Def: The graph of all quadratic equations is the U-shaped curve called a **parabola**.

Def: The **Vertex** of any parabola is the so called “turn around point”. It is the place where the parabola reaches its maximum or minimum value.

Def: All parabolas are symmetric about the vertical line that passes through the vertex. This lime is called the **axis of symmetry**

## The Graph of

Graph: And



Consider the following functions. Graph each on the same graph:

All of these graphs have been of the form where is in .

What do you notice about the direction of the graph if is positive?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The parabola points upward

The parabola flips upside down

What if is Negative? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

They get steeper

What do you notice happens to the graphs if gets bigger?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

They get wider

What do you notice happens to the graphs if is a positive proper fraction?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Given the graph of come up with a function that is steeper/narrower. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Given the graph of come up with a function that is wider/flatter. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Given the graph of come up with a function that is upside down. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ex: Find examples of functions that could create the following graphs.

## The Graphs of

Let us look at quadratic functions that are perfect squares. By doing so, we will notice that the parabola looks very similar to the graphs of but with a rigid transformation (sliding the parabola around on the coordinate plane like a game of “pin the tail on the donkey”).

First let us consider what this will look like if

Ex: Graph

Consider the Table:

|  |  |  |  |
| --- | --- | --- | --- |
| Function: | Vertex | x-value of vertex | y-value of vertex |
|  |  | 0 | 0 |
|  |  | 2 | 0 |
|  |  | -3 | 0 |
|  |  | 7 | 0 |
|  |  | -8 | 0 |

Think about the graph of

What is the value of x, that corresponds to the vertex?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What will the value of y be for that value of x? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Now think about the graph of

What is the value of x, that corresponds to the vertex?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What will the value of y be for that value of x? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Based on these two examples what does the x value of the vertices have to do with the equations?

The x value of the vertex will make the thing we are squaring 0.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Summary:

## The Graph of

Recall that if you graph a function , then the graph of will be the same as but shifted up by 3.

Sketch the following graphs: