Inspiring Greatness

ISD

INDEPENDENCE SCHOOL DISTRICT

Math Virtual Learning

Algebra 1

April 10, 2020

Algebra 1
Lesson: April 10, 2020

Learning Target:

Students will identify key parts of a quadratic function.

Bell Ringer:

1. **Solve the system of equations.**

A) $12x + 18y = -12$
$2x + 3y = -2$

Hint: Elimination method. -Multiply one of the lines to get a variable to cancel out

B) $y = -4x + 11$
$6x + 4y = 4$

Hint: Substitution method. -Substitute the y equals expression in for y in the other equation.(Use Parenthesis)

2. **Explain similarities/differences between the two functions? Solve both equations**

A) $12x^2 - 27x = 0$

B) $12x^2 - 27 = 0$

Answers are at the beginning of Practice Video

Learning Target:

Students will identify key parts of a quadratic function.

Let's Get Started on the Lesson:

Watch Video: Identifying key parts of a Quadratic Function

Practice Video:

You can go ahead and try to work through problems on the next slides before watching the video.

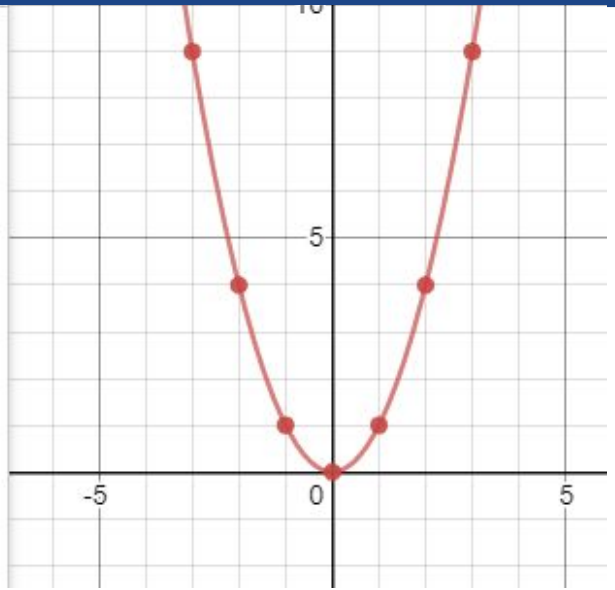
Practice:
Identify the key parts of the quadratic:

- Opens:
  - Up or Down
- y-intercept:
  - (,)
- Axis of Symmetry:
  - x = _____
- Vertex:
  - (,)
  - Max or Min
- Domain:
  - _____ ≤ x ≤ _____
- Range:
  - _____ ≤ y ≤ _____
- End Behavior:
  - As x → -∞, y →_____
  - As x → ∞, y →_____
- # of Zeros/X-Intercepts _____
  - _____

x	x^2
−3	9
−2	4
−1	1
0	0
1	1
2	4
3	9

Example 1:

$y = x^2$



Next graph is **$y = -x^2$**

-Notice a difference?

-What do you think the difference will change about the graph?

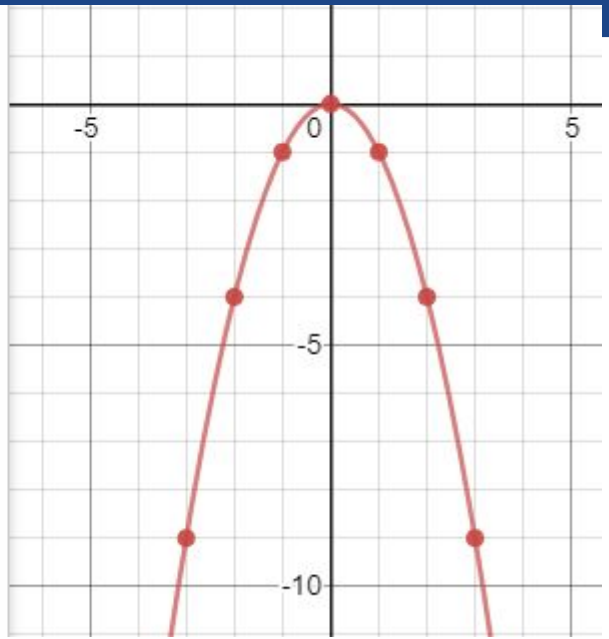
Practice:
Identify the key parts of the quadratic:

- Opens:
  - Up or Down
- y-intercept:
  - (,)
- Axis of Symmetry:
  - x = _____
- Vertex:
  - (,)
  - Max or Min
- Domain:
  - _____ ≤ x ≤ _____
- Range:
  - _____ ≤ y ≤ _____
- End Behavior:
  - As x → -∞, y →_____
  - As x → ∞, y →_____
- # of Zeros/X-Intercepts _____
  - _____

x	$-x^2$
−3	−9
−2	−4
−1	−1
0	0
1	−1
2	−4
3	−9

Example 2:

$y = -x^2$



Next graph is **$y = -2x^2$**

-What do you know about the next graph using what we just went over?

