

review

Grade 9 ( Review)

Email: [rabdulla@uasdubai.ae](mailto:rabdulla@uasdubai.ae)

Office hour: Wednesday after school, every day from 6-7:30 am and at lunch time.

Test Day: January 18, 2017

Unit 2: Collecting Like Terms

Simplify:

•  $x + x + y + y + y = 2x + 3y$

•  $x + 2x^2 + x^2 = x + 3x^2$

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Unit 2: Distribution Law

Solve: Expand

•  $2(x + 3) =$   
 $2x + 6$

•  $4(2 - x) =$   
 $8 - 4x$

•  $-3(3 - 3x) =$   
 $-9 + 9x$

•  $-7(5 - 4x) =$   
 $-35 + 28x$

**Open-Ended** Suppose you used the Distributive Property to get the expression  $12x + 3y - 9$ . With what expression could you have started?

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$3(4x + y - 3)$

Unit 2: Equations Involving Fractions

Solve:

•  $\frac{x+5}{3} = \frac{2x+2}{2}$

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

$10(x + \frac{1}{2}) = 3x + 5 + 7x$

$10x + 5 = 3x + 5 + 7x$

$10x + 5 = 10x + 5$   
 $-10x - 5 \quad -10x - 5$

$0 = 0$   
 $\frac{1}{4} + \frac{1}{2}t = 4$

$\frac{1}{2}t = 4 - \frac{1}{4}$

$2x + 10 = 6x + 6 \quad | \quad x = 1$   
 $-2x \quad -6 \quad -2x \quad -6$   
 $4 = 4x$   
 $\frac{4}{4} = \frac{4x}{4}$   
 $1 = x$

$n - 1 = 17(2)$

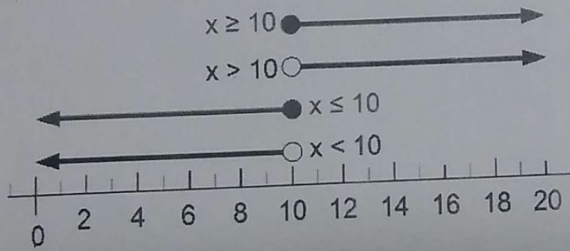
$n = 34 + 1$   
 $n = 35$

$\frac{1}{3}(c - 2) = \frac{7}{3}$

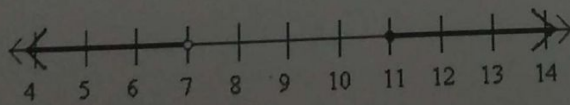
$3 \times \frac{1}{3}(c - 2) = \frac{7}{3} \times 3$

$c - 2 = 7$   
 $c = 9$

Unit 2: Inequalities/Graphing



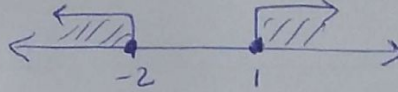
- Open dot or closed dot?
- Which way does the arrow go?



- What is the inequality here?

$x > 11$   
 or  $x < 7$

How would you solve and draw this?



$$x + 4 \geq 5 \text{ or } x - 3 \leq -5$$

$$x \geq 1 \quad \parallel \quad x \leq -2$$

Solve each inequality.

1.  $2(t + 3) \geq 16$

$$t + 3 \geq 8$$

$$t \geq 5$$

2.  $3(d - 2) - 2d > 16$

$$3d - 6 - 2d > 16$$

$$d - 6 > 16$$

$$d > 22$$

3.  $4h - 8 < 2(h - 1)$

$$4h - 8 < 2h - 2$$

$$-2h - 8 < -2$$

$$2h - 8 < -2$$

$$2h < 6$$

$$h < 3$$

4.  $6y + 10 > 8 - (y + 14)$

$$6y + 10 > 8 - y - 14$$

$$7y > -16$$

$$y > -\frac{16}{7}$$

5.  $4.6(x - 3.4) > 5.1x$

$$x - 3.4 > \frac{5.1}{4.6}x$$

$$x - \frac{5.1}{4.6}x > 3.4$$

$$x < 31.2$$

6.  $-5x - (2x + 3) \geq 1$

$$-5x - 2x - 3 \geq 1$$

$$-7x - 3 \geq 1$$

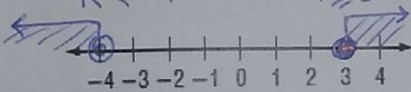
$$-7x \geq 4$$

$$x \leq -\frac{4}{7}$$

Solve each compound inequality. Then graph the solution set.

