

Name: _____

Date: _____

Study Guide for Semester 1 Final

Please show your work. Solutions will be posted on the website: imaurer.weebly.com

Order of Operations:

1. $5 + (7 - 3) - 2 \cdot 4 =$

$5 + 4 - 8 = 9 - 8 = 1$

2. $3 - 3 \cdot 4 + 5 \cdot (7 - 3) =$

$3 - 12 + 5 \cdot 4 = 3 - 12 + 20 = -9 + 20 = 11$

3. $10 - 3 \cdot 2 + 4 \cdot 3 =$

$10 - 6 + 12 = 4 + 12 = 16$

Use parentheses to make the expression equal 3 different whole numbers

4. $(12 - 4 \cdot 3 + 8/2) =$

$(12 - 12 + 4) = (0 + 4) = 4$

5. $12 - 4 \cdot (3 + 8/2) =$

$12 - 4 \cdot (3 + 4) = 12 - 4(7) = 12 - 28 = -16$

6. $(12 - 4) \cdot 3 + 8/2 =$

$8 \cdot 3 + 4 = 24 + 4 = 28$

Solving 2-step Linear Equations

1.

a. $6x + 3 = 21$

a) $6x + 3 = 21$
 $\quad -3 \quad -3$
 $6x = 18$
 $\quad \underline{6 \quad 6}$
 $x = 3$

b. $7(x - 1) = 35$

b) $7(x - 1) = 35$
 $\quad \underline{7 \quad 7}$
 $x - 1 = 5$
 $\quad +1 \quad +1$
 $x = 6$

c. $\frac{x - 3}{5} = -3$

c) $\frac{x - 3}{5} = -3.5$
 $x - 3 = -15$
 $\quad +3 \quad +3$
 $x = -12$

d. $\frac{x}{3} - 5 = 3$

d) $\frac{x}{3} - 5 = 3$
 $\quad +5 \quad +5$
 $\frac{x}{3} = 8$
 $\quad \underline{3 \quad 3}$
 $x = 24$

2. I bought 12 boxes of voodoo donuts for my class (because I'm just that nice). I also bought a coffee for \$2.50. I spent \$74.50 in total. How much does a box of donuts cost?

$x =$ cost of donuts

$12x + 2.50 = 74.50$
 $\quad -2.50 \quad -2.50$

$12x = 72$
 $\quad \underline{12 \quad 12}$

$x = 6$

Donuts cost \$6 per box

3. I worked for a restaurant for 20 hours last week. At the end of the week, I was handed \$55 in cash for tips. Altogether, I earned \$285. How much do I earn each hour?

$x =$ wages per hour

$20x + 55 = 285$
 $\quad -55 \quad -55$

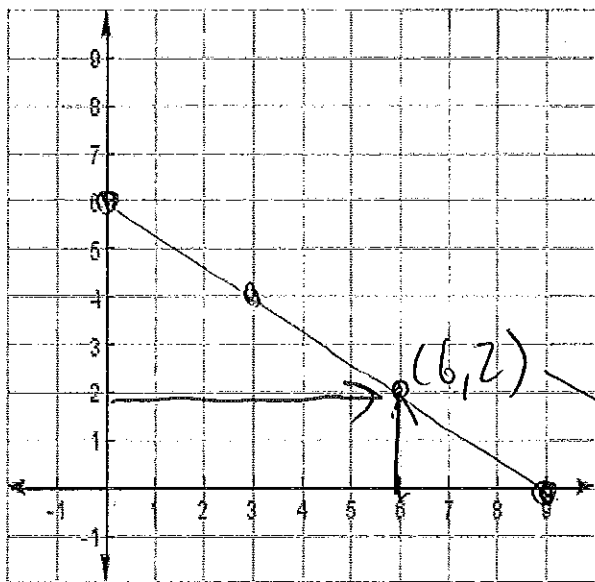
$20x = 230$
 $\quad \underline{20 \quad 20}$

$x = 11.50$

You earn \$11.50 per hour

Multiple Representations of Linear Equations

- 1) a) You own a bike shop with only bicycles and tricycles, and there are 18 total wheels in your showroom. Write a linear equation to model this situation. $x = \text{bikes}, y = \text{trikes}$
 b) Graph your equation. c) Create a table to model the situation.



