

Honors Algebra 1

10.1 – Graphing Simple Quadratics

Name: *Key*
Period:

Opener!

Work with your partner to complete the table for the function $y = x^2$. Think about how that table would translate to a graph. Describe the shape and any unique features.

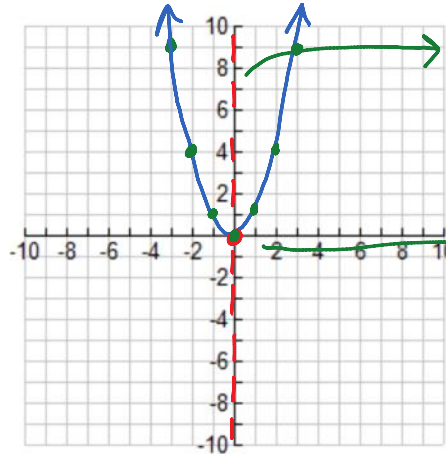
| x | y |
|----|----|
| -2 | 4 |
| -1 | 1 |
| 0 | 0 |
| 1 | 1 |
| 2 | 4 |
| 3 | 9 |
| 4 | 16 |

$$y = (-2)^2$$

$$y = (-1)^2 = 1$$

$$y = (0)^2$$

parabola: u-shaped graph



axis (or line) of symmetry: divide the graph in half, passes through the vertex

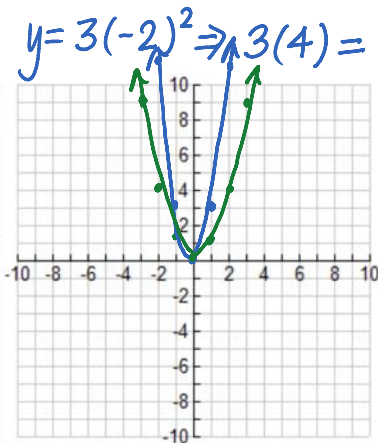
vertex: lowest (min) point on graph OR highest (max) point on graph

Let's Explore!

Complete the table and sketch the graph of the following functions. Include observations about how each graph relates back to the parent quadratic equation $y = x^2$. Hint: it may help to sketch in the graph of the parent function.

1. $y = 3x^2$

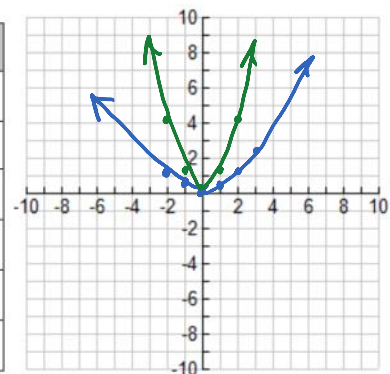
| x | y |
|----|----|
| -2 | 12 |
| -1 | 3 |
| 0 | 0 |
| 1 | 3 |
| 2 | 12 |
| 3 | 27 |



Observations: • y-values are tripled
• narrower or skinnier

2. $y = \frac{1}{4}x^2$

| x | y |
|----|-----|
| -2 | 1 |
| -1 | 1/4 |
| 0 | 0 |
| 1 | 1/4 |
| 2 | 1 |
| 3 | 9/4 |



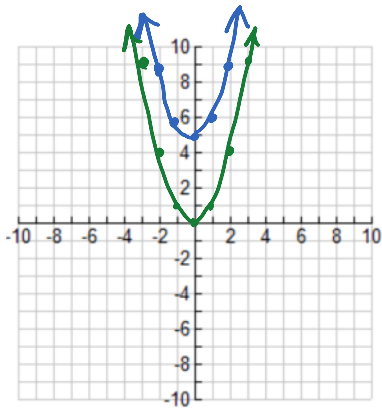
Observations: • wider or fatter
• y-values are multiplied by 1/4

Summary! • if my leading coefficient is greater than 1, graph looks skinnier
• if my L.C. is less than 1, graph looks wider

- if my L.C. is less than 1, graph looks wider
- every y-value gets multiplied by L.C.

3. $y = x^2 + 5$

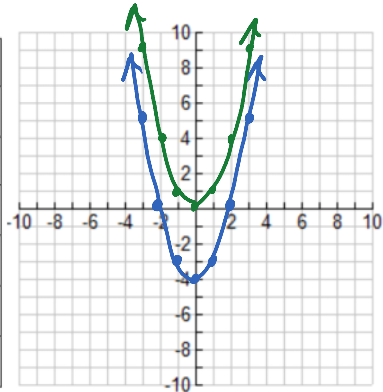
| x | y |
|----|----|
| -2 | 9 |
| -1 | 6 |
| 0 | 5 |
| 1 | 6 |
| 2 | 9 |
| 3 | 14 |



Observations: • up 5
• vertex @ (0, 5)

4. $y = x^2 - 4$

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



Observations: • down 4
• vertex @ (0, -4)

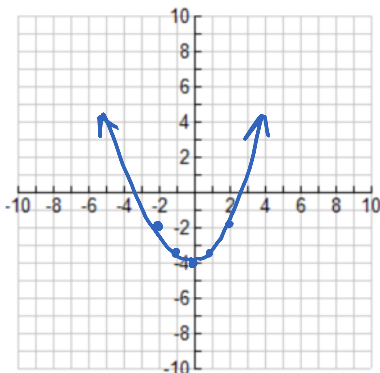
Summary! • when my last term is positive, shifting ↑
negative, shifting ↓

A few more for practice!

5. $y = \frac{1}{2}x^2 - 4$

Predictions about the graph: wider graph, y-values ↓ 4 mult. by $\frac{1}{2}$

| x | y |
|----|------|
| -2 | -2 |
| -1 | -3.5 |
| 0 | -4 |
| 1 | -3.5 |
| 2 | -2 |
| 3 | .5 |

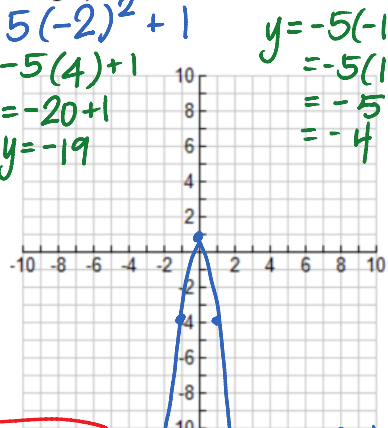


vertex @ (0, -4)

6. $y = -5x^2 + 1$ skinnier graph, y-values by -5 ↑ 1

Predictions about the graph:

| x | y |
|----|-----|
| -2 | -19 |
| -1 | -4 |
| 0 | 1 |
| 1 | -4 |
| 2 | -19 |
| 3 | |



vertex @ (0, 1)

L.C. is negative, graph flips over x-axis

Think about it!

How would the graph of the function $y = x^2 + 6$ be affected if the function were changed to $y = x^2 + 2$?

vertex @ (0, 6)

vertex @ (0, 2)

(0, 6)

↓ [shifting ↓ 4 units]

vertical (y) shift

$(0, 6)$

↓

$(0, 2)$

Shifting ↓ 4 units