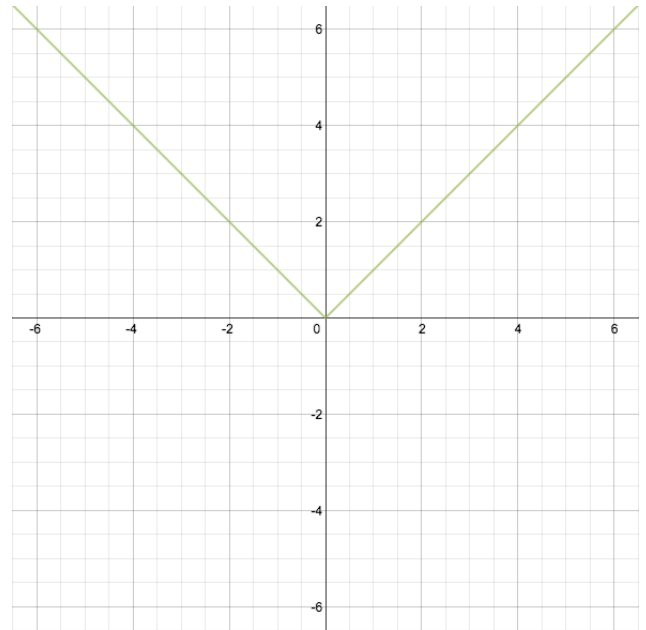


## P.S. #12.1 - Vertical and Horizontal Shifts

Name: \_\_\_\_\_ Class: \_\_\_\_\_

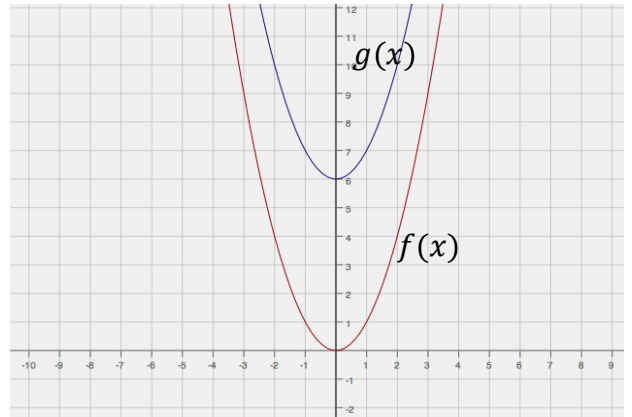
Let  $f(x) = |x|$  for every real number  $x$ . The graph of  $y = f(x)$  is shown to the right. Describe how the graph for each function below is a transformation of the graph of  $y = f(x)$ . Then use this same set of axes to graph each function for problems 1 and 2. Be sure to label each function on your graph.



1.)  $a(x) = |x| + \frac{3}{2}$

2.)  $b(x) = |x| - 3$

3.) Linda sketched the graphs of  $f(x) = x^2$  and  $g(x) = x^2 - 6$  as shown. Did she graph both of the functions correctly? Explain how you know.



4.) Graph the functions in the same coordinate plane. Do not use a graphing calculator.

$$f(x) = \sqrt{x}$$

$$p(x) = 7 + \sqrt{x}$$

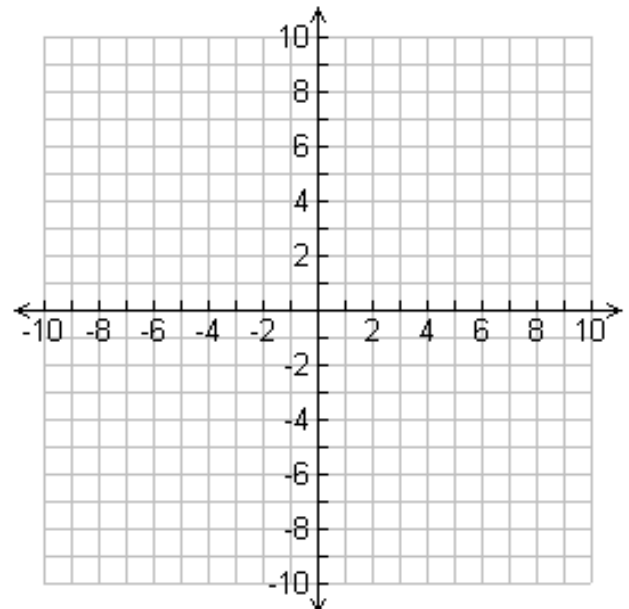
$$q(x) = \sqrt{x+8}$$

Identify the domain and range of each function.

$f(x)$

$g(x)$

$q(x)$



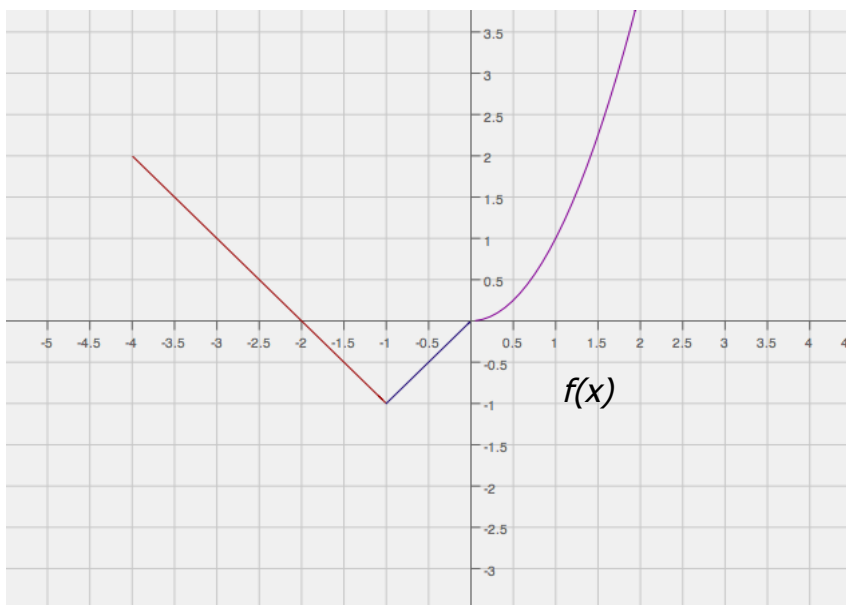
5.) Write a function that translates the graph of the parent function  $f(x) = x^2$  down 7.5 units and right 2.5 units.

6.) How would the graph of  $f(x) = |x|$  be affected if the function were transformed to  $f(x) = |x + 6| + 10$ ?

7.) Below is a graph piecewise function  $f$  whose domain is the interval  $-4 < x < 2$ . Sketch the graph of the given functions below. Label your graphs correctly.