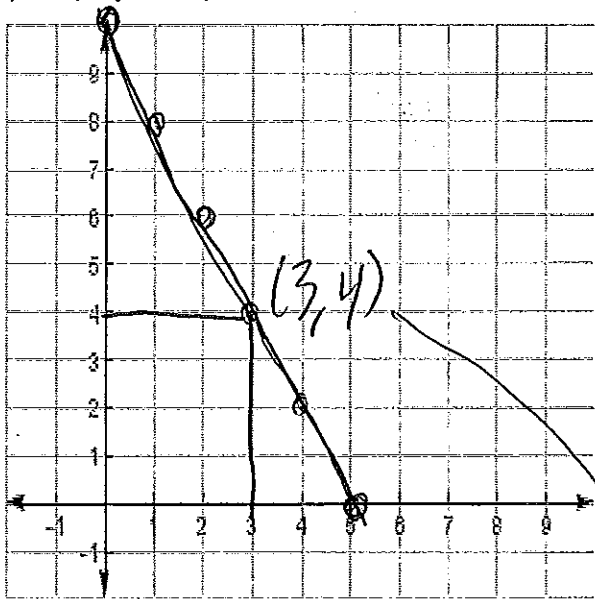
$$2x + 3y = 18$$

x	y
9	0
6	2
3	4
0	6

- d) If there are 6 bicycles, how many tricycles are there?

2 tricycles

- 2) a) You start with 10 cupcakes and give 2 cupcakes to each of your friends. Write a linear equation to model this situation. $x = \text{friends}, y = \text{cupcakes}$
 b) Graph your equation. c) Create a table to model the situation.



$$y = 10 - 2x$$

x	y
0	10
1	8
2	6
3	4
4	2
5	0

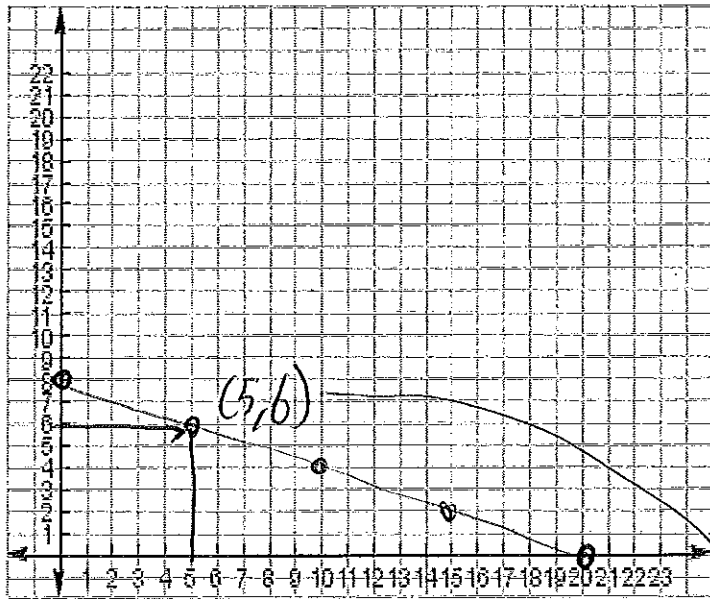
- d) If you end with 4 cupcakes, how many friends do you have?

