Name _____ Date_____

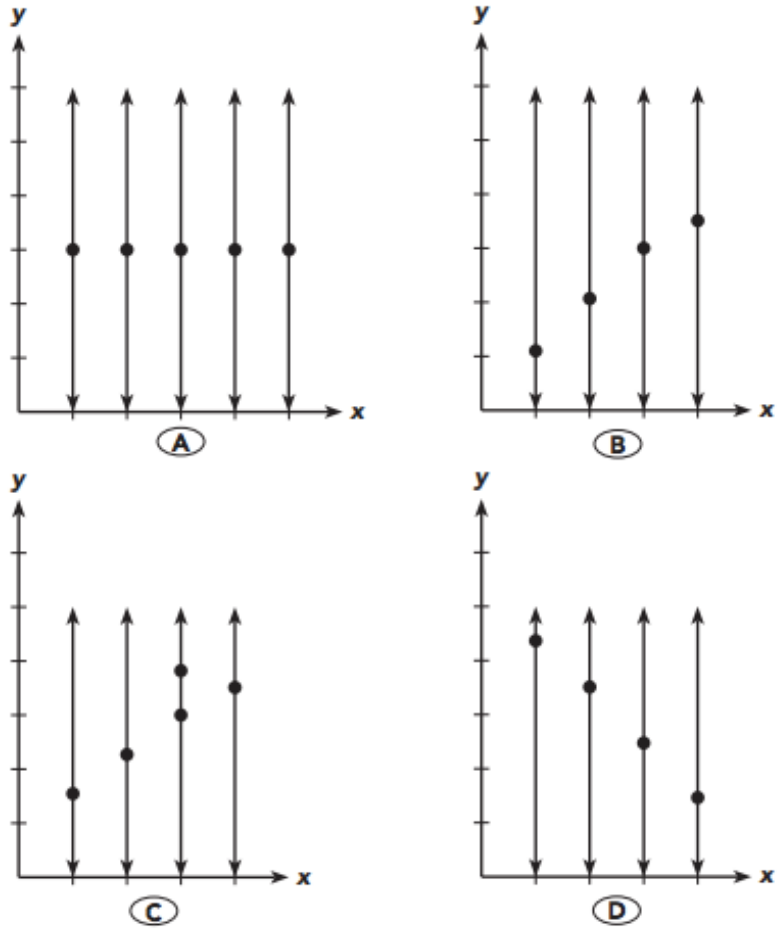
Algebra I Summer Packet

PART ONE

Section 1: Multiple Choice

Show your work in the blank space. Then select the best answer for each question. You may receive partial credit for an incorrect response if you have shown some valid work.

1. Which of the following vertical line tests represents a relation that is **not** a function?



2. The equation $\frac{1}{4}x = y - 8$ has _____.

   (A) a negative slope
   (B) a y-intercept whose coordinates are $(0, -8)$
   (C) the point $(4, 9)$ lying on the graph
   (D) a slope of 0

3. Which equation represents a linear relationship?

Ⓐ $y = 3x$ Ⓑ $x^2 = 3$ Ⓒ $y = x^2$ Ⓓ $y^3 = x^2$

4. Which of the following tables represents a linear relationship?
Select ALL correct responses!

Ⓐ

x	5	10	20
y	125	250	500

Ⓑ

x	50	20	10
y	100	250	50

Ⓒ

x	5	10	20
y	−125	−250	−500

Ⓓ

x	2	4	6
y	8	10	12

5. Robert has to pay the price of his meal (c) plus a 20% tip.
Which of the following expressions shows the price he will pay for his meal including the tip?
Select ALL correct responses!

A) $1.2c$

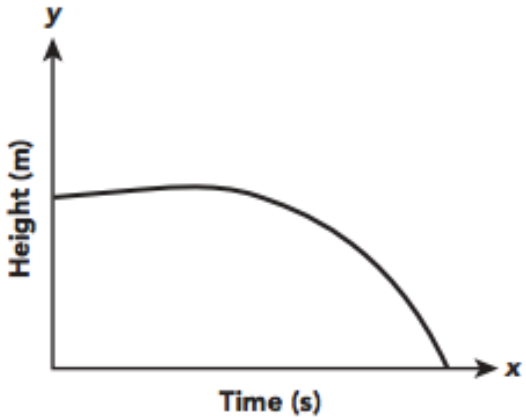
B) $c + 20c$

C) $c + 0.20c$

D) $0.8c$

Section 2: Open Response
Show your work and solution clearly. Label units when necessary.

6. The graph shows the height, *y meters*, of a baseball *x seconds* after it is thrown from Ms. Welsh's arm.



a) Describe this relation as a many-to-one, one-to-one, one-to-many, or many-to-many.

_____

_____

b) Tell whether the relation is a function. Justify your answer.

