GSE Algebra 1 **7.1 – Notes** Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The goal here to see what happens to parabolas as we move them around a graph, what happens in the equation and how that can affect the tables.

Let’s look at quadratics again. What shape do they make? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Match the correct statement to the description below.

|  |  |  |
| --- | --- | --- |
| **Matching Equation****(A, B, C, or D)** | **Statement** | **Function Equation** |
|  | The length of each side of a square is increased by 5 units.  | A | $$A\left(x\right)=5x^{2}$$ |
|  | The length of each side of a square is multiplied by 5 units. | B | $$A\left(x\right)=(x+5)^{2}$$ |
|  | The area of a square is increased by 5 square units.  | C | $$A\left(x\right)=(5x)^{2}$$ |
|  | The area of a square is multiplied by 5.  | D | $$A\left(x\right)=x^{2}+5$$ |

What is the **domain** of $y=x^{2}$? **PARENT FUNCTION:** $y=x^{2}$

Let’s look at how each part above changes the graph, equation and table.

$$ y=x^{2}+5$$

How has this changed from the parent function $y=x^{2}$?

**Equation** **Table** **Graph**

|  |  |
| --- | --- |
| $$y=x^{2}$$ | $$y=x^{2}+5$$ |
|  |  |

|  |  |
| --- | --- |
| $$y=x^{2}$$ | $$y=x^{2}+5$$ |
| x | y | x | y |
| -2 |  | -2 |  |
| -1 |  | -1 |  |
| 0 |  | 0 |  |
| 1 |  | 1 |  |
| 2 |  | 2 |  |
| 3 |  | 3 |  |

Let’s look at a few more. Try these two based off the work from above.

1. ****$y=x^{2}+2$ b) $y=x^{2}-3$

***So the number OUTSIDE of the parentheses***

***(in the back of the equation) makes the***

***parabola move \_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_***

Now let’s try this one:

$$y=(x+5)^{2}$$

**Equation** **Table** **Graph**

|  |  |
| --- | --- |
| $$y=x^{2}$$ | $$y=(x+5)^{2}$$ |
|  |  |

|  |  |
| --- | --- |
| $$y=x^{2}$$ | $$y=(x+5)^{2}$$ |
| x | y | x | y |
| -2 |  | -7 |  |
| -1 |  | -6 |  |
| 0 |  | -5 |  |
| 1 |  | -4 |  |
| 2 |  | -3 |  |
| 3 |  | -2 |  |

Let’s look at a few more. Try these two based off the work from above.

1. ****$y=(x+2)^{2}$ b) $y=(x-3)^{2}$

***So the number INSIDE of the parentheses***

***(in the middle of the equation) makes the***

***parabola move \_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_***

Now this one:

$$y=5x^{2}$$

**Equation** **Table** **Graph**

|  |  |
| --- | --- |
| $$y=x^{2}$$ | $$y=5x^{2}$$ |
|  |  |

|  |  |
| --- | --- |
| $$y=x^{2}$$ | $$y=5x^{2}$$ |
| x | y | x | y |
| -2 |  | -2 |  |
| -1 |  | -1 |  |
| 0 |  | 0 |  |
| 1 |  | 1 |  |
| 2 |  | 2 |  |
| 3 |  | 3 |  |

****Now try these two:

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

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

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

Let’s look at what happens when the parabola is flipped upside down.

$$y=-x^{2}$$

**Equation** **Table** **Graph**

|  |  |
| --- | --- |
| $$y=x^{2}$$ | $$y=-x^{2}$$ |
|  |  |

|  |  |
| --- | --- |
| $$y=x^{2}$$ | $$y=-x^{2}$$ |
| x | y | x | y |
| -2 |  | -2 |  |
| -1 |  | -1 |  |
| 0 |  | 0 |  |
| 1 |  | 1 |  |
| 2 |  | 2 |  |
| 3 |  | 3 |  |

So what happens when the number in **front** of the x2 is **negative**?

This is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ over the x-axis.

**Bringing it ALL together!**

The vertex form of a quadratic is all of what you just did put together.

$y=a(x-h)^{2}+k$ **Vertex: (h, k)**

What does each part mean?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **a** | If **a** is **positive** | If **a** is **negative** | If **a > 1** | If **0 < a < 1**  |
| **h** | If **h** is **positive** in the equation | If **h** is **negative** in the equation |
| **k** | If **k** is **positive** in the equation | If **k** is **negative** in the equation |

Tell what has happened just based on the equation.

1. $y=4(x-1)^{2}+3$ 2) $y=-(x+3)^{2}-2$ 3) $y=\frac{1}{3}x^{2}-3$ 4) $y=-10(x+2)^{2}$