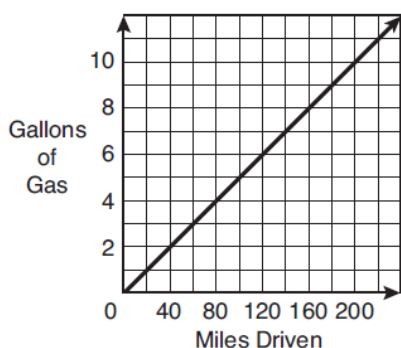
2. A graph of the relationship between the speed of a car in miles per hour and the car's approximate stopping distance in feet is shown below. What is the approximate stopping distance for a car traveling 70 miles per hour?

- J 350 ft
K 250 ft
L 325 ft
M 300 ft

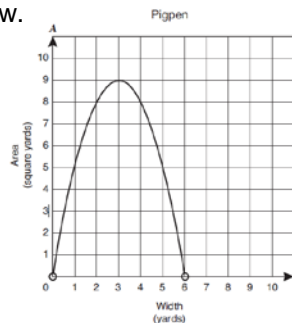


3. The graph shows the number of gallons of gas used by Maria's car as a function of the number of miles driven. About how many gallons of gas will Maria need for a 170-mile trip?

- W 7 gal
X 11 gal
Y 8.5 gal
Z 9.5 gal



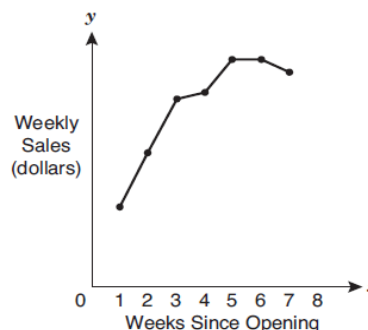
4. Hank wants to build a rectangular pigpen using 12 linear yards of fencing. The possible area in square yards, A , for this pigpen is described by the function $A = w(6 - w)$, where w represents the width in yards of the rectangular pen. The graph of this function is shown below.



Which statement best represents the information in this graph?

- A The pigpen with the maximum area has a width of 6 yards.
B The pigpen with the maximum area has a width of 3 yards.
C The pigpen with the maximum area has a width of 9 yards.
D The pigpen with the maximum area has a width of 12 yards.

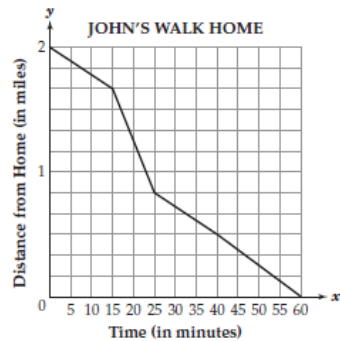
5. Jim recently opened a store. The graph below shows the store's weekly sales since it opened. What can be inferred from this graph?



- P The store's sales have been increasing since it opened.
Q The store's sales increased for the first 5 weeks after it opened, remained constant the next week, and then decreased the last week shown.
R The store's sales increased for the first 2 weeks after it opened, but then they began to decrease.
S The store's sales increased for the first 5 weeks after it opened, but then they decreased the next 2 weeks.

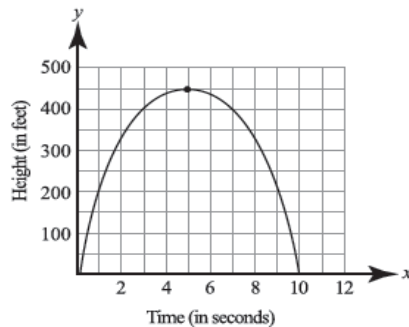
practice

1. John is 2 miles away from his house. The graph below shows the time it takes John to walk home.



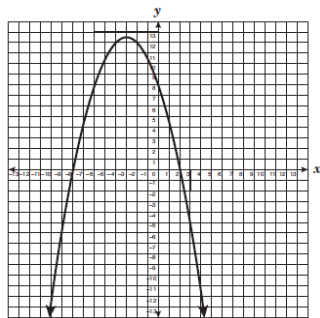
According to the graph, during what time interval is John walking the fastest?

2. The graph below represents the relationship between the term, in seconds, an arrow is shot upward and its height, in feet.



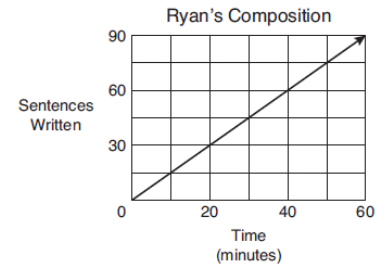
From the time it was shot, how long does it take for the arrow to return to the ground, and what is its maximum height?