-What do you think the 2 out in front will do to the table values?

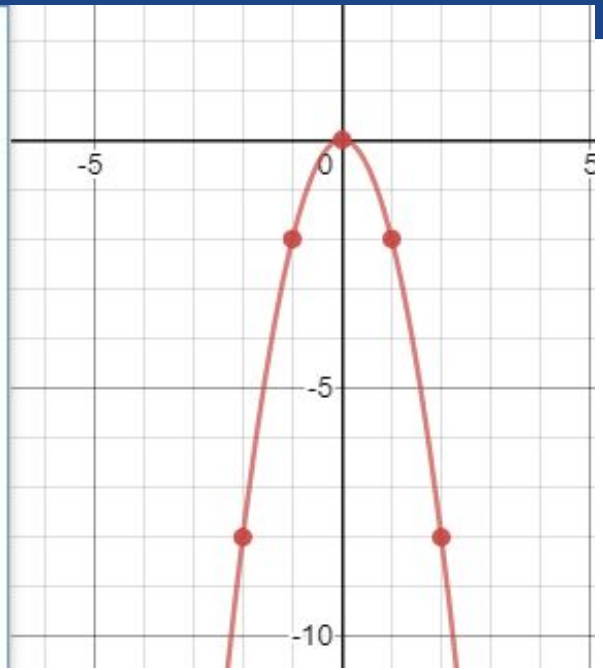
Practice:
Identify the key parts of the quadratic:

- Opens:
  - Up or Down
- y-intercept:
  - (,)
- Axis of Symmetry:
  - x = _____
- Vertex:
  - (,)
  - Max or Min
- Domain:
  - _____ ≤ x ≤ _____
- Range:
  - _____ ≤ y ≤ _____
- End Behavior:
  - As x → -∞, y →_____
  - As x → ∞, y →_____
- # of Zeros/X-Intercepts _____
  - _____

x	$-2x^2$
−3	−18
−2	−8
−1	−2
0	0
1	−2
2	−8
3	−18

Example 3:

$y = -2x^2$



Next graph is **$y = 1/2x^2$**

-What do you know about the next graph?

-What do you think the 1/2 out in front will do to the table values?

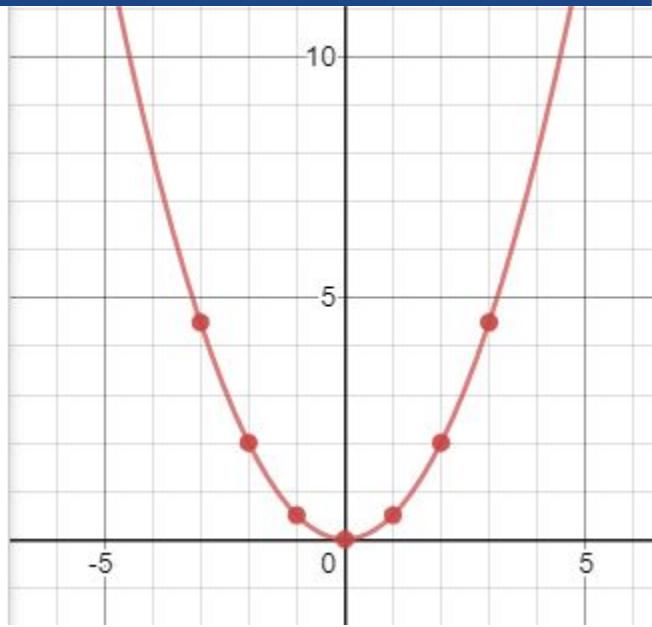
Practice:
Identify the key parts of the quadratic:

- Opens:
  - Up or Down
- y-intercept:
  - (,)
- Axis of Symmetry:
  - x = _____
- Vertex:
  - (,)
  - Max or Min
- Domain:
  - _____ ≤ x ≤ _____
- Range:
  - _____ ≤ y ≤ _____
- End Behavior:
  - As x → -∞, y →_____
  - As x → ∞, y →_____
- # of Zeros/X-Intercepts _____
  - _____

x	$\frac{1}{2}x^2$
−3	4.5
−2	2
−1	0.5
0	0
1	0.5
2	2
3	4.5

Example 4:

$y = 1/2x^2$



Next graph is **$y = x^2 + 1$**

-Notice anything we haven't seen yet?