3 friends

3) You sell hats for 4 dollars and shirts for 10 dollars. You sell a total of \$80 of swag. Write a linear equation to model this situation.

b) Graph your equation.

c) Create a table to model the situation.



$$4x + 10y = 80$$

x	y
0	8
5	6
10	4
15	2
20	0

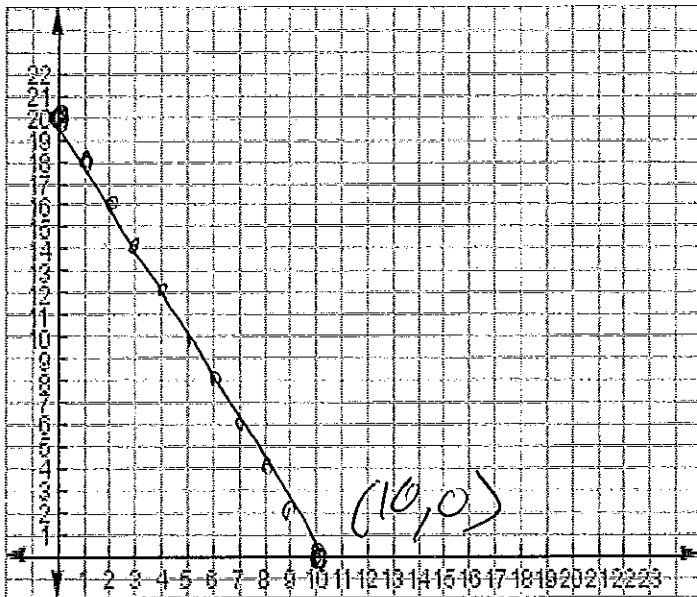
d) If you sell 5 hats, how many shirts did you sell?

6 shirts

4) You buy 12 large pizzas and 6 small pizzas. The total cost is \$120. Write a linear equation to model this situation.

b) Graph your equation.

c) Create a table to model the situation.



$$12x + 6y = 120$$

x	y
0	20
1	18
2	16
3	14
⋮	⋮
10	0

d) If a large pizza costs 10 bucks, how much does a small pizza cost? Does this answer make sense?

\$0 - No. Why free pizza?

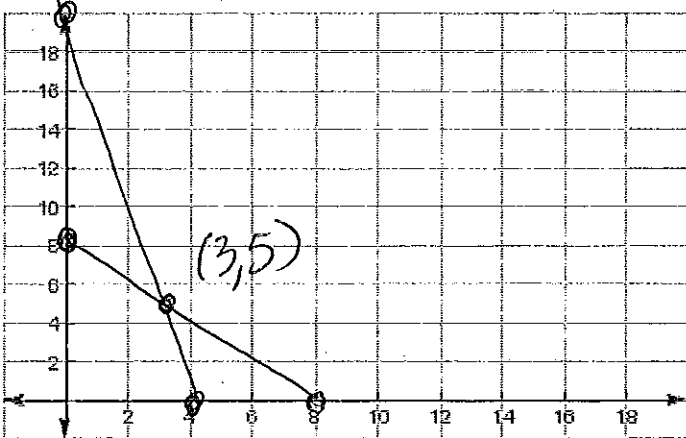
Graphing Systems of Linear Equations

$x = \text{hot dogs}, y = \text{hamburgers}$

1. a. You buy 10 hot dogs and 2 hamburgers for \$40. Your friend buys 2 hot dogs and 2 hamburgers for \$16. Write a system of equations to represent this situation. Define your variables.

$$\begin{aligned} 10x + 2y &= 40 && (4,0) \&\& (0,20) \\ 2x + 2y &= 16 && (8,0) \&\& (0,8) \end{aligned}$$

- b. Graph both equations on the graph below.



- c. Where do the two lines intersect? $(3, 5)$
 d. What would be the cost of 3 hot dogs and 5 hamburgers?