- A 5 seconds, 450 feet
 B 10 seconds, 450 feet
 C 10 seconds, 500 feet
 D 450 seconds, 10 feet
3. The graph of $f(x) = -\frac{1}{2}x^2 - 3x + 8$ is shown below. Which of the following statements appears to be true?



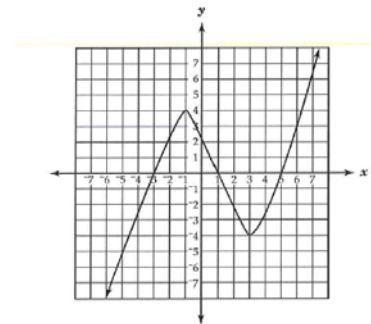
- A The vertex is at $(-3, 12)$.
 B The axis of symmetry is $x = -3$.
 C The zeros of the related function are $-8, 2$, and 8 .
 D The y -intercept is $(8, 0)$.

4. Ryan is writing a composition for homework. He decides to keep track of the number of sentences he writes compared to the time in minutes he works. The graph below shows the data he collected.



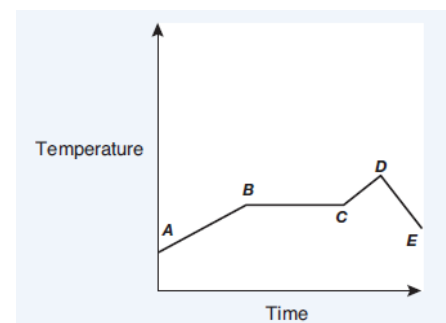
At what rate does Ryan write his composition?

- A 0.5 sentence per minute
 B 1 sentence per minute
 C 1.5 sentences per minute
 D 2 sentences per minute
5. Look at the function that is graphed below.



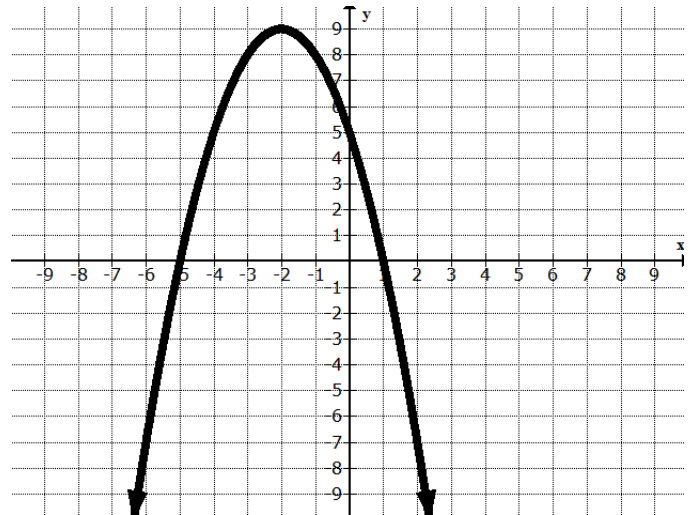
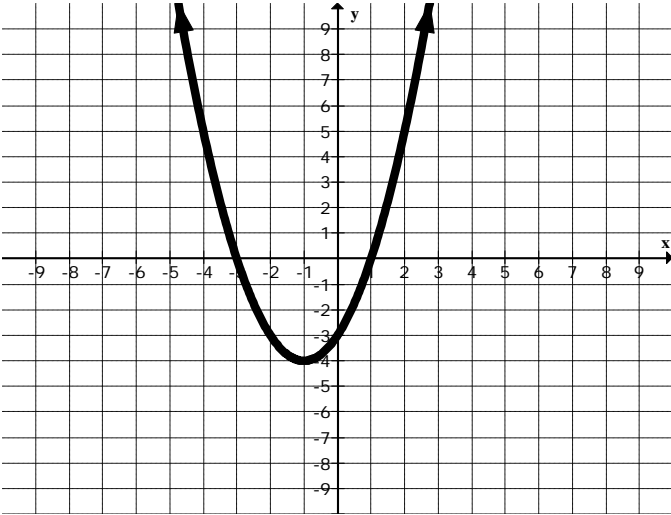
What are the zero(s) of the function?

6. The graph below shows the temperature in a town over the course of one day.



During what time period did the temperature increase at the greatest rate?

Quadratics



important vocabulary:

Quadratic Parent Function -

Vertex -

Line (Axis) of Symmetry -

Concavity -

X-intercepts -

Roots -

Solutions -

Zeroes -

Standard Form -

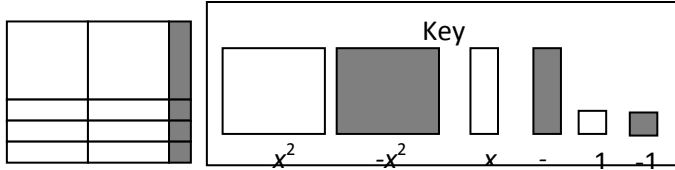
Discriminant -

Compression -

Translation -

practice

1. The polynomial $3x^2 + 10x - 8$ is modeled below.

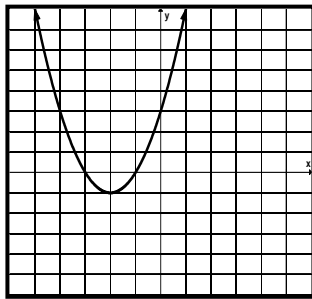


What are the factors of this polynomial?

2. The length of time required by a high-speed printer to print a large set of documents is given by the equation $x^2 - 3x - 54 = 0$ where x is the time in hours. How many hours are required to print the set of documents?

- A 2 hr
- B 3 hr
- C 6 hr
- D 9 hr

3. The graph of $y = x^2 + 4x + 3$ is shown below. Use the graph to determine the solution set of the equation.



- A $\{0, -2\}$
- B $\{1, 3\}$
- C $\{-1, -3\}$
- D $\{-3\}$

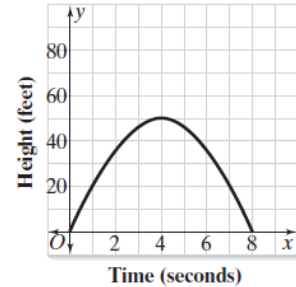
4. The function $y = x^2 - 3$ is transformed to the function $y = x^2 + 2$. How does the graph of $y = x^2 + 2$ compare to the graph of $y = x^2 - 3$?

- A Translated 1 unit up
- B Translated 4 units up
- C Translated 5 units up
- D Translated 1 unit down

5. What is the solution set for the quadratic equation $x^2 - 16 = 0$?

- A $\{4\}$
- B $\{-4, 4\}$
- C $\{256\}$
- D $\{-256, 256\}$

6. The graph shows the height of a cannonball in terms of the time after it was fired



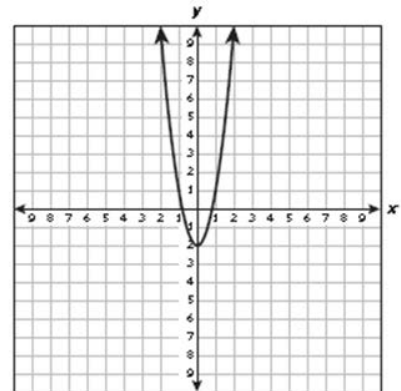
Describe the domain of the function shown in the graph.

Describe the range of the function shown in the graph.

7. What are the x-intercepts of the the graph of the quadratic function $f(x) = 5x^2 + 4x - 1$?

- A. $1/5$ and -1
- B. $-1/5$ and 1
- C. 0 and -1
- D. $-2/5$ and $7/5$

8. The graph of $y = 3x^2 - 2$ is shown below.



If the coefficient of x^2 is changed from 3 to another positive number to create a new function, how will the graph of the new function compare with the graph of the original function?

- A. The x-intercepts of the new graph will be the same as the x-intercepts of the original function.
- B. The vertex of the new graph will be different from the vertex of the original graph.
- C. The new graph will be wider or narrower than the original graph.
- D. The new graph will open in the opposite direction as the original graph.

general test taking tips

calculator shortcuts

Tables and Hidden Tables

1.

The table below shows the average tuition per semester at a community college over a 20-year period.

Year	Average Tuition
1980	\$385
1985	\$510
1990	\$605
1995	\$730
2000	\$825

If the trend continues, what is the best estimate of the tuition at this community college in 2005?