_____

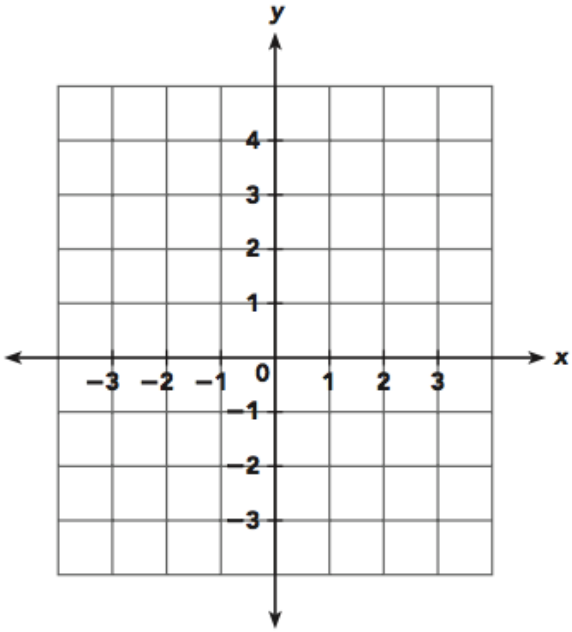
_____

_____

7. Find the slope of the line that passes through the following points:

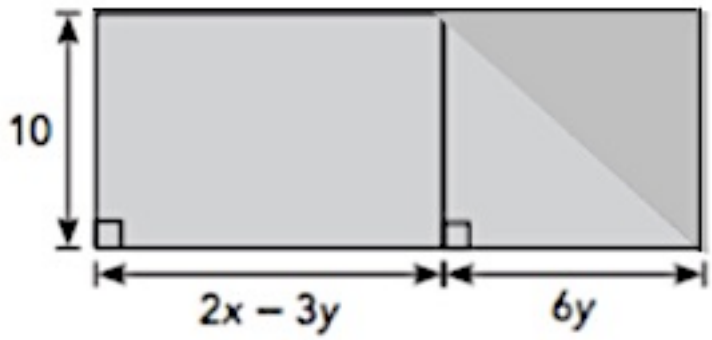
$A\,(4, 8)$ and $B\,(2, 0)$

8. Sketch a graph of a line that is parallel to $4y - 3x = 8$ and has a y-intercept of -1.

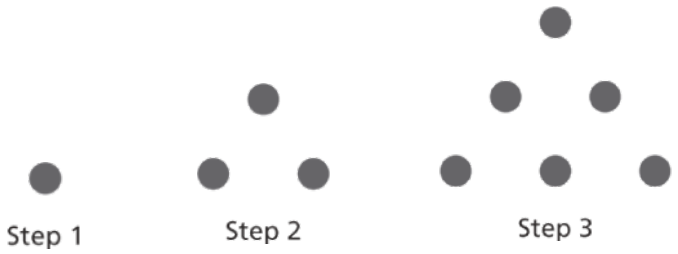


9. Write an expression for the area of the whole rectangular figure.

   Then expand and simplify.



10. The party room at a miniature golf course is decorated with golf ball patterns such as the one below.



a. Complete the table to show the number of golf balls in the next 5 steps of the pattern. (Draw them to help you).

Golf Ball Pattern

Pattern Step Number	1	2	3	4	5	6	7	8
Number of Balls Used	1	3	6					

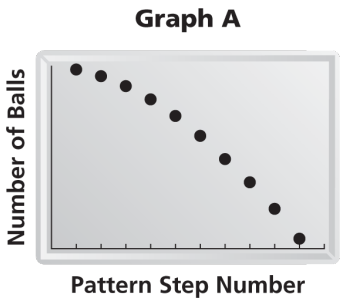
b. Is the relationship linear? Explain why or why not.

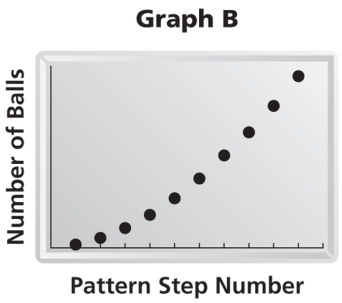
_____

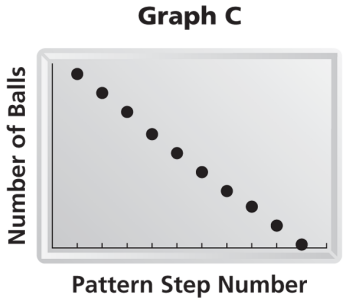
_____

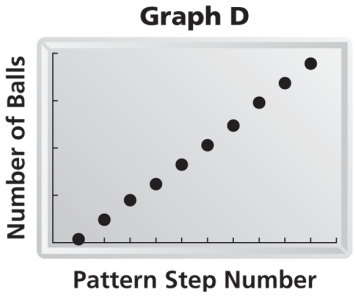
_____

c. Circle the graph that matches the pattern relating *number of balls used* to *pattern step number*.





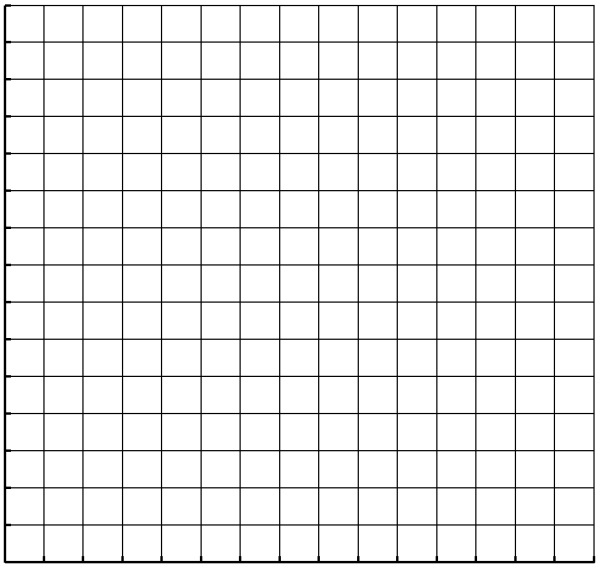




11. The Grant Center has operating costs of $450 a day just to open. Additionally, it costs $150 a day per group of 10 students as shown in the table below.

Number of Students	0	10	20	30	40
Daily Operating Cost	$450	$600	$750	$900	$1,050

a. Make a graph of the data (number of students, operating cost). Include a title, scale, and axis labels with units.



b. Write an equation showing how the operating cost, *C*, depends on the number of students, *n*. Label each term in your equation to show what it represents.

c. For what number of student visitors will the daily operating cost be $690? Show your work.

d. What will be the operating cost on a day with 12 student visitors? Show your work.

PART TWO

Section 1: Multiple Choice

Show your work in the blank space. Then select the best answer for each question. You may receive partial credit for an incorrect response if you have shown some valid work.