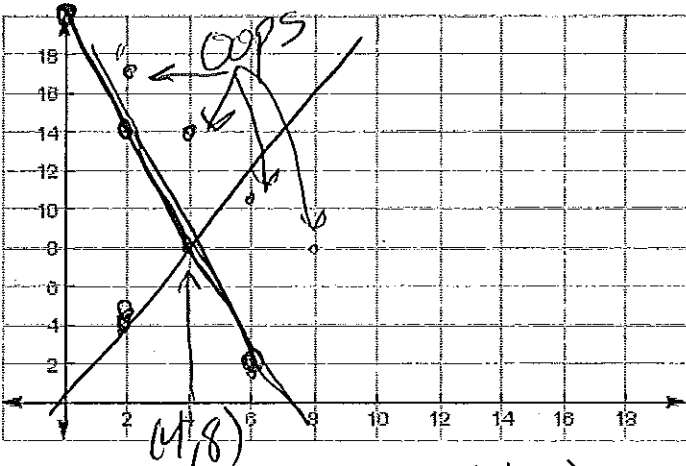
$$3(3) + 5(5) = 9 + 25 = 34$$

- 2a. I start with 20 pieces of swag and lose 3 pieces every day. My brother starts with 0 pieces and gains 2 every day. Write a system of equations to represent this situation. Define your variables.

- b. Graph both equations on the graph below.

$x = \text{days}, y = \text{swag}$

$$\begin{aligned} y &= 20 - 3x \\ y &= 0 + 2x \end{aligned}$$



- c. Where do the two lines intersect? $(4, 8)$
 d. When will my brother have *twice* as much swag as me?

On day 5. I have $20 - 3 \cdot 5 = 5$,
 he has $0 + 2 \cdot 5 = 10$.

Solving Systems of Linear Equations

Solve each system of equations for X AND Y. Use any method.

1. $y = 6x - 13$
 $y = -12x + 23$

$$\begin{array}{r} 6x - 13 = -12x + 23 \\ +12x \qquad \qquad +12x \\ \hline 18x - 13 = 23 \\ 18x = 36 \\ \hline x = 2 \end{array}$$

$$y = 6(2) - 13$$

$$12 - 13 = -1$$

$$y = -12(2) + 23$$

$$-24 + 23 = -1$$

2. $y = 17 - 3x$
 $y = -2x + 11$

$$\begin{array}{r} 17 - 3x = -2x + 11 \\ +3x \qquad +3x \\ \hline 17 = x + 11 \\ -11 \qquad -11 \\ \hline 6 = x \end{array}$$

$$y = 17 - 3(6)$$

$$17 - 18 = -1$$

$$y = -2(6) + 11$$

$$-12 + 11 = -1$$

$(2, -1)$

$(6, -1)$

3. $4x + 3y = 3$
 $5y - 4x = 37$

Rewrite: $4x + 3y = 3$
 $-4x + 5y = 37$

$$\begin{array}{r} 4(3x + 5y = 1) \\ -3(4x + 7y = 0) \\ \hline 12x + 20y = 4 \\ -12x - 21y = 0 \\ \hline 8y = 4 \\ \hline y = 0.5 \end{array}$$

$$y = 5$$

$$4x + 3(5) = 3$$

$$4x + 15 = 3$$

$$4x = -12, x = -3$$

$$4x + 3(5) = 3$$

$$4x + 15 = 3$$

$$4x = -12, x = -3$$

$(-3, 5)$

$$-1y = 4$$

$$y = -4$$

$$3x + 5(-4) = 1$$

$$3x - 20 = 1$$

$$3x = 21, x = 7$$

$(7, -4)$

Systems of Equations Word Problems

1. You and your 5 best friends go to the movies at Lloyd center. For some reason, the prices are not given for red Icee drinks and large Milk Duds. The cashier tells you that 5 red Icees and 4 large Milk Duds will cost \$35.50. He also says that 7 red Icees and 3 large Milk Duds will cost \$41.25. You volunteer to figure out the prices because you want to show off your math skillz.

- What is the price of one red Icee?
- What is the price of one Milk Dud?
- If you and your friends each buy 1 red Icee and 2 Milk Duds, how much will your group pay in total?