-Name one thing you can state about the graph?

-What do you think the difference will change about the graph?

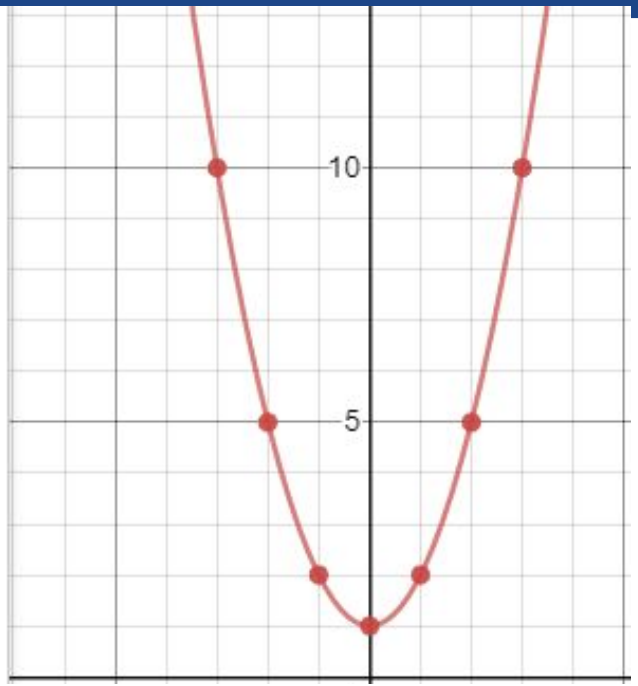
Practice:
Identify the key parts of the quadratic:

- Opens:
  - Up or Down
- y-intercept:
  - (,)
- Axis of Symmetry:
  - x = _____
- Vertex:
  - (,)
  - Max or Min
- Domain:
  - _____ ≤ x ≤ _____
- Range:
  - _____ ≤ y ≤ _____
- End Behavior:
  - As x → -∞, y →_____
  - As x → ∞, y →_____
- # of Zeros/X-Intercepts _____
  - _____

x	$x^2 + 1$
−3	10
−2	5
−1	2
0	1
1	2
2	5
3	10

Example 5:

$y = x^2 + 1$



Next graph is **$y = x^2 - 3$**

-What is going to happen to the graph compared to example 5?

-Name one thing you can state about the graph?

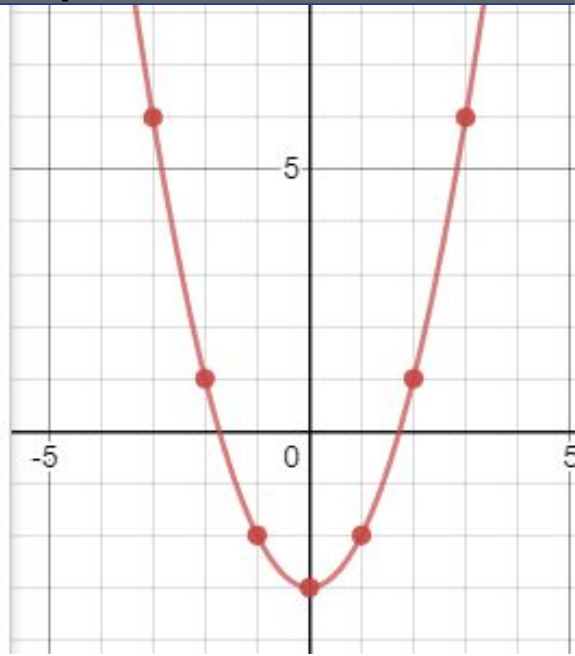
Practice:
Identify the key parts of the quadratic:

- Opens:
  - Up or Down
- y-intercept:
  - (,)
- Axis of Symmetry:
  - x = _____
- Vertex:
  - (,)
  - Max or Min
- Domain:
  - _____ ≤ x ≤ _____
- Range:
  - _____ ≤ y ≤ _____
- End Behavior:
  - As x → -∞, y →_____
  - As x → ∞, y →_____
- # of Zeros/X-Intercepts _____
  - _____

x	$x^2 - 3$
−3	6
−2	1
−1	−2
0	−3
1	−2
2	1
3	6

Example 6:

$y = x^2 - 3$



Next graph is **$y = x^2 + x$**

-Notice anything we haven't seen yet?

-Name one thing you can state about the graph?

-What do you think the difference will change about the graph?