12. What is the greatest common factor of the polynomial?
$24x^3 - 16x + 68x$?

    a. 4

    b. $4x$

    c. 16

    d. $16x$

13. Which is equivalent to the expression?
$(3x - 14)^2$

    a. $9x^2 - 84x + 196$

    b. $9x^2 + 84x + 196$

    c. $9x^2 + 196$

    d. $9x^2 - 196$

14. Which is the absolute maximum of the function $f(x) = -x^2 + 4x$?

    a. $(-2, -4)$

    b. $(0, 0)$

    c. $(2, 4)$

    d. $(4, 2)$

15. What are the x-intercepts of the function $f(x) = -4x^2 - 16x - 12$?

    a. $(1, 0)$ and $(3, 0)$

    b. $(-1, 0)$ and $(-3, 0)$

    c. $(-4, 0)$ and $(-12, 0)$

    d. $(4, 0)$ and $(12, 0)$

16. Which of these functions has a y-intercept of (0, 7)?

a. $f(x) = x^2 + 2x + 7$

b. $f(x) = 7x^2 - 3x + 1$

c. $f(x) = 7(x - 1)(x + 5)$

d. $f(x) = 3x(x - 7)$

17. Which function represents a parabola that opens downward and intersects the x-axis at (3, 0) and (−4, 0)?

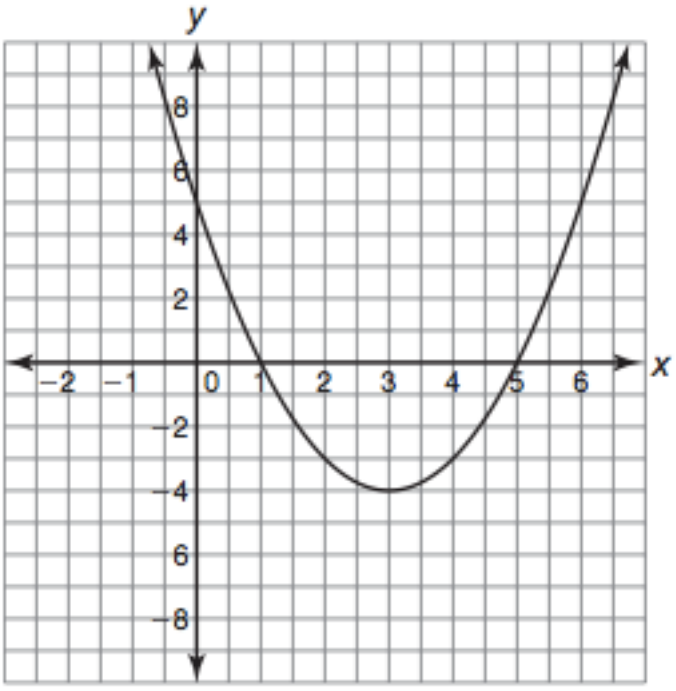
a. $f(x) = -7(x - 3)(x + 4)$

b. $f(x) = -6(x + 3)(x - 4)$

c. $f(x) = 8(x - 3)(x + 4)$

d. $f(x) = 2(x + 3)(x - 4)$

18. What is the interval of increase for the function represented by the graph?



a. $(-\infty, -4)$

b. $(-\infty, 3)$

c. $(-4, \infty)$

d. $(3, \infty)$

Section 2: Open Response
Show your work and solution clearly. Label units when necessary.

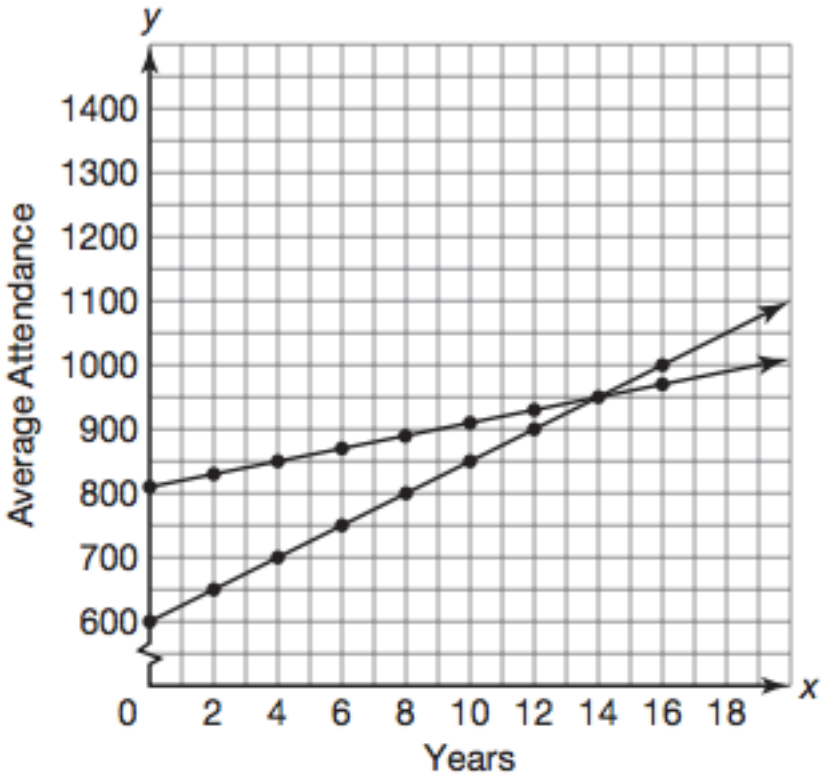
8. Determine the solution to each system of equations:

a. $\begin{cases} 3x - y = 5 \\ 2x + 7y = -12 \end{cases}$

b. $\begin{cases} -2x = -10y - 2 \\ -x + 8y = 5 \end{cases}$

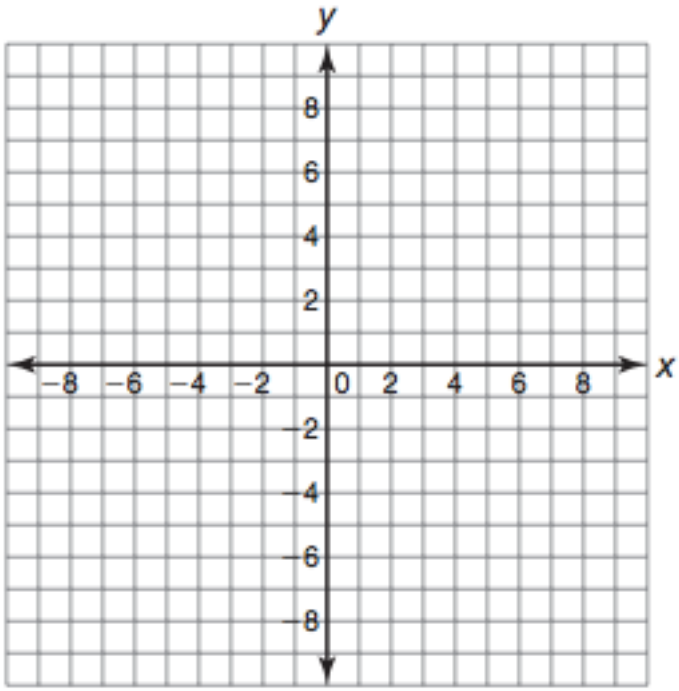
9. A new business is hiring managers and employees. The company needs **at least** 20 managers and **no more than** 500 employees. A total of at least 400 people must be hired. Write a system of linear inequalities to represent the constraints of this situation. Let x represent the number of managers and let y represent the number of employees.