$x = \text{red Icee}$
 $y = \text{Milk Dud}$

$$\begin{array}{r} 5(5x + 4y = 35.50) \longrightarrow 15x + 20y = 106.50 \\ -4(7x + 3y = 41.25) \longrightarrow -28x - 12y = -165 \\ \hline -13x = -58.5 \end{array}$$

$$-13x = -58.5$$

$$5(4.5) + 4y = 35.50$$

$$22.5 + 4y = 35.5$$

$$4y = 13, y = 3.25$$

$x = 4.5$
 Icees cost \$4.50, Milk Duds cost \$3.25. Me & 5 Friends will spend \$66

2. You've got a summer job working at the fair selling balloons and stuffed animals. You don't think the manager has set the prices in the best way. You do a little research and find out two things. At the current prices, you will sell 12 balloons and 8 stuffed animals for \$60. If you reduce the price of a balloon by \$1 and double the price of the stuffed animal, the 12 balloons and 8 stuffed animals will sell for \$72.

$x = \text{balloons}, y = \text{stuffed animals}$

$$12x + 8y = 60$$

$$12(x-1) + 8(2y) = 72$$

Continued on next page

$12x + 8y = 60$
 $12(x-1) + 8(2y) = 72$
 $12x - 12 + 16y = 72$
 $12x + 16y = 84$
 $5 \cdot 2 + 9 \cdot 6 = \64

What is the original price of a balloon?
 What is the original price of a stuffed animal?
 If you sell 5 balloons and 9 stuffed animals at the NEW price, how much do you make?

$12x + 16y = 84$
 $-(12x + 8y = 60)$
 $8y = 24$
 $y = 3$
 $12x + 8(3) = 60$
 $12x + 24 = 60$
 $12x = 36$
 $x = 3$

5. You're going to a basketball game with a student discount. If 6 students and 4 adults go, it will cost \$216. If 5 students and 8 adults go, it will cost \$306.

- Find the cost of a student ticket. \$18
- Find the cost of an adult ticket. \$27
- If 8 students and 3 adults go, how much will it cost?

$-2(6x + 4y = 216) \rightarrow -12x - 8y = -432$
 $5x + 8y = 306 \rightarrow 5x + 8y = 306$
 $-7x = -126$
 $x = 18$

Remember to define your variables and to verify your solution.

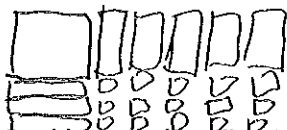
$8 \cdot 18 + 3 \cdot 27 = \225

$5(18) + 8y = 306$
 $90 + 8y = 306$
 $8y = 216$
 $y = 27$

Factoring and Multiplying Quadratics

For each problem, write the answer AND draw a sketch of the tiles

1. Use algebra tiles to multiply $(x + 3)(x + 5)$



$x^2 + 8x + 15$

2. Use algebra tiles to multiply $(x - 2)(x + 4)$



$x^2 + 2x - 8$

3. Use algebra tiles to multiply $(x - 3)(x - 3)$



$x^2 - 6x + 9$

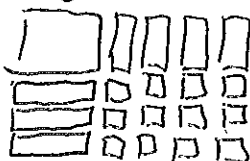
For each problem, write the answer AND draw a sketch of the tiles