$$k - 3 < -7 \text{ or } k + 5 \geq 8$$

$$k < -4 \quad \text{or} \quad k \geq 3$$



$$-n < 2 \text{ or } 2n - 3 > 5$$

$$n > -2 \quad \text{or} \quad 2n > 8$$

$$n > 4$$

$2c - 4 > -6$  and  $3c + 1 < 13$

$$2c - 4 > -6$$

$$2c > -2$$

$$c > -1$$

$$3c + 1 < 13$$

$$3c < 12$$

$$c < 4$$

$$5 < 3h + 2$$

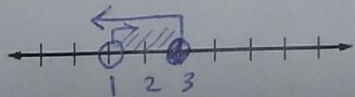
$$3 < 3h$$

$$1 < h$$

$$3h + 2 \leq 11$$

$$3h \leq 9$$

$$h \leq 3$$



Unit 2: Rearranging Formulae

Make y the subject:

$$v = U + ay$$

$$v - U = ay$$

$$\frac{v - U}{a} = y$$

$$ax + by + d = 0$$

$$by = -d - ax$$

$$y = \frac{-d - ax}{b}$$

$$s = 90(n - y) \quad \left\| \quad y + \frac{s}{90} = n \right.$$

$$\frac{s}{90} = n - y \quad \left\| \quad \begin{array}{l} -s/90 \quad -s/90 \\ y = n - \frac{s}{90} \end{array} \right.$$


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$$d^2_x F = \frac{GM y}{d^2} \times d^2$$

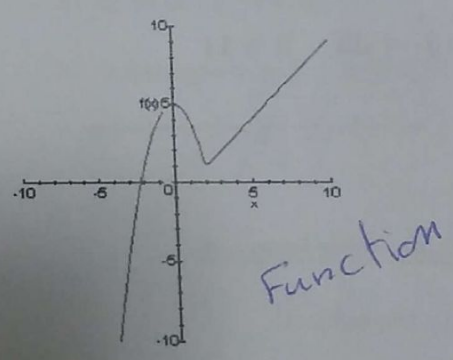
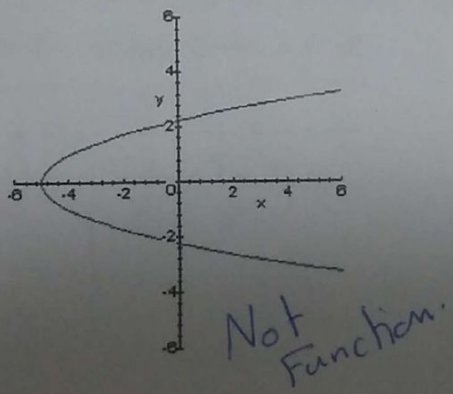
$$\frac{GM y}{GM} = \frac{d^2 F}{GM} \quad \left\| \quad y = \frac{d^2 F}{GM} \right.$$


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$$2ax E = \frac{m(v^2 - y^2)}{2a} \times 2a \quad \left\| \quad \begin{array}{l} 2aE = v^2 - y^2 \\ +y^2 \quad +y^2 \\ 2aE + y^2 = v^2 \end{array} \right. \quad \left\| \quad \begin{array}{l} \sqrt{y^2} = \sqrt{v^2 - 2aE} \\ y = \pm \sqrt{v^2 - 2aE} \end{array} \right.$$

Unit 1: Functions

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Which is a function? Why?

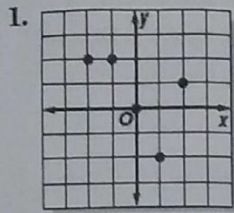
- Vertical Line Test

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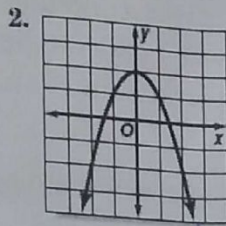
Which is a function? Why?

- F ✓ • One-to-One *every x value has 1-y value*
- NF x • One-to-Many *1-x value has many y values*
- F ✓ • Many-To-One *more than 1-x value have the same y value*
- NF x • Many-To-Many *many x-values have the same y value and no 1-x value has Many y-values.*

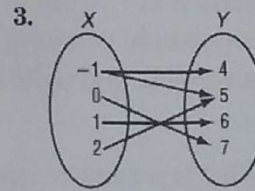
Determine whether each relation is a function.



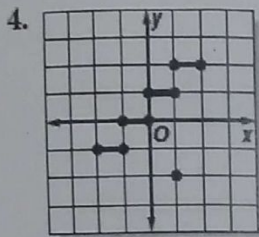
Function



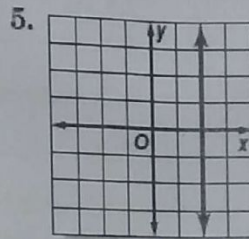
Function



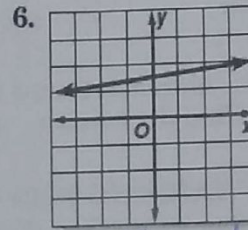
NF



Not Function



Not Function



Function

7.  $\{(4, 2), (2, 3), (6, 1)\}$

Function

8.  $\{(-3, -3), (-3, 4), (-2, 4)\}$

Not Function

9.  $\{(-1, 0), (1, 0)\}$

Function

Unit 1: Formula Construction

Jack pays \$2.50 per pen.

He spends \$17.50.

Write and solve an equation to model this situation.

$$x = \# \text{ pen} \quad 2.5x = 17.50$$

$$x = 7$$

Jill takes a taxi.

The taxi charges \$5 to pick her up and \$3 per km.

The taxi charges \$20.

How far has Jill travelled?

$d = \text{distance}$

$$3d + 5 = 20 \quad \left\| \begin{array}{l} 3d = 15 \\ d = 5 \text{ Km} \end{array} \right.$$

One music download store charges a monthly fee of \$10 plus \$1 per song downloaded. Another music download store charges a monthly fee of \$30 for all the songs you want to download.

$S = \# \text{ of songs}$

a. How many songs would you have to download from the first store for the cost to be the same as the second store?

$$10 + 1S = 30 \quad \left| \begin{array}{l} \text{if you have} \\ \text{to download 20} \\ \text{songs} \end{array} \right.$$

$$S = 20$$

b. If you only download 15 songs per month, from which download store would you buy your music?

1<sup>st</sup> store  $\Rightarrow 15 \times 1 + 10 = \$25$

compared w/ the 2<sup>nd</sup> store \$30

$\therefore$  Buy from 1<sup>st</sup> store

with season pass-cost  $\leftarrow$  without season pass-cost

$$x = \# \text{ of visits} \quad 64 < 5 + 14.5x$$

$$59 < 14.5x$$

$$4 < x$$

you must visit the park more than 4 times to have the season pass a better deal.

A water park offers a season pass for \$64 per person. Without a season pass, admission for the water park is \$14.50 per person, and there is a one-time registration fee of \$5. How many times would you have to visit the water park for the season pass to be a better deal? Define a variable and write an equation for the situation. Then solve.

1. Three is added to a number, and then the sum is multiplied by 4. The result is 16. Find the number.

$$4(3+x) = 16$$

$$3+x = 4$$

$$x = 1$$

2. A number is divided by 4, and the quotient is added to 3. The result is 24. What is the number?

$$\frac{x}{4} + 3 = 24$$

$$\frac{x}{4} = 21$$

$$x = 84$$

3. Two is subtracted from a number, and then the difference is multiplied by 5. The result is 30. Find the number.

$$5(x-2) = 30$$

$$x-2 = 6$$

$$x = 8$$

4. BIRD WATCHING While Michelle sat observing birds at a bird feeder, one fourth of the birds flew away when they were startled by a noise. Two birds left the feeder to go to another stationed a few feet away. Three more birds flew into the branches of a nearby tree. Four birds remained at the feeder. How many birds were at the feeder initially?