10. The graph shows the average attendance for two schools. What does the solution $x = 14$ represent?



11. Graph the system of equations. Determine the solution.

$$\begin{cases} 2x = 10 - 3y \\ 3x + 2y = 5 \end{cases}$$



12. Write the function in factored form. Then determine the x-intercepts.

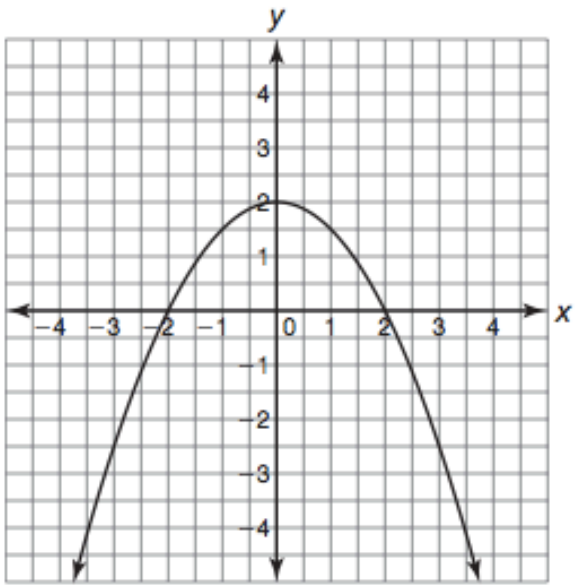
$h(x) = 4x^2 + 12x + 8$

factored form: _____

x-intercepts: _____

13. Label each as linear or quadratic. Then identify *x*-intercepts.

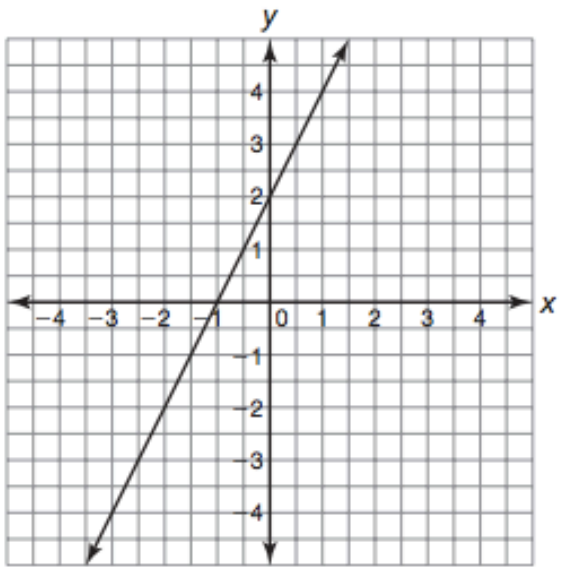
a.



Type of graph: _____

x-intercept(s): _____

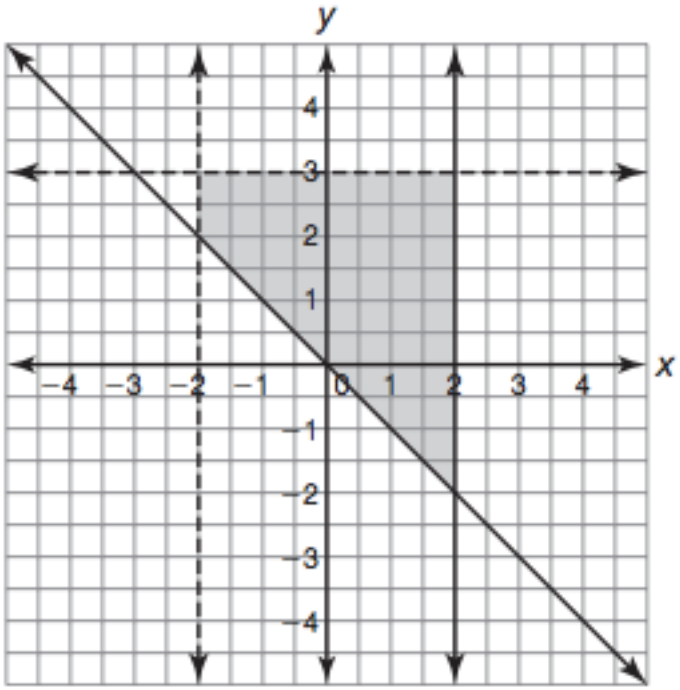
b.



Type of graph: _____

x-intercept(s): _____

14. Write a system of linear inequalities that is represented by the graph.



Name ANSWER KEY Date SUMMER '18

Algebra I Summer Packet

PART ONE

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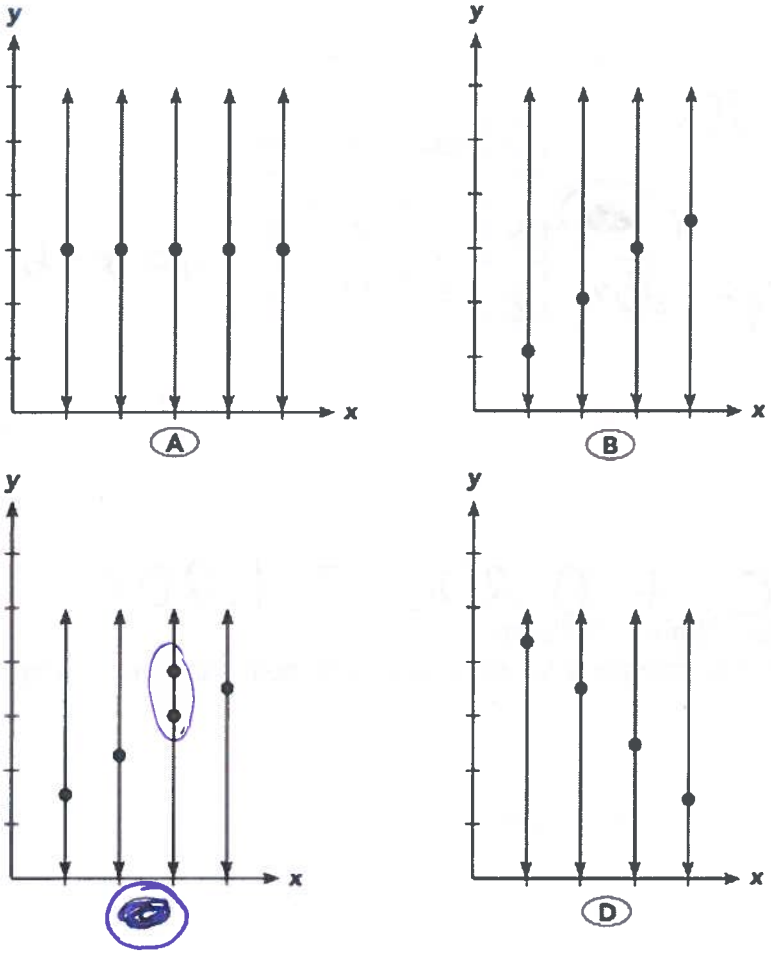

$\frac{1}{4}x = y - 8$

$+8 \qquad +8$

2. The equation $\frac{1}{4}x = y - 8$ has _____.

(A) a negative slope
(B) a y-intercept whose coordinates are (0, −8)
(C) the point (4, 9) lying on the graph
(D) a slope of 0

$y = \frac{1}{4}x + 8$

slope $= \frac{1}{4}$

y-intercept $= 8$

3. Which equation represents a linear relationship?

(A) $y = 3x$ (B) $x^2 = 3$ (C) $y = x^2$ (D) $y^3 = x^2$

4. Which of the following tables represents a linear relationship?
Select ALL correct responses!

(A)

x	5	10	20
y	125	250	500

$y = 25x$

(B)

x	50	20	10
y	100	250	50

(C)

x	5	10	20
y	−125	−250	−500

$y = -25x$

(D)

x	2	4	6
y	8	10	12

$y = x + 6$

$c + 0.20c = 1.20c$

5. Robert has to pay the price of his meal (c) plus a 20% tip.
Which of the following expressions shows the price he will pay for his meal including the tip?
Select ALL correct responses!

A) $1.2c$

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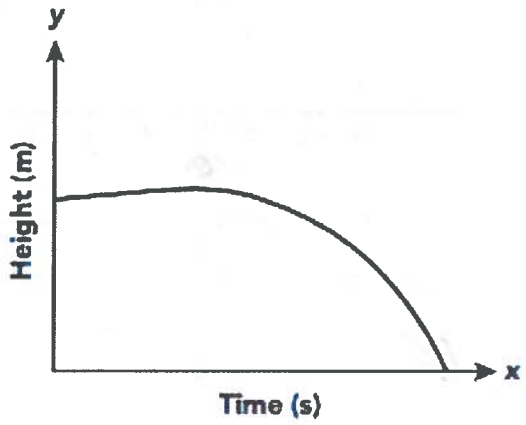
6. The graph shows the height, *y meters*, of a baseball *x seconds* after it is thrown from Ms. Welsh's arm.



a) Describe this relation as a many-to-one, one-to-one, one-to-many, or many-to-many.

This is a one-to-one relation, because every input (s) has exactly one output (m).

b) Tell whether the relation is a function. Justify your answer.

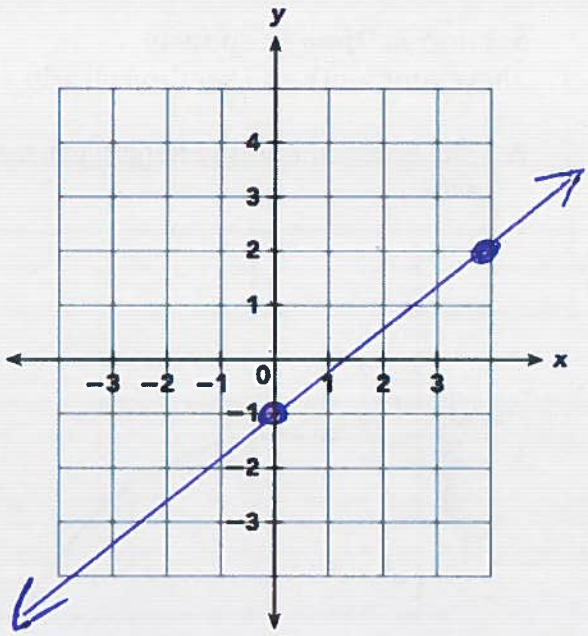
This relation is a function because every input has exactly one output.

7. Find the slope of the line that passes through the following points:

A (4, 8) and B (2, 0)

$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8-0}{4-2} = \frac{8}{2} = 4$$

8. Sketch a graph of a line that is parallel to $4y - 3x = 8$ and has a y-intercept of -1.



$4y - 3x = 8$

$+3x \quad +3x$

$\frac{4y}{4} = \frac{3x}{4} + \frac{8}{4}$

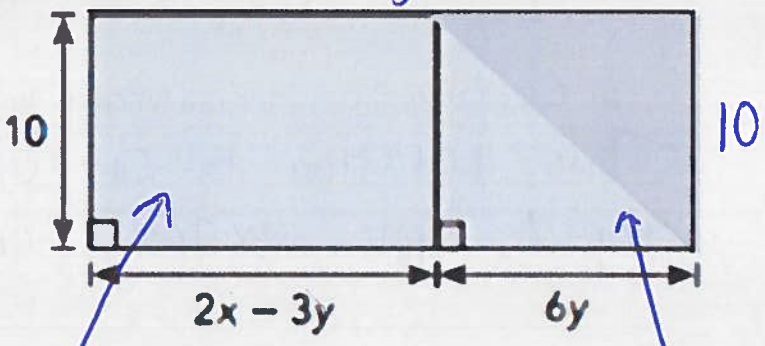
$y = \frac{3}{4}x + 2$

parallel slope

y-intercept = -1

9. Write an expression for the area of the whole rectangular figure.

Then expand and simplify.



Area = length · width

$10(2x - 3y)$

$20x - 30y$

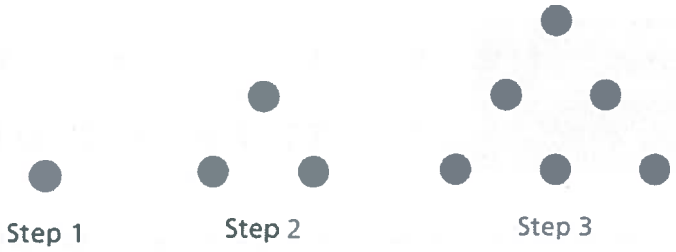
$10(6y)$

$60y$

$20x - 30y + 60y$

$= 20x + 30y$

10. The party room at a miniature golf course is decorated with golf ball patterns such as the one below.



a. Complete the table to show the number of golf balls in the next 5 steps of the pattern. (Draw them to help you).

Golf Ball Pattern

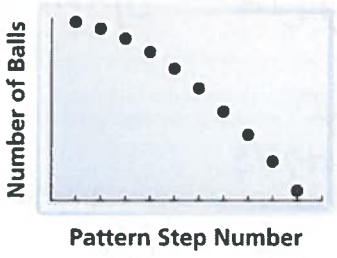
Pattern Step Number	1	2	3	4	5	6	7	8
Number of Balls Used	1	3	6	10	15	21	28	36

b. Is the relationship linear? Explain why or why not.

