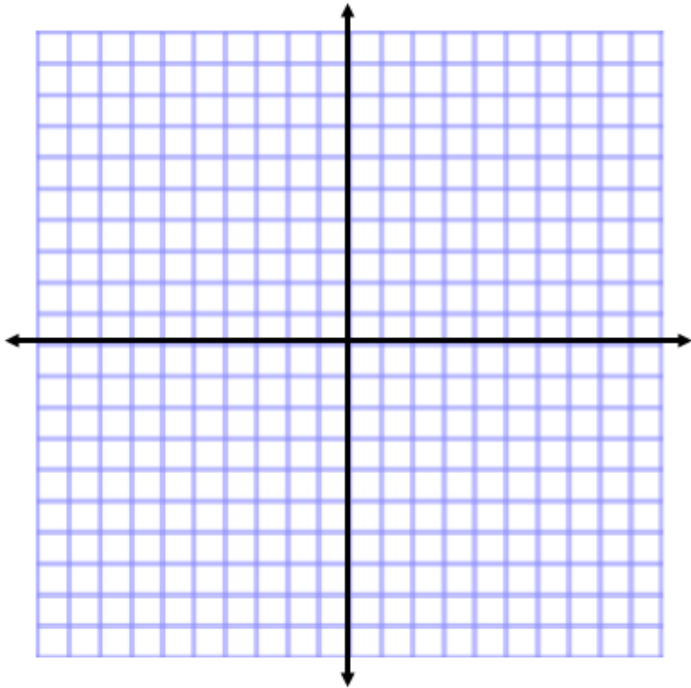# Graphing Quadratic Functions

Objective: You will be able to…

1. Graph quadratic equations/functions using a table of values.

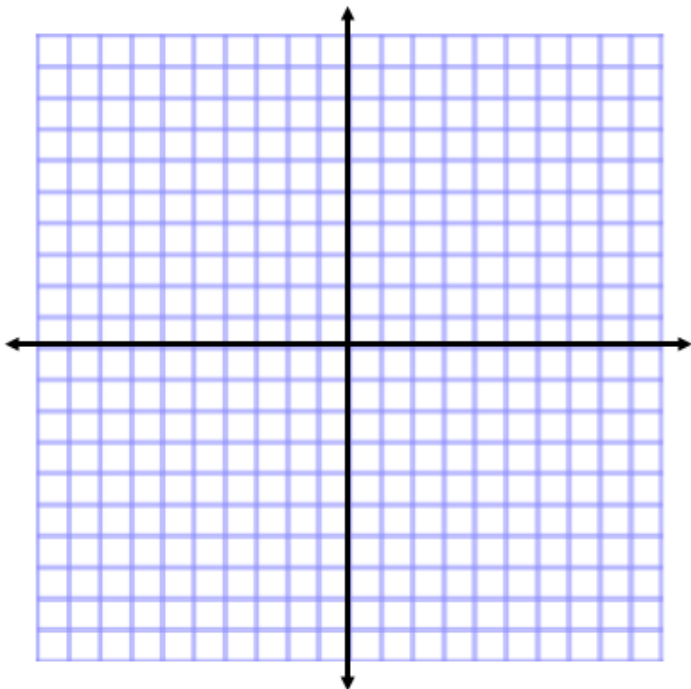**Example:**

1. $y = x^2$

x	y
-3	
-2	
-1	
0	
1	
2	
3	

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

x	y
-1	
0	
1	
2	
3	
4	

Graphing with a Table of Values

Practice Set #1: Divide (by folding) the piece of graph paper into four parts. On the piece of graph paper, graph #3-6 using a pencil first and then trace over it with a marker. On the graph, answer each of the following questions.

a. Fold the paper so that the two sides of the graph match up exactly. Highlight the point on the graph that is along the fold line (the lowest or highest point on the graph). LABEL this as the "vertex".

b. Find the (x and y) coordinates of the vertex.

c. What do you notice about all of the y-values before and after the vertex?

d. What is the minimum (or maximum) value that y can be? How do you know?

3. $y = -x^2 + 4x - 1$

X	y
-1	
0	
1	
2	
3	
4	
5	

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

X	y
-1	
0	
1	
2	
3	
4	
5	

5. $y = -x^2 + 2x + 3$

X	y
-2	
-1	
0	
1	
2	
3	
4	

6. $y = -3x^2 - 6x + 4$

X	y
-4	
-3	
-2	
-1	
0	
1	
2	

Graphing WITHOUT a Table of Values

Vertex:

1) _____ or _____ point of the parabola.

2) _____ point of the table of values.

3) If a quadratic equation is $y = ax^2 + bx + c$, then the "x-coordinate" of the vertex is

   $x =$_____

Case 1: Picture	**Case 2**: Picture

Practice Set #2: A) Find the vertex of each graph. B) Is this a maximum or minimum point?
C) What is the maximum or minimum value?

1. $y = 4x^2$	2. $y = -x^2 + 5$	3. $y = x^2 + 2$
A) Vertex:	A) Vertex:	A) Vertex:
B) Min or Max?	B) Min or Max?	B) Min or Max?
C) Min or max value?	C) Min or max value?	C) Min or max value?
4. $y = x^2 - 14x + 13$	5. $y = 5 + 16x - 2x^2$	6. $y = 3x^2 - 6x + 4$
A) Vertex:	A) Vertex:	A) Vertex:
B) Min or Max?	B) Min or Max?	B) Min or Max?
C) Min or max value?	C) Min or max value?	C) Min or max value?