1. Use algebra tiles to factor $x^2 + 4x + 3$



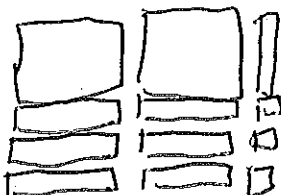
$(x+3)(x+1)$

2. Use algebra tiles to factor $x^2 + 7x + 12$



$(x+4)(x+3)$

3. Use algebra tiles to factor $2x^2 + 7x + 3$



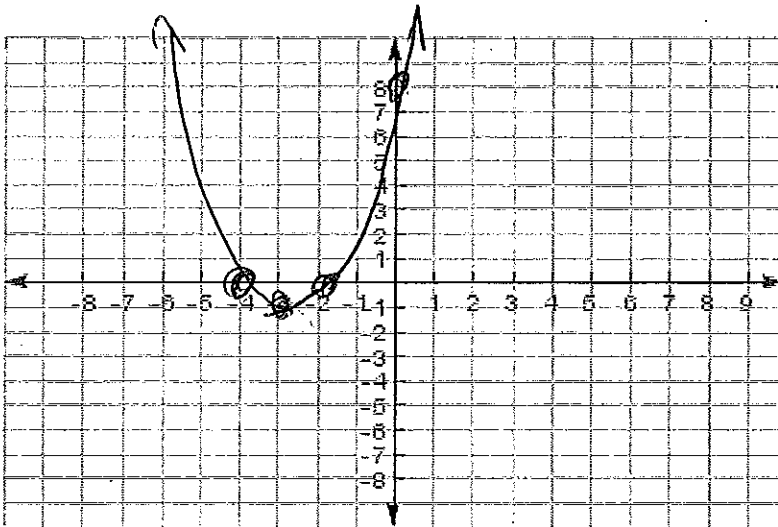
$(2x+1)(x+3)$

Graphing Quadratics

Graphing Quadratics Quiz

Name: _____

1. Draw a graph of $y = x^2 + 6x + 8$. Label the zeros, y-intercept, and vertex.



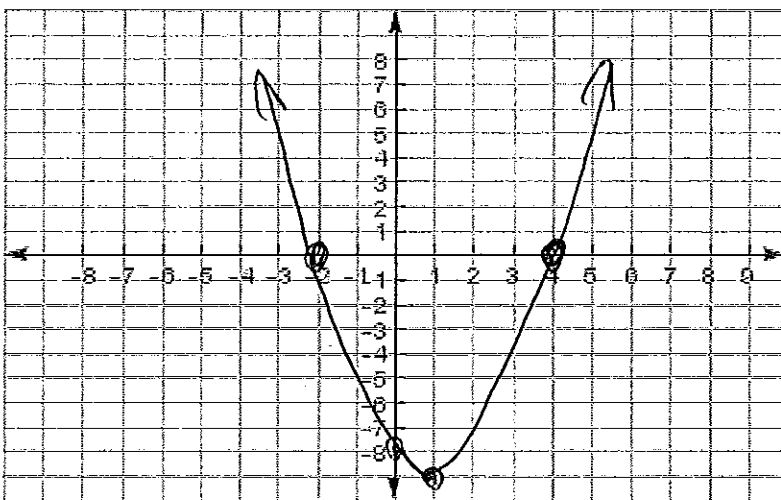
$$(x+4)(x+2)$$
$$x = -4, x = -2$$

$$h = \frac{-4 + -2}{2} = \frac{-6}{2} = -3$$

$$k = (-3+4)(-3+2)$$
$$(1)(-1) = -1$$

$$V: (-3, -1)$$

2. Draw a graph of $y = x^2 - 2x - 8$. Label the zeros, y-intercept, and vertex.



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

$$x = 4, x = -2$$

