Lesson 3.3.2: Patterns in Absolute Value Graphs
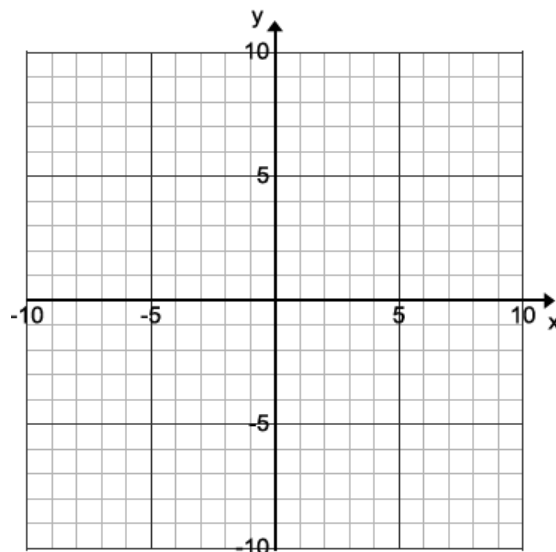
Targets:
1. I understand how to transform absolute value equations.

Warm Up:

Graph all three functions on the same coordinate plane.
Notice you have already graphed these in Lesson 3.3.1.

a. $f(x) = |x|$
b. $g(x) = |x - 5|$
c. $h(x) = |x + 2|$

What do you notice about the three graphs? Can you find a pattern that might help you graph similar functions in the future?
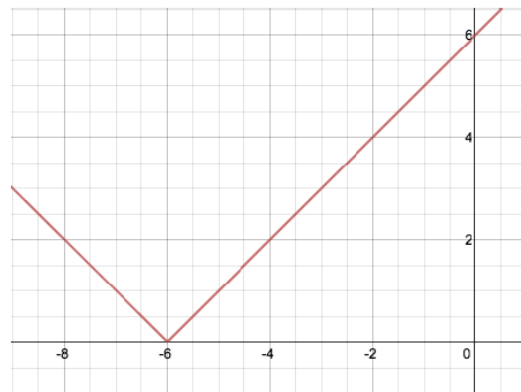
Practice 1

1.) Your classmate is unsure how to graph this function: $g(x) = |x - 4|$. Write an explanation about how you can transform the function $f(x) = |x|$ to graph $g(x)$.

2.) Karla and Isamar are disagreeing over which way the graph of the function $g(x)=|x+3|$ is translated relative to the graph of $f(x)=|x|$. Karla believes the graph of g is "to the right" of the graph of f; Isamar believes the graph is "to the left." Who is correct? Use the coordinates of the vertex of f and g and to support your explanation.

3.) Write the formula for the function depicted by the graph.

$y =$

Practice 2

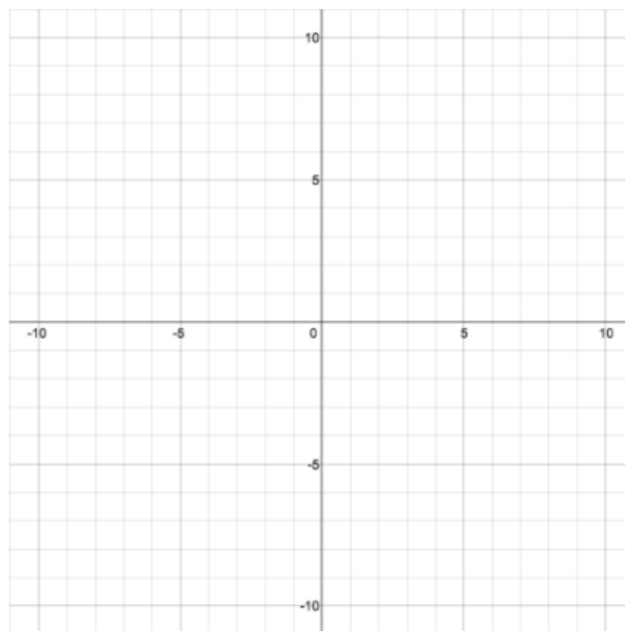Let $f(x) = |x|$, $g(x) = f(x) - 3$, $h(x) = f(x) + 2$ for any real number x.

a. Write an explicit formula for $g(x)$ in terms of $|x|$ (i.e., without using $f(x)$ notation).

b. Write an explicit formula for $h(x)$ in terms of $|x|$ (i.e., without using $f(x)$ notation).

c. Complete the table of values for these functions.

d. Graph all three functions.

x	$f(x) = |x|$	$g(x) = f(x) - 3$	$h(x) = f(x) + 2$
-3			
-2			
-1			
0			
1			
2			
3			

e. What is the relationship between the graph of $y = f(x)$ and the graph of $y = f(x) + k$?