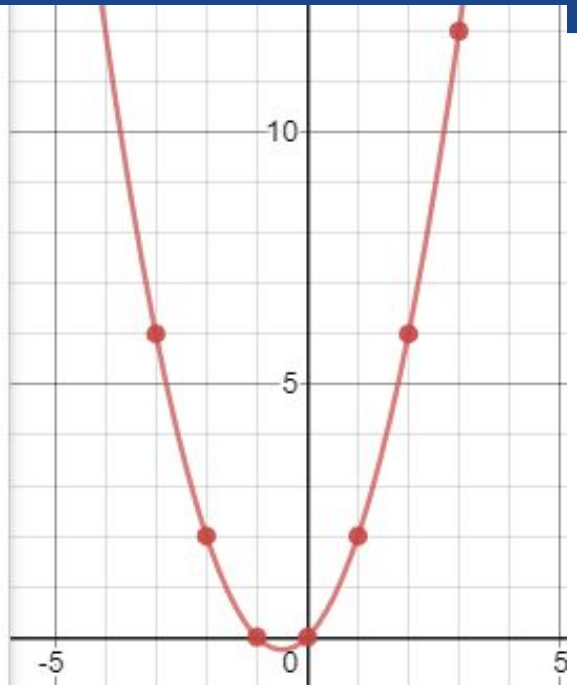
Practice:
Identify the key parts of the quadratic:

- Opens:
  - Up or Down
- y-intercept:
  - (,)
- Axis of Symmetry:
  - x = _____
- Vertex:
  - (,)
  - Max or Min
- Domain:
  - _____ ≤ x ≤ _____
- Range:
  - _____ ≤ y ≤ _____
- End Behavior:
  - As x → -∞, y →_____
  - As x → ∞, y →_____
- # of Zeros/X-Intercepts _____
  - _____

x	$x^2 + x$
−3	6
−2	2
−1	0
0	0
1	2
2	6
3	12

Example 7:

$y = x^2 + x$



Next graph is **$y = x^2 - 2x$**

-Notice anything we haven't seen yet?

-What is going to happen to the graph compared to example 7?

-Name one thing you can state about the graph?

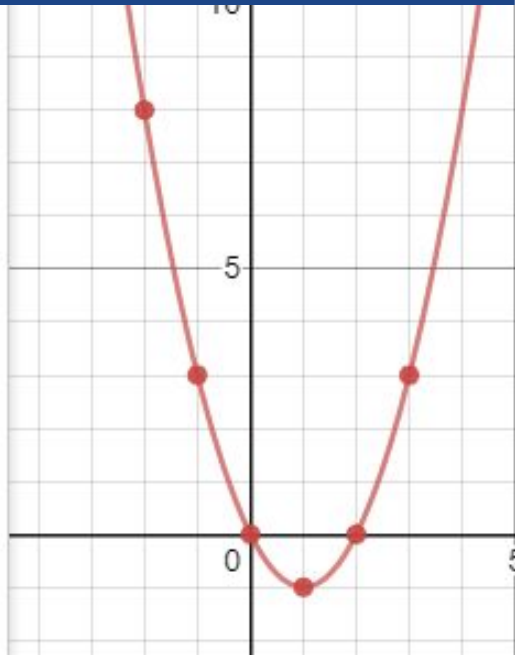
Practice:
Identify the key parts of the quadratic:

- Opens:
  - Up or Down
- y-intercept:
  - (,)
- Axis of Symmetry:
  - x = _____
- Vertex:
  - (,)
  - Max or Min
- Domain:
  - _____ ≤ x ≤ _____
- Range:
  - _____ ≤ y ≤ _____
- End Behavior:
  - As x → -∞, y →_____
  - As x → ∞, y →_____
- # of Zeros/X-Intercepts _____
  - _____

x	$x^2 - 2x$
−3	15
−2	8
−1	3
0	0
1	−1
2	0
3	3

Example 8:

$y = x^2 - 2x$



Next graph is **$y = x^2 + 3x$**

-What is going to happen to the graph compared to example 8?

-Name one thing you can state about the graph?

