Task: Linear vs. Nonlinear Equations

QUESTION: When does an equation make a graph that is linear (a straight line) and when does an equation make a graph that is nonlinear (not a straight line)? Can you <u>predict</u>, just by looking at an equation, if the graph will be linear or not?

<u>Instructions</u>

Go to **desmos.com/calculator**. There, you can type in any equations you want, and look at the corresponding graph. Your goal is to try to notice some patterns and see if you can figure out which types of equations become linear and which become nonlinear. Keep track of the equations you graph by sorting them into the two boxes.

TIPS:
- You can type in function notation on Desmos, but for this activity, use "y" instead of "f(x)".
- Your equations should have x and y in them. Most equations use the form y = _____. But you can try some with x and y on the same side of the equation if you want. You may also use only x, or only y.
- You can easily type a fraction using the / button on the keyboard.
- Use the keyboard button on the bottom left to pull up some mathematical symbols you can use. You can put exponents using the a^b button, and there are other buttons like parentheses, square root, absolute value, and more. You should definitely experiment with these.
- Depending on the numbers you used, you may need to zoom way out to see your graph. Use the + and – buttons on the screen to zoom in and out.

These equations turned out linear:	These equations turned out nonlinear:

<u>OUR THEORY: An equation will be linear if…………</u>   <u>An equation will be nonlinear if…………</u>