Practice 3

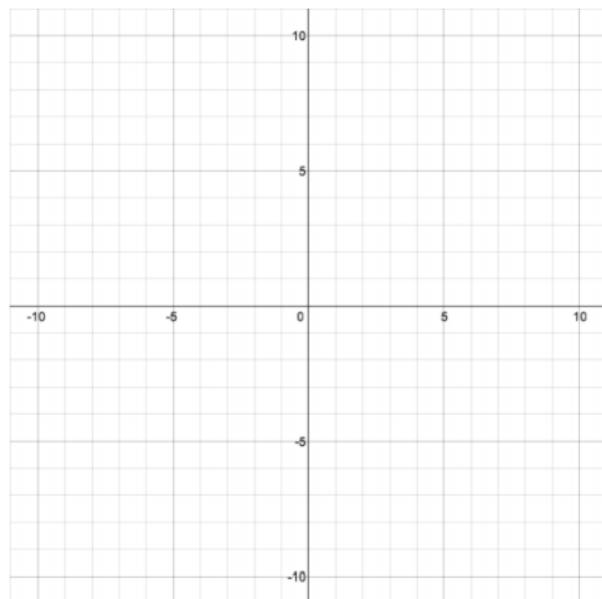Let $f(x) = |x|$, $g(x) = 2f(x)$, $h(x) = \frac{1}{2}f(x)$ for any real number

a. Write an explicit formula for $g(x)$ in terms of $|x|$ (i.e., without using $f(x)$ notation).

b. Write an explicit formula for $h(x)$ in terms of $|x|$ (i.e., without using $f(x)$ notation).

c. Complete the table of values for these functions.

d. Graph all three functions.

x	$f(x) = |x|$	$g(x) = 2f(x)$	$h(x) = \frac{1}{2}f(x)$
-3			
-2			
-1			
0			
1			
2			
3			

e. What is the relationship between the graph of $y = f(x)$ and the graph of $y = k \cdot f(x)$?

Practice 4

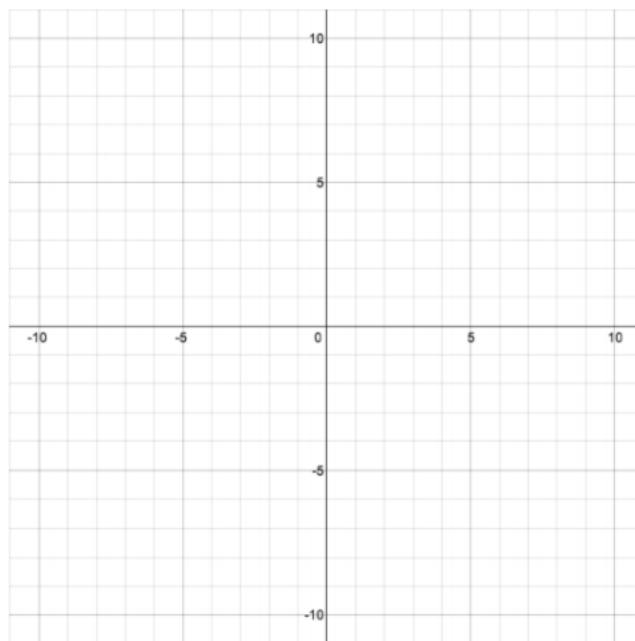Let $p(x) = -|x|$, $q(x) = -2f(x)$, $r(x) = -\frac{1}{2}f(x)$ for any real number

a. Write an explicit formula for q(x) in terms of |x| (i.e., without using f(x) notation).

b. Write an explicit formula for r(x) in terms of |x| (i.e., without using f(x) notation).

c. Complete the table of values for these functions.

d. Graph all three functions.

x	$p(x) = -|x|$	$q(x) = -2f(x)$	$r(x) = -\frac{1}{2}f(x)$
−3			
−2			
−1			
0			
1			
2			
3			

e. What is the relationship between the graph of $y = f(x)$ and the graph of $y = -k \cdot f(x)$?

Exit Ticket

Graph the following functions by transforming the graph of $f(x) = |x|$

a. $g(x) = |x - 3|$

b. $h(x) = |x| + 3$

c. $j(x) = 3|x|$

d. $k(x) = -3|x|$

e. $m(x) = 2|x + 2| + 2$