- A. \$920
- B. \$985
- C. \$950
- D. \$930

Factoring or Simplifying

1. Factor $x^2 - x - 6$

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

2. Factor $2x^2 - 5x - 12$

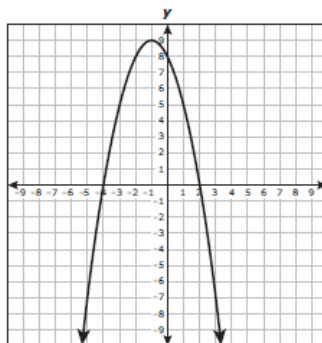
- A. $(2x-3)(x+4)$
- B. $(2x+4)(x-3)$
- C. $(2x+3)(x-4)$
- D. $(x+3)(x-4)$

3. Simplify $3(x+4) - 2(5x-1)$

- A. $13x+10$
- B. $-7x+14$
- C. $13x+14$
- D. $-7x+10$

Plot Points

11 The graph of a quadratic function is shown below.



Which statement about this graph is not true?

- A The graph has a y-intercept at (0, 8).
- B The graph has a maximum point at (-1, 9).
- C The graph has an x-intercept at (2, 0).
- D The graph has the y-axis as a line of symmetry.

Straight-Up Calculator

1. Given $\begin{matrix} 2x+3y=12 \\ 2x-y=4 \end{matrix}$, what is the value of $x+y$?

- A. -5
- B. -1
- C. 1
- D. 5

2. How can the graph of $y = x^2 + 6$ be obtained from the graph of $y = x^2 - 8$?

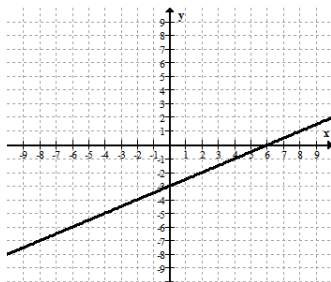
- A. Move the graph of $y = x^2 - 8$ up 6.
- B. Move the graph of $y = x^2 - 8$ down 8
- C. Move the graph of $y = x^2 - 8$ down 14.
- D. Move the graph of $y = x^2 - 8$ up 14.

practice

1. The graph of the function $y = \frac{1}{2}x - 3$ is shown below. If

the line is translated 2 units down, which equation will best describe the new line?

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



2. The table shows a set of values for x and y .

x	3	1	-2	-3	-7
y	-4	-6	-9	-10	-14

Which equation best represents this set of data?

- A. $y = x - 1$
- B. $y = x - 7$
- C. $y = 2x$
- D. $y = -x - 1$
- E. $y = x - 2$

3. The table shows the population, p , of mice in a field at the end of m months.

Mouse Population

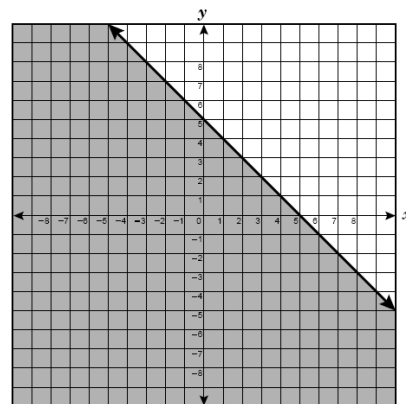
Time, m (months)	Population, p
0	6
1	12
2	24
3	48
4	96

Based on the data in the table, what will be the population of mice in the field at the end of 8 months?

- A. 192
- B. 3,072
- C. 1,536
- D. 256

4. Which inequality best describes the graph below?

- A. $x - y \leq -5$
- B. $x + y \geq 5$
- C. $x + y \leq 5$
- D. $x - y \leq 5$
- E. $x + y \geq -5$



5. The equations of 2 lines are given as

$$2x - y = 2$$

$$3x + 4y = 25$$

What are the coordinates of the point of intersection?

- A. $(5\frac{1}{2}, 9)$
- B. $(4, 3)$
- C. $(3, 4)$
- D. $(3, -4)$
- E. $(-1, -4)$

6. What is the value of x in the following equation?

$$2x - (4x - 6) = 0$$

- A. -8
- B. -4
- C. -3
- D. 3
- E. 4

7. The chart shows the prices of a medium pizza with different number of toppings

Medium Pizza

Number of Toppings	Total Price
1	\$5.50
2	\$7.00
3	\$8.50
4	\$10.00

Which equation shows the relationship between the total price, P , and the number of toppings, t ?

- A. $P = 4t + 1.50$
- B. $P = 1.50t + 4$
- C. $P = t(4 + 1.50)$
- D. $P = 1.50(4 + t)$
- E. $P = 4(t + 1.50)$