Unit 2: Formula by Induction

5, 8, 11, 14, 17...

d=3

Find a formula.

$$n^{\text{th}} \text{ term} = 5 + (n-1)d$$

$$= 5 + (n-1)3$$

$$= 5 + 3n - 3 = 3n + 2$$

What is the 20<sup>th</sup> term?

$$20^{\text{th}} \text{ term} = 3(20) + 2 = 60 + 2 = 62$$

x = total # of birds

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

$$\frac{1}{4}x + 9 = x$$

$$9 = x - \frac{1}{4}x$$

$$9 = \frac{3}{4}x$$

$$\frac{9 \times 4}{3} = x$$

$$12 = x$$

12 birds

Example 1

Self Tutor

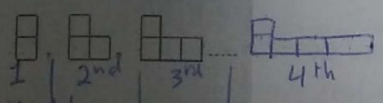
a Complete a table for the first four figures in the pattern:

b Find how many matches are required to make the:

i 10th figure    ii 50th figure

c Write a description of the pattern in words.

d Predict a general rule for finding the number of matches M in the nth figure.



# matches: 4, 7, 10, 13

16

# matches

$$1^{\text{st}} = 7 = 7$$

$$2^{\text{nd}} = 10 = 7 + 3$$

$$3^{\text{rd}} = 13 = 7 + 3 + 3$$

$$4^{\text{th}} = 16 = 7 + 3 + 3 + 3$$

$$n^{\text{th}} = 7 + (n-1)d$$

$$= 7 + (n-1)3$$

$$= 7 + 3n - 3$$

$$n^{\text{th}} = 4 + 3n$$

b) 10<sup>th</sup> Figure =  $4 + 3(10) = 4 + 30 = 34$

50<sup>th</sup> Figure =  $4 + 3(50) = 4 + 150 = 154$

c) @ a certain figure we multiply the number of the figure by 3 and then add 4.

d)  $M = 4 + 3n$

Unit 1: Domain & Range

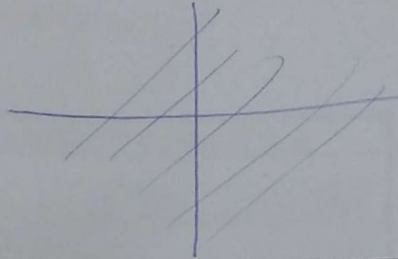
- Domain = x values
- Range = y values

How do you write Domain & Range?

Example:

$D = \{ \mid 0 \leq x \leq 4 \}$

$R = \{ \mid y \leq 6 \}$

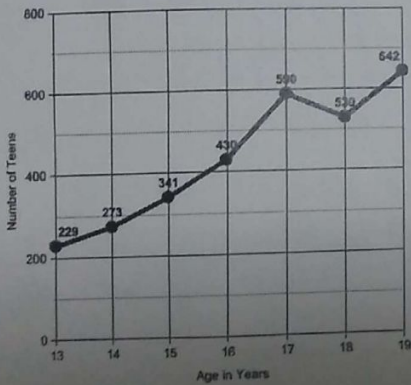


What could the graph look like?

Find the Domain and Range of the following:

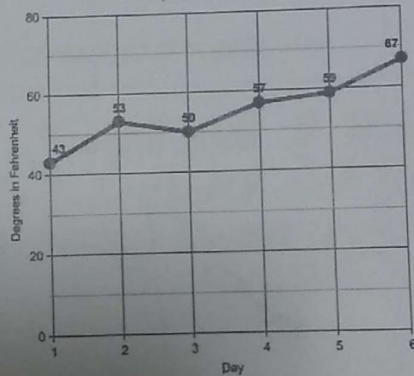
Domain:  $13 \leq x \leq 19$   
 Range:  $229 \leq y \leq 642$

Smalltown Teens With Cell Phones



Domain:  $1 \leq x \leq 6$   
 Range:  $43 \leq y \leq 67$

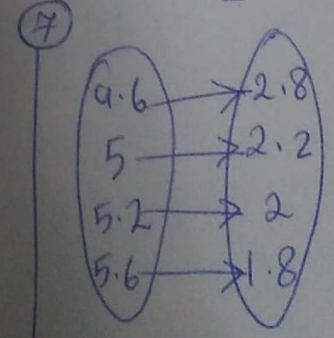
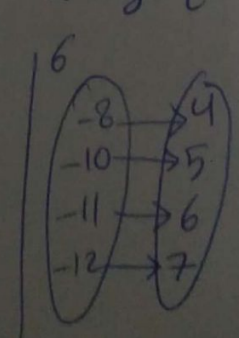
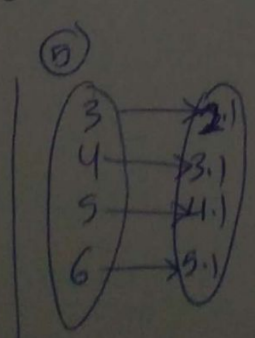
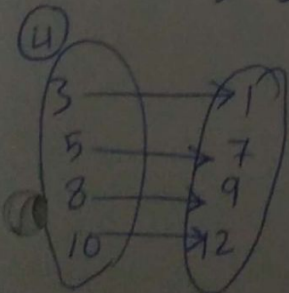
Temperatures in New York City



Identify the domain and range of each relation. Use a mapping diagram to determine whether the relation is a function.

- (F) 4.  $\{(3, 1), (5, 7), (8, 9), (10, 12)\}$   
 Domain:  $x = \{3, 5, 8, 10\}$   
 Range:  $y = \{1, 7, 9, 12\}$
- (F) 6.  $\{(-8, 4), (-10, 5), (-11, 6), (-12, 7)\}$   
 Domain  $x = \{-8, -10, -11, -12\}$   
 Range  $y = \{4, 5, 6, 7\}$

- (F) 5.  $\{(3, 2.1), (4, 3.1), (5, 4.1), (6, 5.1)\}$   
 Domain  $\{3, 4, 5, 6\}$   
 Range  $\{2.1, 3.1, 4.1, 5.1\}$
- (F) 7.  $\{(4.6, 2.8), (5, 2.2), (5.2, 2), (5.6, 1.8)\}$   
 Domain  $\{4.6, 5, 5.6, 5.2\}$   
 Range  $\{2.8, 2.2, 2, 1.8\}$



Unit 1: Function Notation

1 If  $f(x) = 3x + 2$ , find the value of:

a $f(0)$ $f(0) = 3(0) + 2$ $= 2$	b $f(2)$ $f(2) = 3(2) + 2$ $= 8$	c $f(-1)$ $f(-1) = 3(-1) + 2$ $= -1$	d $f(-5)$ $f(-5) = 3(-5) + 2$ $= -13$	e $f(-\frac{1}{3})$ $f(-\frac{1}{3}) = 3(-\frac{1}{3}) + 2$ $= +1$
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2 If  $f(x) = 3x - x^2 + 2$ , find the value of:

a $f(0)$ $f(0) = 3(0) - 0^2 + 2$ $= 2$	b $f(3)$ $f(3) = 3(3) - 3^2 + 2$ $= 2$	c $f(-3)$ $f(-3) = 3(-3) - (-3)^2 + 2$ $= -16$	d $f(-7)$ $f(-7) = 3(-7) - (-7)^2 + 2$ $= -68$	e $f(\frac{3}{2})$ $f(\frac{3}{2}) = 3(\frac{3}{2}) - (\frac{3}{2})^2 + 2$ $= 17/4$
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3 If  $g(x) = x - \frac{4}{x}$ , find the value of:

a $g(1)$ $g(1) = 1 - \frac{4}{1}$ $= -3$	b $g(4)$ $g(4) = 4 - \frac{4}{4}$ $= 3$	c $g(-1)$ $g(-1) = -1 - \frac{4}{-1}$ $= +3$	d $g(-4)$ $g(-4) = -4 - \frac{4}{-4}$ $= -3$	e $g(-\frac{1}{2})$ $g(-\frac{1}{2}) = -\frac{1}{2} - \frac{4}{-\frac{1}{2}}$ $= 7.5$
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### Unit 3: Gradient

How do you find the equation between two co-ordinates?

$$y = mx + b$$

- Find  $m$  (the gradient) first
- Use  $m$  and one of the co-ordinates to find  $b$

#### THE GRADIENT FORMULA

If A is  $(x_1, y_1)$  and B is  $(x_2, y_2)$  then

the gradient of AB is  $\frac{y_2 - y_1}{x_2 - x_1}$ .

#### Practice Questions

- Find the equation of the line between the following pairs of co-ordinates.