Practice Set #3:

    a. Create a table of values for the equation (using the vertex as your center value).

    b. Graph the equation (on a piece of graph paper).

    c. What is the minimum (or maximum) value that y can be?

       How do you know?

1. $y = -2x^2$

X	y

1. $y = x^2 + 1$

X	y

1. $y = x^2 - x - 6$

X	y

2. $y = -3x^2 - 6x + 1$

| X	y

Poster Problems

1. You have 10 feet of fencing to create a small garden. Your garden area looks like this.

| length	width	area
0		
1		
2		
3		
4		
5		
x		

   a. Write an equation for the area of the garden where y is the area of the garden and x represents the length of one side of the garden.
   b. Find the vertex of your equation.
   c. Create a table of values for your equation. Use the vertex point as your center value.
   d. Graph your function on poster paper.
   e. Find the maximum value that you can have for your area. What is the length and width that gives you the maximum area?
   f. Write out your maximum area value on your poster.
   g. Decorate your poster.

2. The pathway of a firework is modeled by the equation $h = -5t^2 + 40t + 2$, where h represents the firework's height in meters after t seconds. The rocket will explode at the highest point.
   a. Find the vertex of your equation.
   b. Create a table of values for your equation. Use the vertex point as your center value.
   c. Graph your function on poster paper.
   d. Find the maximum height that the firework will reach. (Draw the firework at the point)
   e. Write the maximum height on your poster.
   f. At what time will the firework explode? Write your answer on the poster.
   g. Decorate your poster.

3. The pathway of a soccer ball kicked by the Farragut forward is modeled by the equation $h = -5t^2 + 25t$, where h represents the soccer ball's height in meters after t seconds.

   a. Find the vertex of your equation.
   b. Create a table of values for your equation. Use the vertex point as your center value.
   c. Graph your function on poster paper.
   d. Find the maximum height that the soccer ball will reach. (Draw the ball at the point).
   e. Write the maximum height on your poster.
   f. At what time will the ball be at its highest point? Write your answer on the poster.
   g. Decorate your poster.

4. A carnival game involves striking a lever that forces a weight up a tube. If the weight reaches 20 feet to ring the bell, the contestant wins a prize. The equation $h = -16t^2 + 32t + 3$ gives the height of the weight if the initial velocity is 32 feet per second.

   a. Find the vertex of your equation.
   b. Create a table of values for your equation. Use the vertex point as your center value.
   c. Graph your function on poster paper.
   d. Find the maximum height that the soccer ball will reach. (Draw the ball at the point).
   e. Write the maximum height on your poster.
   f. At what time will the ball be at its highest point? Write your answer on the poster.
   g. Decorate your poster.
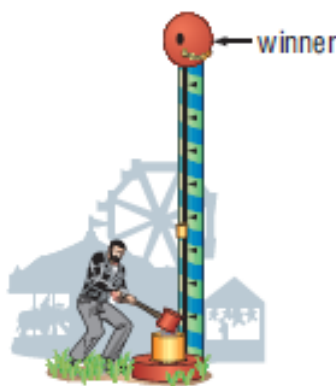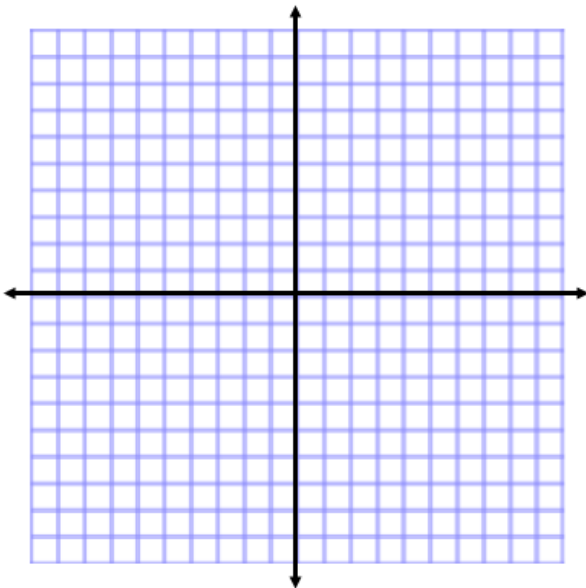
Graphing Quadratic Functions Homework

1. Graph $y = x^2 - 4$.
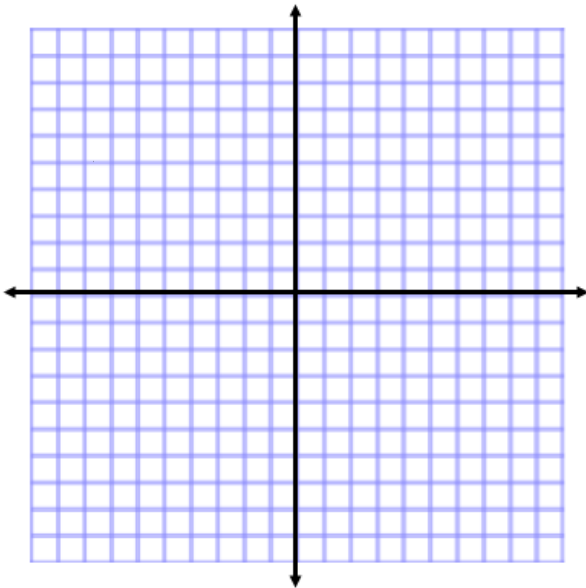
2. Why do quadratic functions have a U-shape?