a.  $g(x) = f(x) - 1$

b.  $h(x) = g(x - 2)$

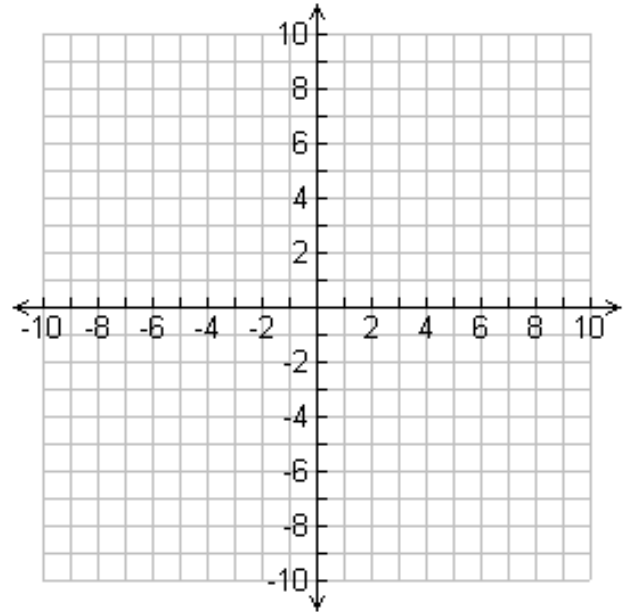
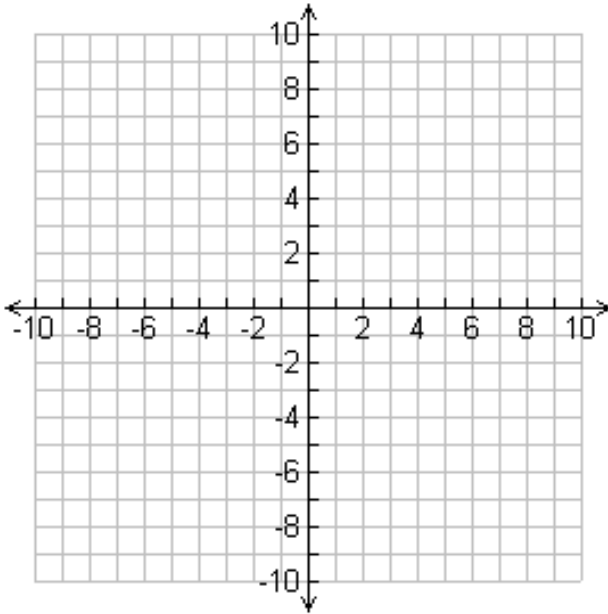


8.) The minimum point on the graph of the function  $y = f(x)$  is  $(-2, -4)$ . What is the minimum point on the graph of the function  $y = f(x) + 7$ ?

Graph the following functions using their parent functions and your knowledge of vertical and horizontal shifts.

9.)  $g(x) = 3^{x-1} - 5$

10.)  $k(x) = \sqrt[3]{x+2} + 4$

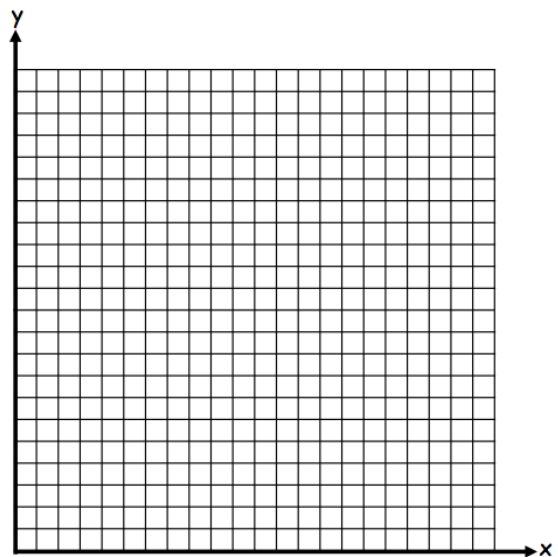


11.) The value of tolls on the New Jersey Turnpike is based upon the number of miles traveled.

The function  $t(x) = \begin{cases} 3x + 15 & 0 \leq x \leq 95 \\ 11x - 725 & 95 < x \leq 112 \end{cases}$  can be used to calculate the cost of traveling

along the NJ Turnpike, where  $x$  represents the number of miles traveled (rounded to the nearest mile) and  $t(x)$  represents the cost of the toll in cents.

- Sketch the graph of  $t(x)$ .
- Find the cost of getting at exit 7A – mile marker 60.9 and getting off at exit 11 – mile marker 93.4.
- Find the cost of traveling the entire length of the NJ Turnpike – 112 miles.
- Approximately how many miles would you need to travel to have a toll of \$2.50?



12.) A garden measuring 12 m by 16 m is to have a pedestrian pathway that is  $w$  meters wide installed all the way around it, increasing the total area to 285 sq m. What is the width,  $w$ , of the pathway?