Group 1:

Activity 1:

Step 1: Use a graphing utility (I would recommend Desmos) to graph $y = \sqrt{x}$.

Step 2: Graph $y = \sqrt{x} + 2$, $y = \sqrt{x} + 3$, $y = \sqrt{x} - 4$, and $y = \sqrt{x} - 7$. How does the graph change? Be as specific as you can be.

Step 3: What rule can you make about how $y = \sqrt{x} \pm a$ looks compared to $y = \sqrt{x}$?

Activity 2:

Step 1: Use a graphing utility (I would recommend Desmos) to graph $y = |x|$.

Step 2: Graph $y = |x - 2|$, $y = |x + 3|$, $y = |x - 4|$, and $y = |x - 7|$. How does the graph change? Be as specific as you can be.

Step 3: What rule can you make about how $y = |x \pm a|$ looks compared to $y = |x|$?

Conclusion #1:

Now that you've done those two activities, what rule can you make about how $y = f(x) \pm a$ looks compared to $y = f(x)$? What rule can you make about $y = f(x \pm a)$? Be prepared to share with the rest of the class

Activity 3:

Step 1: Use a graphing utility (I would recommend Desmos) to graph $y = \sqrt{x}$.

Step 2: Graph $y = -\sqrt{x}$, $y = \sqrt{-x}$. How does the graph change? Be as specific as you can be.

Step 3: Now use a graphing utility to graph $y = |x|$.

Step 4: Graph $y = -|x|$, $y = |-x|$. How does the graph change? Be as specific as you can be.

Conclusion #2:

What rule can you make about how $y = -f(x)$ looks compared to $y = f(x)$? What rule can you make about $y = f(-x)$? Be prepared to share with the rest of the class

Group 2:

<u>Activity 1:</u>

Step 1: Use a graphing utility (I would recommend Desmos) to graph $y = \sqrt{x}$.

Step 2: Graph $y = 2\sqrt{x}$, $y = 3\sqrt{x}$, and $y = \frac{4}{3}\sqrt{x}$. How does the graph change? Be as specific as you can be.

Step 3: Now graph $y = \frac{1}{2}\sqrt{x}$, $y = \frac{1}{3}\sqrt{x}$, and $y = \frac{3}{4}\sqrt{x}$. How does the graph change? Be as specific as you can be.

<u>Activity 2:</u>

Step 1: Use a graphing utility (I would recommend Desmos) to graph $y = |x|$.

Step 2: Graph $y = 2|x|$, $y = 3|x|$, and $y = \frac{4}{3}|x|$. How does the graph change? Be as specific as you can be.

Step 3: Now graph $y = \frac{1}{2}|x|$, $y = \frac{1}{3}|x|$, and $y = \frac{3}{4}|x|$. How does the graph change? Be as specific as you can be.

<u>Conclusion:</u>

Now that you've done those two activities, what rule can you make about how $y = af(x)$ looks compared to $y = f(x)$? Be prepared to share with the rest of the class

Note: Remember that things like $\frac{1}{2}x$ can also be written like $\frac{x}{2}$. Similarly $\frac{3}{4}x$ can also be written as $\frac{3x}{4}$

Group 3:

<u>Activity 1:</u>

Step 1: Use a graphing utility (I would recommend Desmos) to graph $y = \sqrt{x}$.

Step 2: Graph $y = \sqrt{2x}$, $y = \sqrt{3x}$, and $y = \sqrt{\frac{4}{3}x}$. How does the graph change? Be as specific as you can be.

Step 3: Now graph $y = \sqrt{\frac{1}{2}x}$, $y = \sqrt{\frac{1}{3}x}$, and $y = \sqrt{\frac{3}{4}x}$. How does the graph change? Be as specific as you can be.

<u>Activity 2:</u>

Step 1: Use a graphing utility (I would recommend Desmos) to graph $y = |x|$.

Step 2: Graph $y = |2x|$, $y = |3x|$, and $y = \left|\frac{4}{3}x\right|$. How does the graph change? Be as specific as you can be.

Step 3: Now graph $y = \left|\frac{1}{2}x\right|$, $y = \left|\frac{1}{3}x\right|$, and $y = \left|\frac{3}{4}x\right|$. How does the graph change? Be as specific as you can be.

<u>Conclusion:</u>

Now that you've done those two activities, what rule can you make about how $y = f(ax)$ looks compared to $y = f(x)$? Be prepared to share with the rest of the class

Note: Remember that things like $\frac{1}{2}x$ can also be written like $\frac{x}{2}$. Similarly $\frac{3}{4}x$ can also be written as $\frac{3x}{4}$