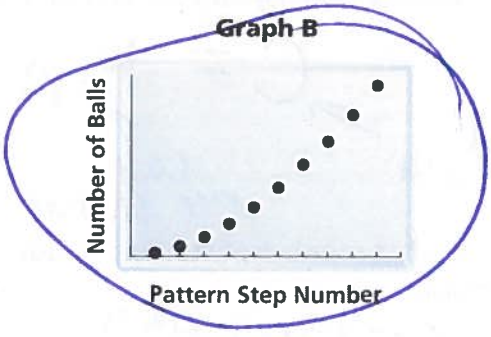
This relationship is nonlinear because each step the number of balls increases at an inconsistent rate.

c. Circle the graph that matches the pattern relating *number of balls used* to *pattern step number*.

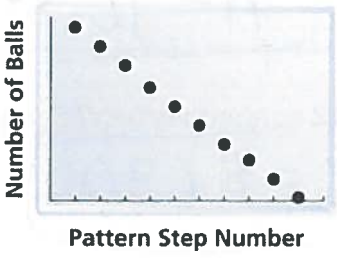
Graph A



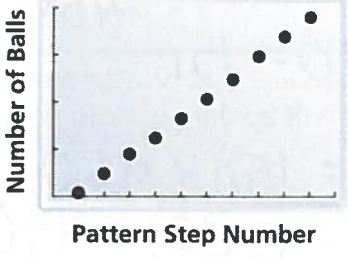
Graph B



Graph C



Graph D

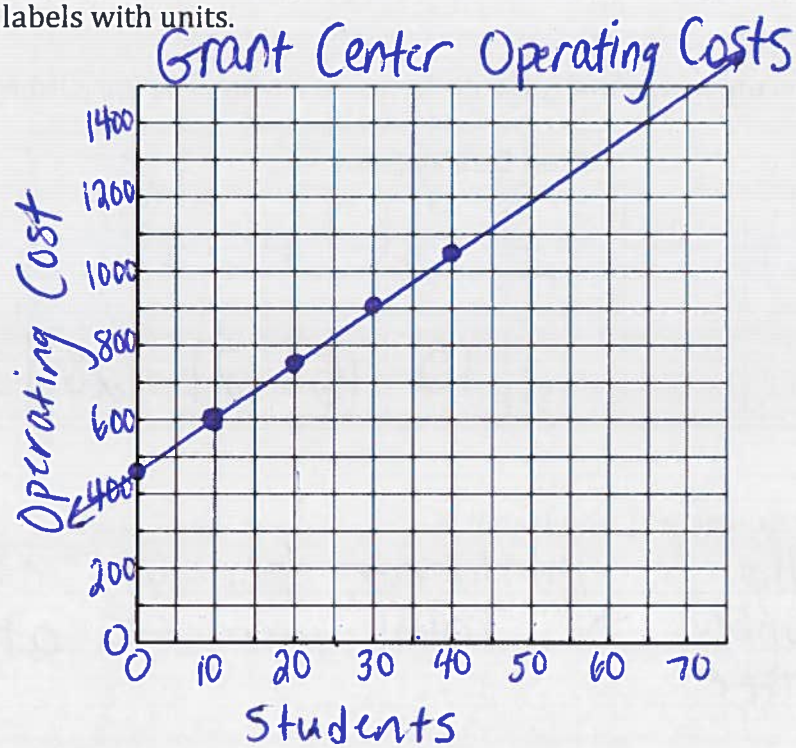


11. The Grant Center has operating costs of $450 a day just to open. Additionally, it costs $150 a day per group of 10 students as shown in the table below.

1 student = $15

Number of Students	0	10	20	30	40
Daily Operating Cost	$450	$600	$750	$900	$1,050

a. Make a graph of the data (number of students, operating cost). Include a title, scale, and axis labels with units.



b. Write an equation showing how the operating cost, C, depends on the number of students, n. Label each term in your equation to show what it represents.

$C = 15n + 450$ ← opening cost

Total cost → C; cost per student → 15; # of students → n

c. For what number of student visitors will the daily operating cost be $690? Show your work.

$C = 15n + 450$

$690 = 15n + 450$

$-450 \qquad -450$

$240 = 15n$

$\frac{240}{15} = \frac{15n}{15}$

$n = 16$ students

d. What will be the operating cost on a day with 12 student visitors? Show your work.

$C = 15n + 450$

$C = 15(12) + 450$

$C = 180 + 450$

$C = \$630$

PART TWO

Section 1: Multiple Choice

Show your work in the blank space. Then select the best answer for each question. You may receive partial credit for an incorrect response if you have shown some valid work.

12. What is the greatest common factor of the polynomial?
$24x^3 - 16x + 68x$?

a. 4

b. $4x$

c. 16

d. $16x$

13. Which is equivalent to the expression?
$(3x - 14)^2$

a. $9x^2 - 84x + 196$

b. $9x^2 + 84x + 196$

c. $9x^2 + 196$

d. $9x^2 - 196$

$(3x-14)(3x-14)$

$9x^2 - 42x - 42x + 196$

$-84x$

14. Which is the absolute maximum of the function $f(x) = -x^2 + 4x$?

a. $(-2, -4)$

b. $(0, 0)$

c. $(2, 4)$

d. $(4, 2)$

15. What are the x-intercepts of the function $f(x) = -4x^2 - 16x - 12$?

a. (1, 0) and (3, 0)

b. $(-1, 0)$ and $(-3, 0)$

c. $(-4, 0)$ and $(-12, 0)$

d. (4, 0) and (12, 0)