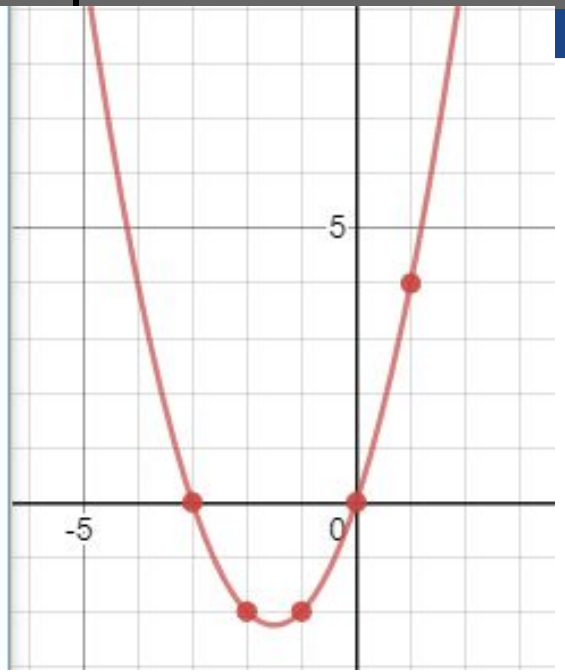
Practice:
Identify the key parts of the quadratic:

- Opens:
  - Up or Down
- y-intercept:
  - (,)
- Axis of Symmetry:
  - x = _____
- Vertex:
  - (,)
  - Max or Min
- Domain:
  - _____ ≤ x ≤ _____
- Range:
  - _____ ≤ y ≤ _____
- End Behavior:
  - As x → -∞, y →_____
  - As x → ∞, y →_____
- # of Zeros/X-Intercepts _____
  - _____

x	$x^2 + 3x$
−3	0
−2	−2
−1	−2
0	0
1	4
2	10
3	18

Example 9:

$y = x^2 + 3x$



Next graph is **$y = -x^2 - 4x$**

-What is going to happen to the graph compared to example 9?

-Name one thing you can state about the graph?

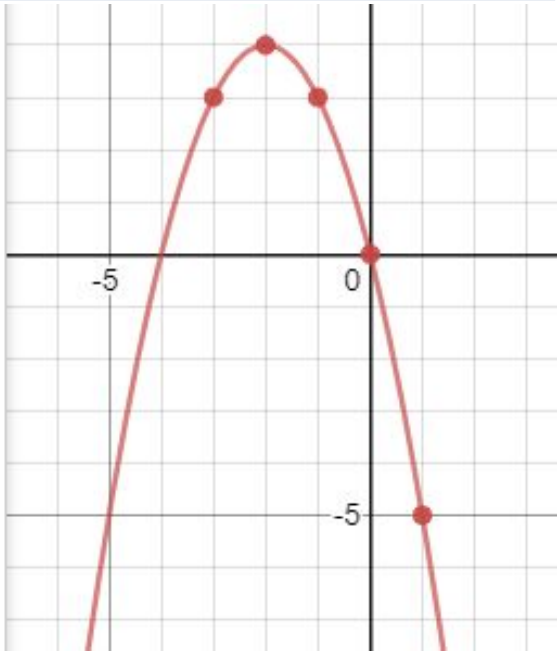
Practice:
Identify the key parts of the quadratic:

Example 10:

$y = -x^2 - 4x$

- Opens:
  - Up or Down
- y-intercept:
  - (,)
- Axis of Symmetry:
  - x = _____
- Vertex:
  - (,)
  - Max or Min
- Domain:
  - _____ ≤ x ≤ _____
- Range:
  - _____ ≤ y ≤ _____
- End Behavior:
  - As x → -∞, y →_____
  - As x → ∞, y →_____
- # of Zeros/X-Intercepts _____
  - _____

x	$-x^2 - 4x$
−3	3
−2	4
−1	3
0	0
1	−5
2	−12
3	−21



Discovery from Lesson:

1. Quadratic Equations are in the shape of _____
2. Quadratic equation in Standard Form: $y = ax^2 + bx + c$
   a. If A is positive, then _____
   b. If A is negative, then _____
3. What does the value of C do to the graph?
   a. If C is positive, then _____
   b. If C is negative, then _____
4. What does the value of B do to the graph(when A is positive)?
   a. If B is positive, then _____
   b. If B is negative, then _____
   c. If A is negative, then it is the _____

Discovery from Lesson:

5. The point that is the Max or the Min is the _____
6. The line that can be drawn down the middle of the quadratic function is called the _____
   a. Always a _____ equation. It's the x value of the _____
7. Domain for quadratics is always _____, unless there are domain restrictions.
8. Range is written as a compound inequality -- ***Small #*** ≤ y ≤ ***large #***
   a. The y value of the _____ tells you the max/min number for the range.
   b. Any inequality with infinity is not equal to.

Independent Practice

Complete the problems and then check your work with the key. Use desmos to help you graph and fill in the tables.

Practice

Key

Additional Practice:

Click on the links below to get additional practice and to check your understanding!

Extra Practice

Key