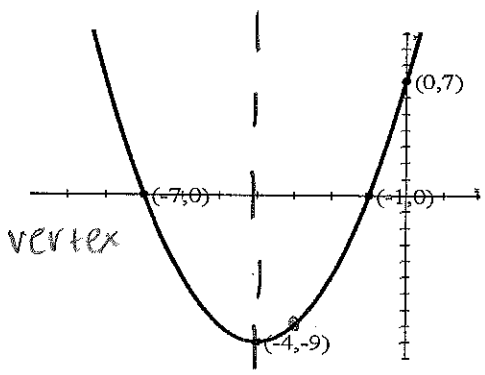
3-1 Graphing Quadratic Functions Classwork

Quadratic Form $f(x)=ax^2+bx+c$

1. $y=x^2+8x+7$

x	y
-7	0
-6	-5
-5	-8
-4	-9
-3	-8
-2	-5
-1	0



The quadratic term a = 1
The linear term b = 8
The constant c = 7

a. *y*-intercept (0 , 7) → (0, c)

b. *x*-intercept(s) (-7 , 0) (-1 , 0)

c. root(s) or zero(es) x = -7 , x = -1

d. vertex (-4 , -9)

e. Since the *a* term is (positive, negative), the graph opens (up, down), and the vertex is the (maximum, minimum) value of the function.

f. Sketch the Line of Symmetry.

Its equation is x = -4

h. What is the name of the point where the *y*-value or the function changes direction?

vertex

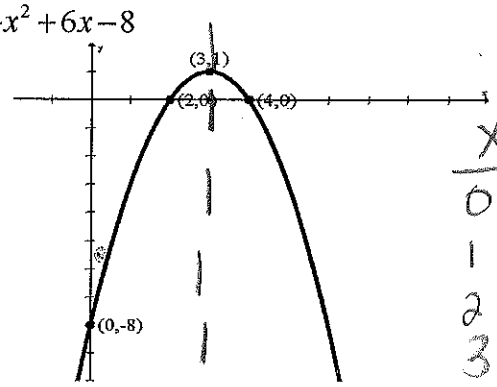
j. What are the other 3 names for *x*-intercepts?

zeros, roots, solutions

k. State the domain in inequality and interval notation:
$-\infty < x < \infty$; $(-\infty, \infty)$

l. State the range in inequality and interval notation: $y \geq -9$ $[-9, \infty)$

2. $y=-x^2+6x-8$



x	y
0	-5
1	-3
2	0
3	1
4	0
5	-3
6	-5

vertex

The quadratic term a = -1
The linear term b = 6
The constant c = -8

a. *y*-intercept (0 , -8) → (0, c)

b. *x*-intercept(s) (2 , 0) (4 , 0)

c. root(s) or zero(es) x = 2 , x = 4

d. vertex (3 , 1)

e. Since the *a* term is (positive, negative), the graph opens (up, down), and the vertex is the (maximum, minimum) value of the function.

f. Sketch the Line of Symmetry.

Its equation is x = 3

h. What is the name of the point where the *y*-value or the function changes direction?

vertex

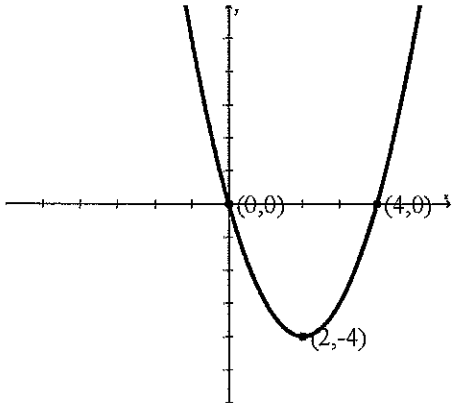
j. What are the other 3 names for roots?

zeros, solutions, x-intercept

k. State the domain in inequality and interval notation:
$-\infty < x < \infty$; $(-\infty, \infty)$

l. State the range in inequality and interval notation: $y \leq 1$; $(-\infty, 1]$

3. $y = x^2 - 4x$



The quadratic term $a =$ 1
The linear term $b =$ -4
The constant $c =$ 0

a. *y*-intercept (0 , 0) → (0, c)

b. *x*-intercept(s) (0 , 0) (4 , 0)

c. root(s) or zero(es) $x =$ 0 , $x =$ 4

d. vertex (2 , -4)

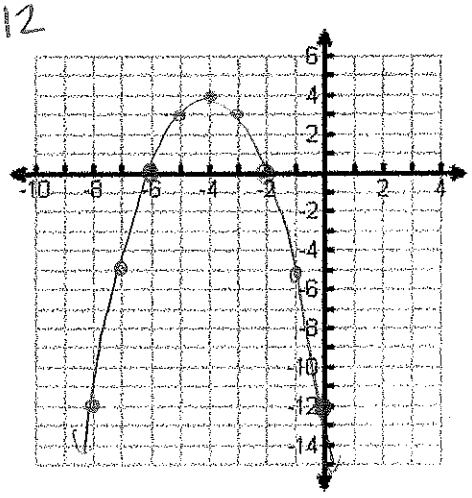
e. Since the *a* term is (positive, negative), the graph opens (up, down), and the vertex is the (maximum, minimum) value of the function.

f. State the domain in inequality and interval notation:
$-\infty < x < \infty$; $(-\infty, \infty)$

g. State the range in inequality and interval notation
$y \geq -4$; $[-4, \infty)$

4. $y = -x^2 - 8x - 12$

x	y
-8	-12
-7	-5
-6	0
-5	3
-4	4
-3	3
-2	0
-1	-5
0	-12
1	-21



The quadratic term $a =$ -1
The linear term $b =$ -8
The constant $c =$ -12

a. *y*-intercept (0 , -12)

b. *x*-intercept(s) (-6, 0) (2 , 0)

c. root(s) or zero(es) $x =$ -6 , $x =$ 2

d. vertex (-4 , 4)

e. Since the *a* term is (positive, negative), the graph opens (up, down), and the vertex is the (maximum, minimum) value of the function.

f. State the domain in inequality and interval notation:
$-\infty < x < \infty$; $(-\infty, \infty)$

g. State the range in inequality and interval notation
$y \leq 4$; $(-\infty, 4]$

You can use the **MINUMUM** or **MAXIMUM** feature on a graphing calculator to find the minimum or maximum of a quadratic function. This involves defining an interval that includes the vertex of the parabola. A lower bound is an x-value left of the vertex, and an upper bound is an x-value right of the vertex.
Step 1. Graph the function so that the vertex of the parabola is visible.
Step 2. Select 3:minimum or 4 maximum from the **CALC** menu.
Step 3 Using the arrow keys, locate a left bound and press **ENTER**
Step 4.Using the arrow keys, locate a right bound and press **ENTER** twice. The cursor appears on the maximum or minimum of the function. The maximum or minimum value of the function is the y-coordinate of the vertex point.

Take notice ☺ When the range is $(-\infty, \#]$ does the quadratic function have a minimum, maximum or neither?
When the range is $[\#, \infty)$ does the quadratic function have a minimum, maximum or neither?