$y = \frac{1}{3}x + \frac{1}{3}$   
 $y = 1.5x - 5$   
 $x = -6$

a  $(2, 1)$  and  $(5, 2)$   ~~$y = 3x - 1$~~

b  $(5, 3)$  and  $(2, 2)$   $y = \frac{1}{3}x + \frac{4}{3}$

c  $(2, -2)$  and  $(4, 1)$   ~~$y = 0.75x + 2.5$~~

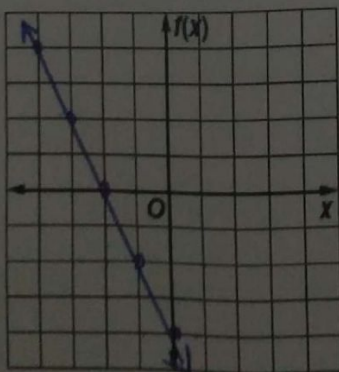
d  $(7, 2)$  and  $(-3, 2)$   $y = 2$

e  $(-6, -2)$  and  $(-6, -4)$

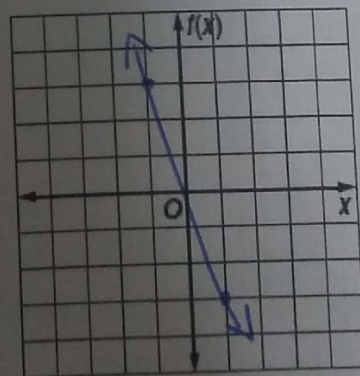
f  $(5, -1)$  and  $(-3, -3)$   
 $y = 0.25x - 2.5$

Graph each equation.

1.  $y = -2x - 4$



2.  $y = -3x$



Quadratics

Use the quadratic formula to solve each equation. If necessary, round to the nearest hundredth.

1.  $6g^2 + g - 2 = 0$   $g = 0.5, g = -0.67$   
 $= -2/3$

2.  $a^2 + 7a - 9 = 0$   $a = 1.11$   
 $a = 8.11$

3.  $2h^2 - 3h + 2 = 0$  No solution

4.  $b^2 + 5b - 3 = 0$   $b = 0.54$   
 $b = -5.45$

Solve each equation. If necessary, round to the nearest hundredth.

5.  $d^2 - d = 30$   
 $d = 6, d = -5$

6.  $15x^2 - 23x + 4 = 0$   
 $x = \frac{4}{3}, x = \frac{1}{5}$

Find the vertex and axis of symmetry for the graph of each function using  $x = -\frac{b}{2a}$ .

1.  $f(x) = x^2 - 4x - 8$   
 Vertex:  $(2, -12)$   
 axis of sym:  $x = 2$

2.  $g(x) = -4x^2 - 8x + 3$   
 $V: (-1, 7)$   
 axis of sym.  $\Rightarrow x = -1$

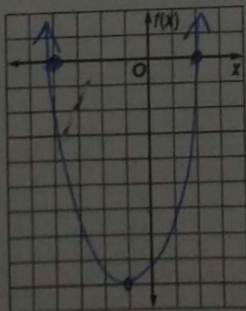
3.  $y = -x^2 + 8x + 3$   
 $V: (4, 19)$   
 axis of sym.  $\Rightarrow x = 4$

4.  $f(x) = 2x^2 + 6x + 5$   
 $V: (-\frac{3}{2}, \frac{1}{2})$   
 axis of sym.  $\Rightarrow x = -\frac{3}{2}$

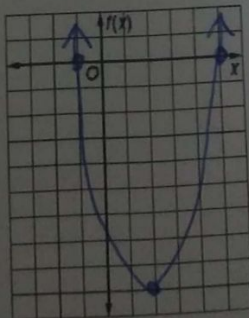
5.  $A(x) = x^2 + 12x + 36$   
 $V: (-6, 0); x = -6$   
 Solve each equation by graphing

6.  $k(x) = -2x^2 + 2x - 6$   
 $V: (\frac{1}{2}, -\frac{11}{2}); x = \frac{1}{2}$

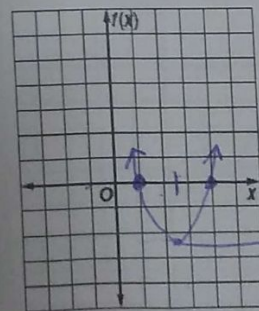
1.  $x^2 + 2x - 8 = 0$



2.  $x^2 - 4x - 5 = 0$



3.  $x^2 - 5x + 4 = 0$



$\rightarrow (2.5, -2.25)$