$-4(x^2 + 4x + 3)$

$-4(x+1)(x+3)$

16. Which of these functions has a y-intercept of (0, 7)?

a. $f(x) = x^2 + 2x + 7$

b. $f(x) = 7x^2 - 3x + 1$

c. $f(x) = 7(x - 1)(x + 5)$

d. $f(x) = 3x(x - 7)$

17. Which function represents a parabola that opens downward and intersects the x-axis at (3, 0) and (−4, 0)?

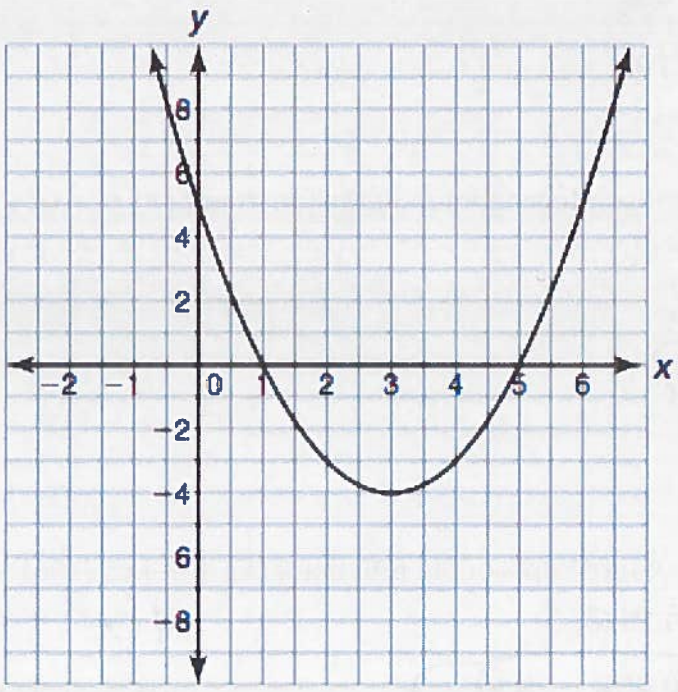
a. $f(x) = -7(x - 3)(x + 4)$

b. $f(x) = -6(x + 3)(x - 4)$

c. $f(x) = 8(x - 3)(x + 4)$

d. $f(x) = 2(x + 3)(x - 4)$

18. What is the interval of increase for the function represented by the graph?



a. $(-\infty, -4)$

b. $(-\infty, 3)$

c. $(-4, \infty)$

d. $(3, \infty)$

Section 2: Open Response

Show your work and solution clearly. Label units when necessary.

8. Determine the solution to each system of equations:

a. $\begin{cases} 3x - y = 5 \\ 2x + 7y = -12 \end{cases}$

$y = 3x - 5$

$2x + 7(3x-5) = -12$

$2x + 21x - 35 = -12$

$+35 \quad +35$

$\frac{23x}{23} = \frac{23}{23}$

$x = 1$

$y = 3(1) - 5$

$y = 3 - 5$

$y = -2$

$(1, -2)$

b. $\begin{cases} -2x = -10y - 2 \\ -x + 8y = 5 \end{cases}$

$x = 5y + 1$

$-(5y+1) + 8y = 5$

$-5y - 1 + 8y = 5$

$+1 \quad +1$

$\frac{3y}{3} = \frac{6}{3}$

$y = 2$

$x = 5(2) + 1$

$x = 10 + 1$

$x = 11$

$(11, 2)$

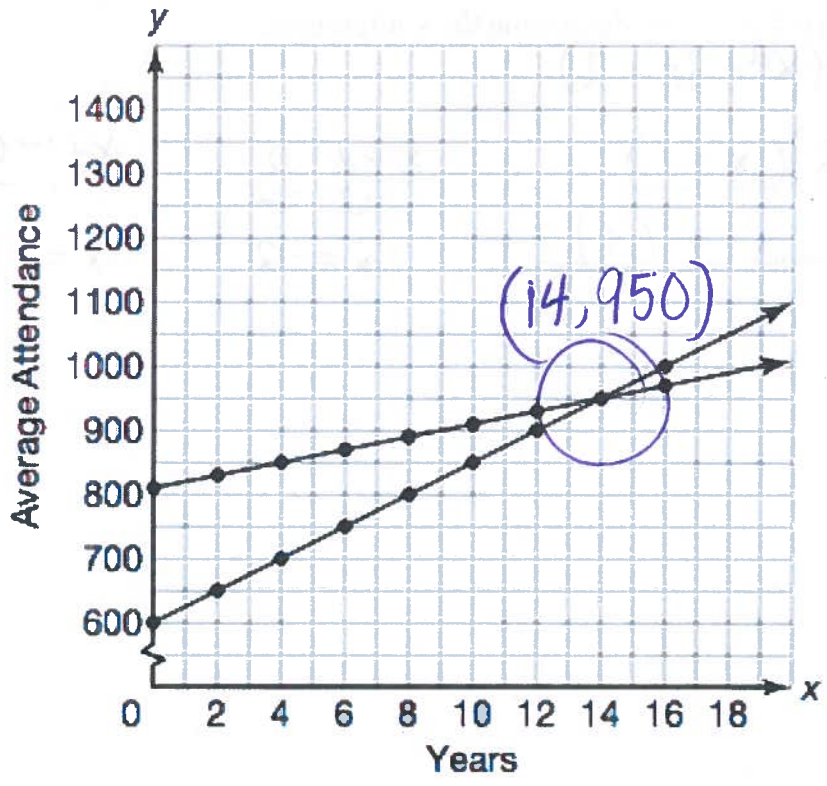
9. A new business is hiring managers and employees. The company needs **at least** 20 managers and **no more than** 500 employees. A total of at least 400 people must be hired. Write a system of linear inequalities to represent the constraints of this situation. Let x represent the number of managers and let y represent the number of employees.

x = managers

y = employees

$$\begin{cases} x + y \geq 400 \\ x \geq 20 \\ y \leq 500 \end{cases}$$

10. The graph shows the average attendance for two schools. What does the solution $x = 14$ represent?



After 14 years, both schools will have the same attendance of 950 students.

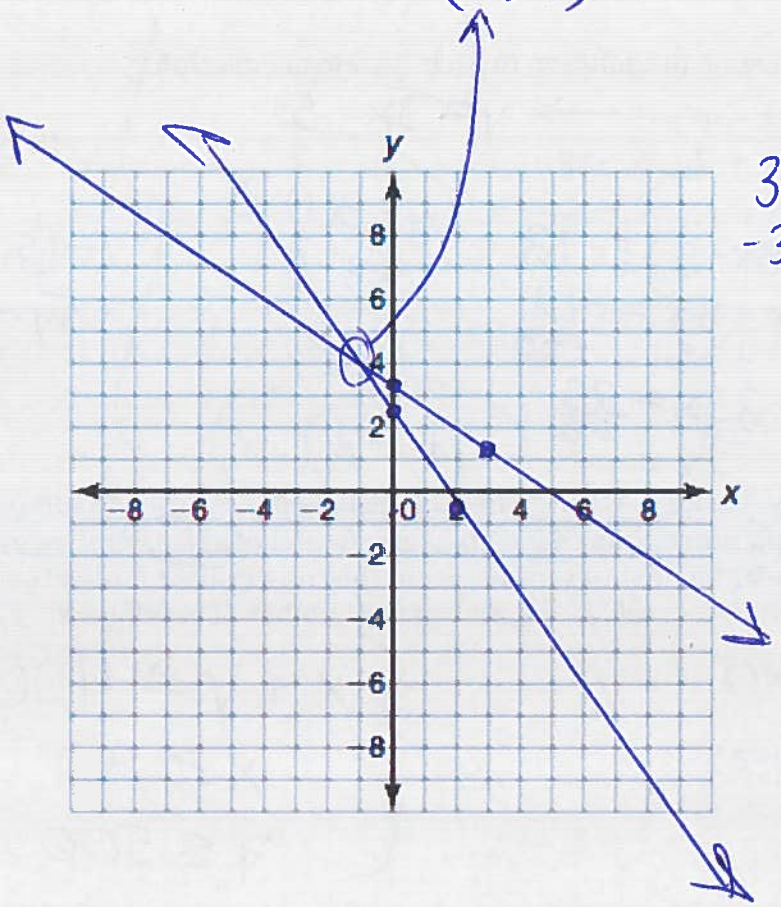
11. Graph the system of equations. Determine the solution. $(-1, 4)$

