**The Absolute Value Function**

Today we will be investigating what happens when we change the equation of the absolute value function, *y* = |*x*|. Go to Desmos.com and complete the questions below with your partner.

**The Parent Function:**

1. The parent function for the family of absolute value functions is *y* = |*x*|.

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Graph the function on the grid to the right.

1. The vertex is located at .
2. The axis of symmetry is at .

**Graphing functions of the form** $y=a\left|x-h\right|+k$**.**

We can SHIFT the parent functions two different ways. We can add a number INSIDE the absolute value or OUTSIDE the absolute value.

1. **Shifting: Inside the absolute value:** $y=\left|x-h\right|$

Graph the three following functions, each one in a different color pen or pencil.

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1. $y = \left|x\right|$
2. $y= \left|x-3\right|$ How did the function shift from the parent function?
3. $y= \left|x+2 \right|$ How did the function shift from the parent function?
4. What effect does *h* has on the graph of $y=\left|x-h\right|$?
5. **Shifting: Outside the absolute value:** $y=\left|x\right|+k$

Graph the three following functions, each one in a different color pen or pencil.

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1. $y = \left|x\right|$
2. $y= \left|x\right|-3$ How did the function shift from the parent function?
3. $y= \left|x\right|+2$ How did the function shift from the parent function?
4. What effect does *k* has on the graph of $y=\left|x\right|+k$?
5. **Flipping, Stretching and Shrinking:** $y=a\left|x\right|$

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On the graph at right, graph the three following functions, each one in a different color pen or pencil.

1. $y = \left|x\right|$
2. $y= 3\left|x\right|$ How did the function change from the parent function?
3. $y= \frac{1}{3}\left|x\right|$ How did the function change from the parent function?

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On the graph at right, graph the three following functions, each one in a different color pen or pencil.

1. $y = \left|x\right|$
2. $y= -\left|x\right|$ How did the function change from the parent function?
3. $y= -3\left|x\right|$ How did the function change from the parent function?

d. What effect does *a* has on the graph of $y=a\left|x\right|$?

5. Graph y =  6. Write an equation for the graph.

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