$$h = \frac{4 + -2}{2} = \frac{2}{2} = 1$$

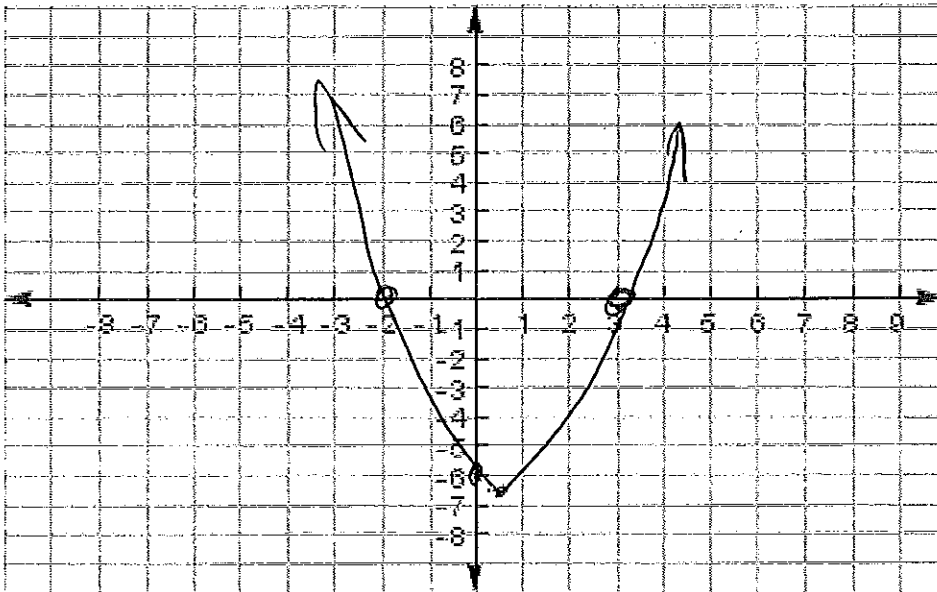
$$k = (1-4)(1+2)$$

$$(-3)(3)$$

$$-9$$

$$V: (1, -9)$$

3. Draw a graph of $y = (x - 3)(x + 2)$. Label the zeros, y-intercept, and vertex.



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

$$x = 3, x = -2$$

$$h = \frac{3 + (-2)}{2} = \frac{1}{2}$$

$$k = (h - 3)(h + 2)$$

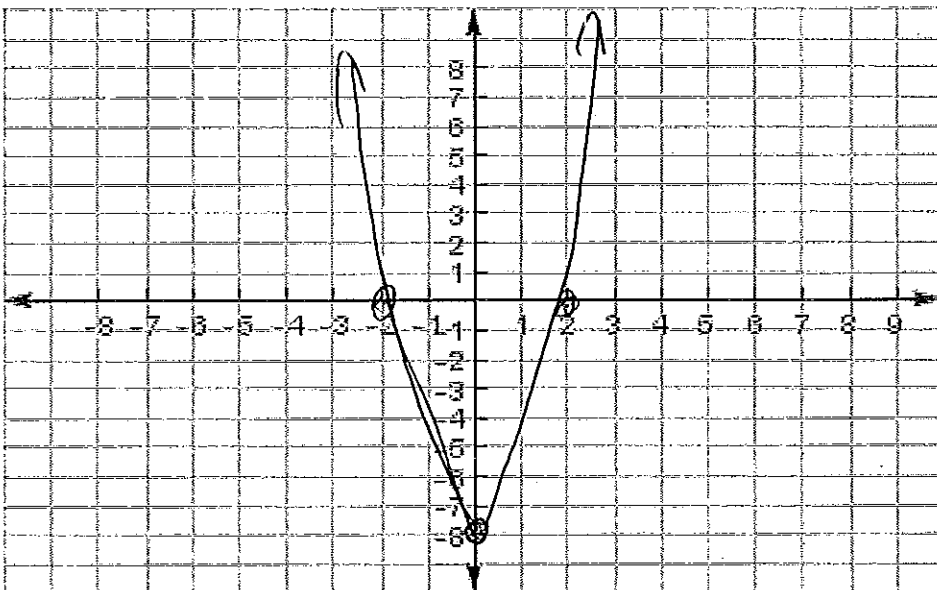
$$(-2.5)(2.5)$$

$$-6.25$$

$$V: (h, k)$$

$$V: (0.5, -6.25)$$

4. Draw a graph of $y = (2x - 4)(x + 2)$. Label the zeros, y-intercept, and vertex.



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

$$2x = 4 \quad x = -2$$

$$x = 2$$

$$h = \frac{2 + (-2)}{2} = \frac{0}{2} = 0$$

$$k = (2(0) - 4)(0 + 2)$$

$$(-4)(2)$$

$$-8$$

$$V: (0, -8)$$