$$\begin{cases} 2x = 10 - 3y \\ 3x + 2y = 5 \end{cases}$$

$2x = 10 - 3y$
$-10 \quad -10$

$\frac{-3y}{-3} = \frac{2x}{-3} - \frac{10}{-3}$

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



$3x + 2y = 5$
$-3x \quad -3x$

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

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

12. Write the function in factored form. Then determine the x-intercepts.

$h(x) = 4x^2 + 12x + 8$ $\quad 4(x^2 + 3x + 2)$

factored form: $4(x+2)(x+1)$

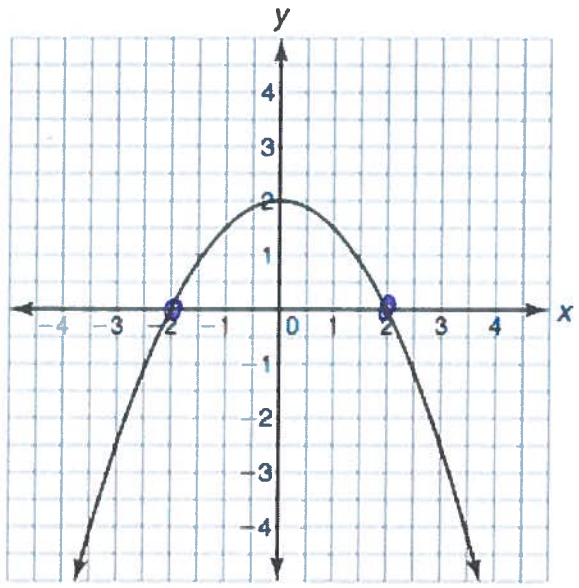
x-intercepts: $(-2, 0)$ and $(-1, 0)$

$x + 2 = 0$
$-2 \quad -2$
$x = -2$

$x + 1 = 0$
$-1 \quad -1$
$x = -1$

13. Label each as linear or quadratic. Then identify *x*-intercepts.

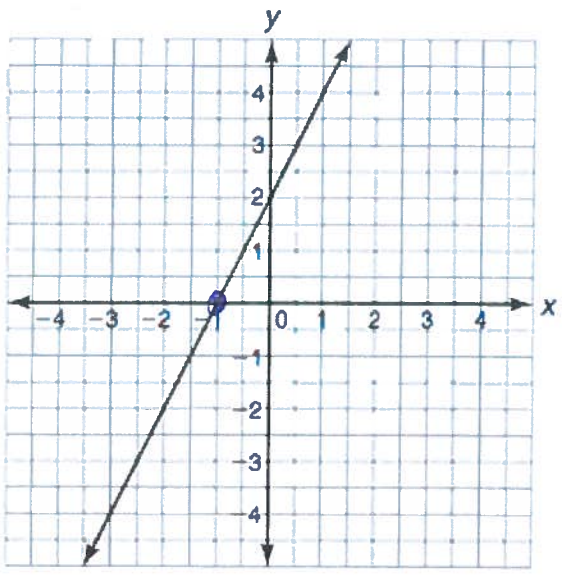
a.



Type of graph: Quadratic

x-intercept(s): (-2, 0) and (2, 0)

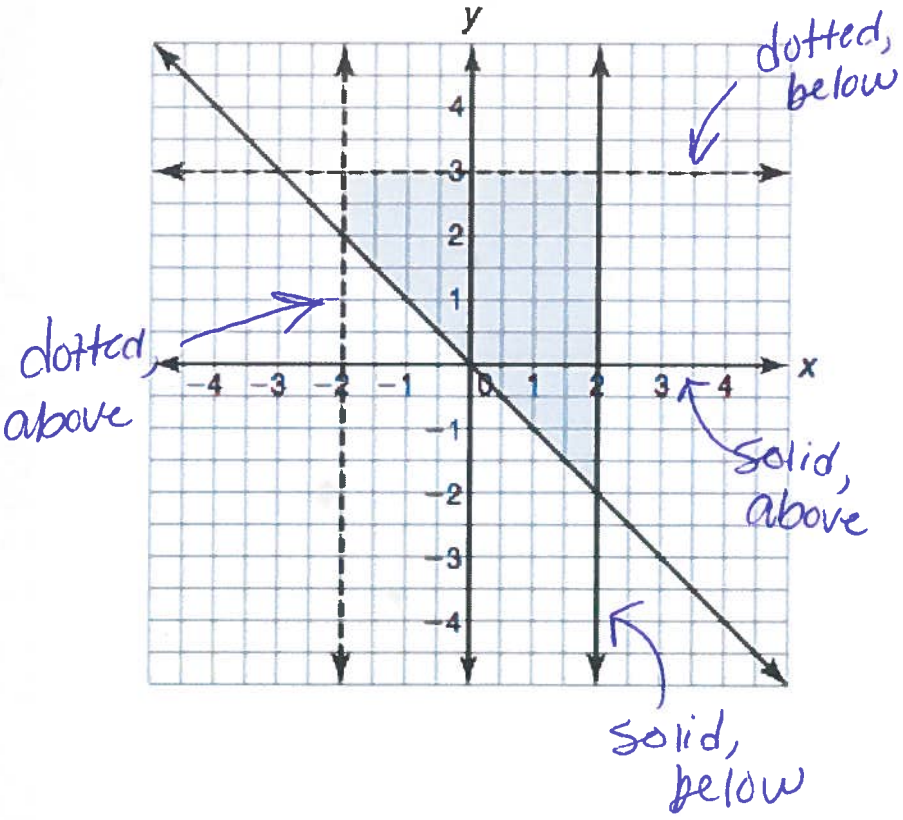
b.



Type of graph: Linear

x-intercept(s): (-1, 0)

14. Write a system of linear inequalities that is represented by the graph.



$$\begin{cases} y < 3 \\ y \geq 0 \\ x > -2 \\ x \leq 2 \end{cases}$$