# Families of Graphs

Graph **y = x** on the coordinate plane to the right (in one color so it stands out from the subsequent equations you graph). If you are using a graphing calculator for this lab, change the **zoom** to **square** to avoid distortion.

Next graph the following related equations using a different color pencil. Explain how it is different from its parent function y = x.

y = x + 5

y = x – 2

y = x + 3

y = x – 1

Write a statement that describes the relationship between the parent and child equations and their graphs.

Graph **y = |x|** on the coordinate plane to the right (in one color so it stands out from the subsequent equations you graph).

Next graph the following related equations using a different color pencil. Explain how it is different from its parent function y = x.

y = |x| + 1

y = |x| + 2

y = |x| - 3

y = |x |– 4

Write a statement that describes what you observed.

Graph **y = |x|** on the coordinate plan on the right and compare it to the following related equations.

y = |x – 2|

y = |x – 1|

y = |x + 4|

y = |x + 2|

Write a statement that describes what you observed.

Compare the parent **y = x2** with the following equations. (In [Desmos](desmos.com) use the ^ key and the number 2 to square x). How are they changed from the original?

y = x2 – 3

y = x2 + 1

y = (x – 4)2

y = (x + 2)2

y = (x + 2) 2 + 3

Write a statement that summarizes how y = x2 compares to y = (x – h)2 + k.

Circling back to our original line **y = x**, what happens when we multiply x by a number?

y = ½ x

y = 3x

y = -¾ x

y = -2x

Explain the effect of multiplying a number whose absolute value is between 0 and 1 has on x.

Explain the effect of multiplying x by a negative number has on the graph.

Do your explanations hold for the following?

y = |x| and y = -|x|

y = x2 and y = ¼ x2

y = x2 and y = -3x2

y = x3 and y = -x3

Summarize what you have learned.