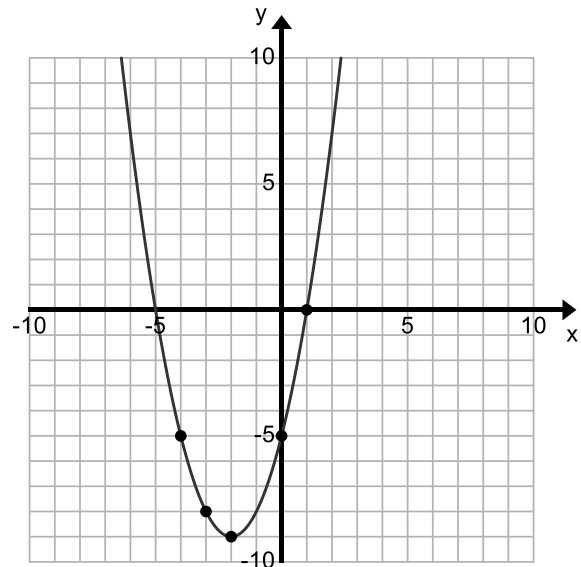**Math 20-2**

Quadratic Properties Part II

Objective: Identify properties of quadratic functions: vertex, x-intercepts, y-intercept, an equation for the axis of symmetry, **Domain and Range**.

1. Given: $y = x^2 + 4x - 5$

   a) Complete the table and add points to the graph

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

   b) Label the x-intercepts.
   c) Label the y-intercept.
   d) The lowest point is called the 'vertex'. Label the vertex.
   e) Draw in the line of symmetry. What point will this line always pass through?

   f) **Domain** is the list of x-values that we can put into the equation. **Range** is the list of y-values that are generated by the x-values.

   Domain: we want to show x can be any number, no restrictions.
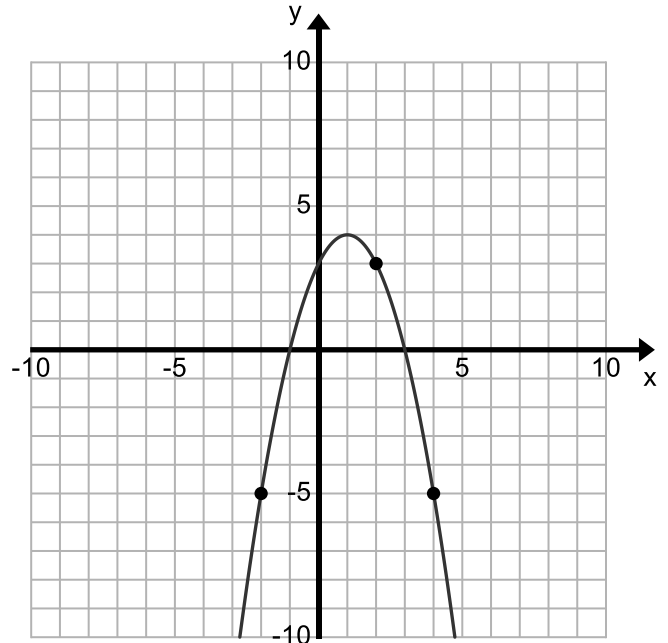
   math language:

   Range: we want to show the y-values are -9 or bigger.

   math language:

2. Given: $y = -x^2 + 2x + 3$

   a) Complete the table and add points to the graph

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

   b) Label the x-intercepts.
   c) Label the y-intercept.
   d) The highest point is also called the 'vertex'. Label the vertex.
   e) Draw in the line of symmetry. Write the equation for the axis of symmetry:

   f) Domain: we want to show x can be any number, no restrictions.
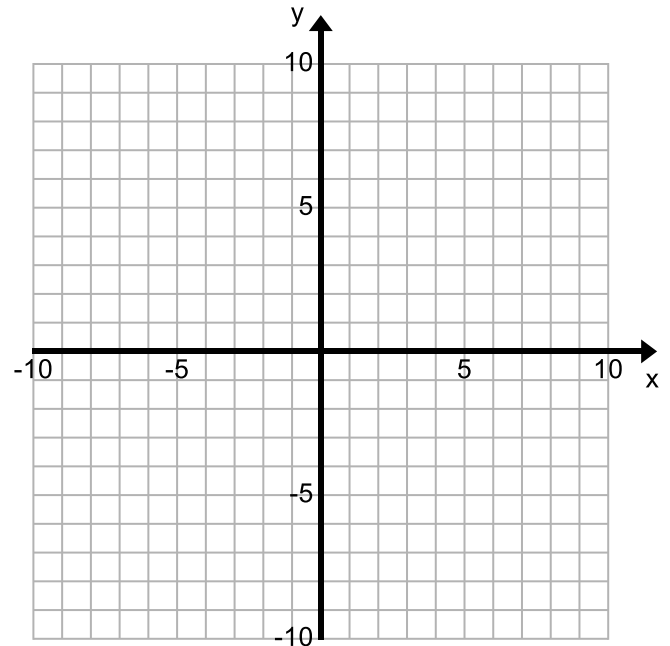
      math language:

      Range: we want to show the y-values are 4 or smaller. .

      math language:

3. Given: $y = x^2 - 6x + 5$

a) Complete the table; plot points and graph

x	y
0	
1	
2	
3	
4	
5	
6	

b) Label the x-intercepts.
c) Label the y-intercept.
d) Label the vertex.
e) Draw in the line of symmetry. Write the equation for the axis of symmetry:

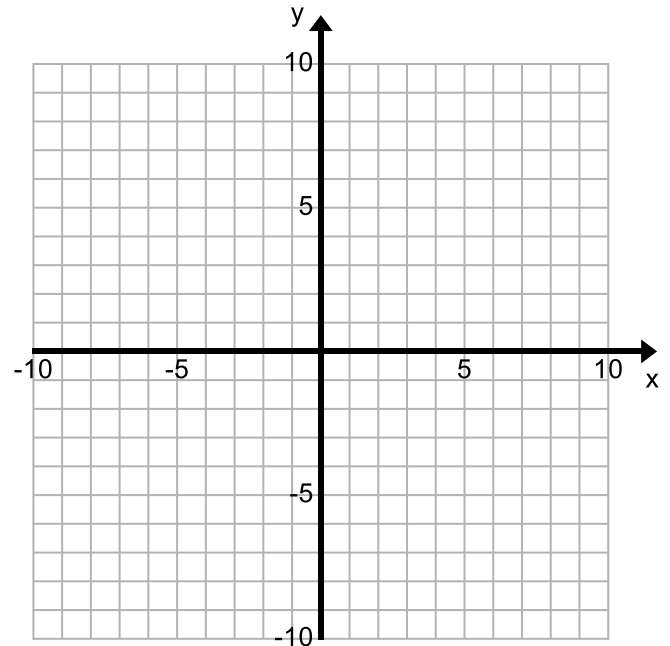f) Write the Domain in words and in 'math language'.

Write the Range in words and in 'math language'.

g) Calculator Skills: Find the "zeroes" and the "minimum value"

4. Given: $y = -x^2 - 6x$

   a) Complete the table; plot points and graph

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

   b) Label the x-intercepts.
   c) Label the y-intercept.
   d) Label the vertex.
   e) Draw in the line of symmetry. Write the equation for the axis of symmetry:

   f) Write the Domain in words and in 'math language'.

      Write the Range in words and in 'math language'.

   g) Calculator Skills: Find the "maximum value".

5. Reading Graphs: Find properties of a quadratic function from just the graph.

a) Complete the table (using symmetry); add points to the graph.

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

b) Label the x-intercepts.

c) Label the y-intercept.

d) Label the vertex.

e) Draw in the line of symmetry. Write the equation for the axis of symmetry:
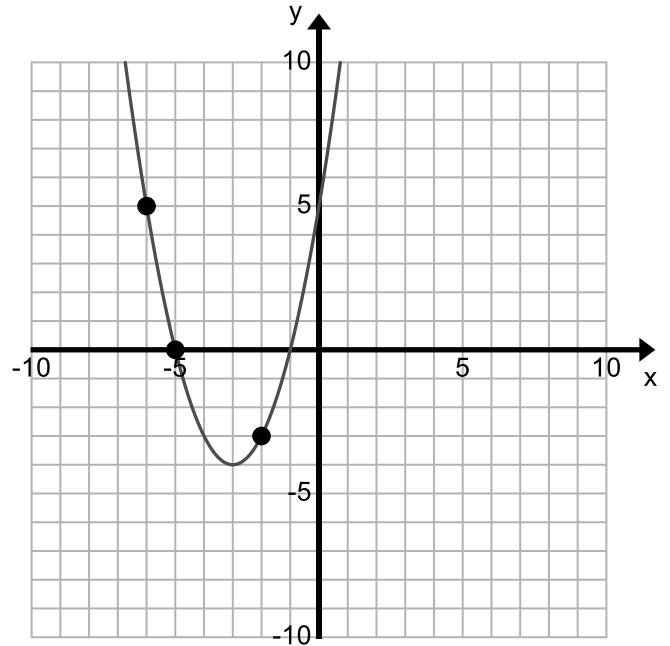
f) Write the Domain in words and in 'math language'.

Write the Range in words and in 'math language'.

6. Applying properties to 'Problem Solving'.

At a fountain the path of water from one of the jets can be defined by the function: $f(x) = -0.12x^2 + 3x$.

x = horizontal distance from the opening in the ground in feet

f(x) = height of the spray water in feet.

a) Find a window that will allow you to see the path of the water.
   - Quadrant one is where you want to see the water.
   - For the scale (count by), make the minimum value one negative scale factor.

   X:[min, max, scale] = [_____, _____, _____]

   Y:[min, max, scale] = [_____, _____, _____]

b) Draw a sketch of the water path using your window.

c) What is the **maximum** height of the water arch?

d) How far from the opening in the ground does the water reach? (height = **zero**)