Name(s): Period:

Math Lab: Investigating Piecewise Functions

STEP A: Cut out the graphs on the last two pages of the packet. Divide them equally between partners. Use transformations and extra guide points to accurately sketch each graph in pencil.

STEP B: Check that each graph your partner sketched is correct, then trace over the sketch in the indicated color.

STEP C: Cut VERTICAL line(s) along each of the domain values described in the piecewise function below for one subfunction at a time, working left to right. For example, if the subfunction is defined as $4(x+3)^2-5$ when $x<-3$, cut a vertical line at $x=-3$ and discard unused sections of graph.

STEP D: Glue the pieces of the subfunctions onto the coordinate plane beneath each piecewise function to create its graph. If the domain value is not included in the function (< or >), make an open circle at that point. If the domain value is included in the function ($\leq$ or $\geq$), make a closed circle at that point. If the domain of any subfunction is half bounded, make an arrowhead on the end that extends toward either positive or negative infinity.

STEP E: State the domain and range of each piecewise function using interval notation.

STEP F: Identify the intervals of increasing, decreasing, and/or constant of each piecewise function.

STEP G: Describe the end behavior of each piecewise function.

STEP H: Identify the extrema of each piecewise function and classify each as a(n) absolute max, absolute min, relative max, or relative min.

After you have completed steps A-H, answer the analysis questions about the piecewise functions f(x), g(x), and h(x) below.

1] Which piecewise function has a bounded domain? What do you notice about its symmetry?

2] Which piecewise function has a half-bounded range? What do you notice about its domain?

3] Which piecewise function has infinite discontinuity? What do you notice about its extrema?

4] Which piecewise function has jump discontinuity? What do you notice about its symmetry?

5] Which piecewise function is odd? Give a set of ordered pairs demonstrating this relationship.

6] Which piecewise function is even? Give a set of ordered pairs demonstrating this relationship.

7] Which is your favorite piecewise function? Explain why.

Evaluate the piecewise functions for the values below. If undefined, write ∅.

8] $f(0) =$

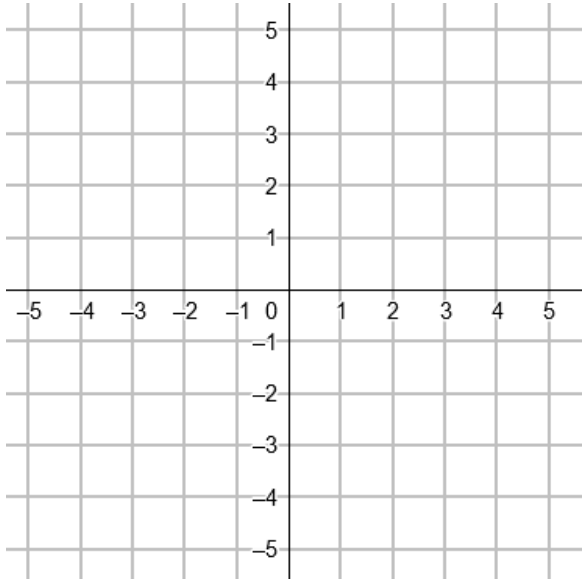
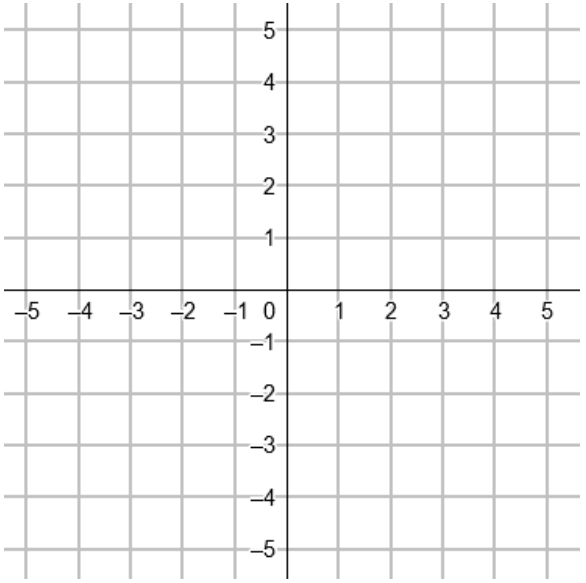
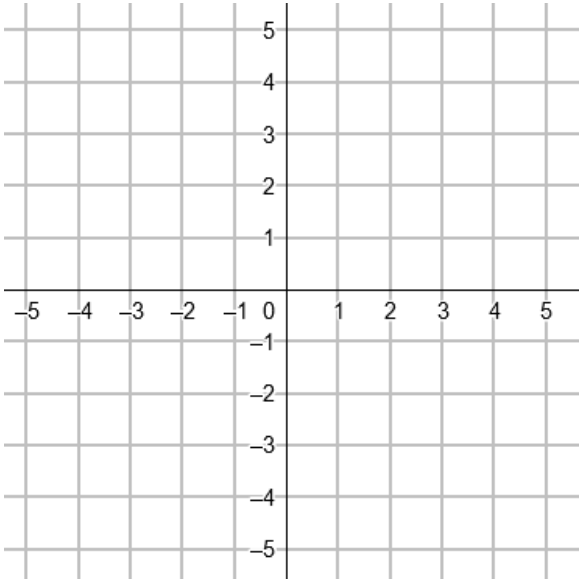
9] $g(0) =$

10] $h(0) =$

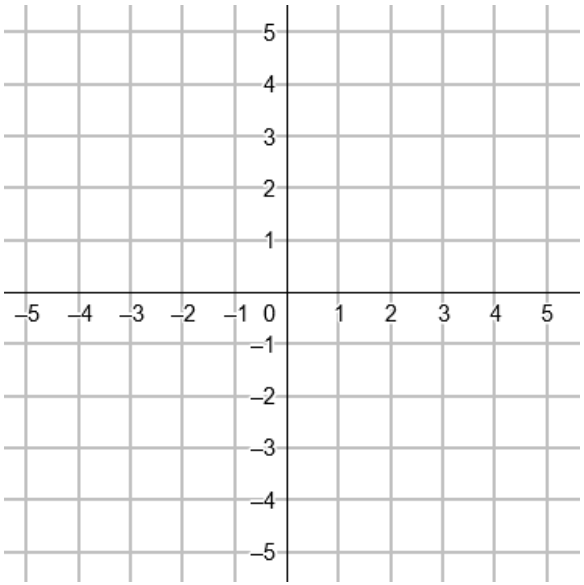
10] $f(-2) =$

11] $g(-2) =$

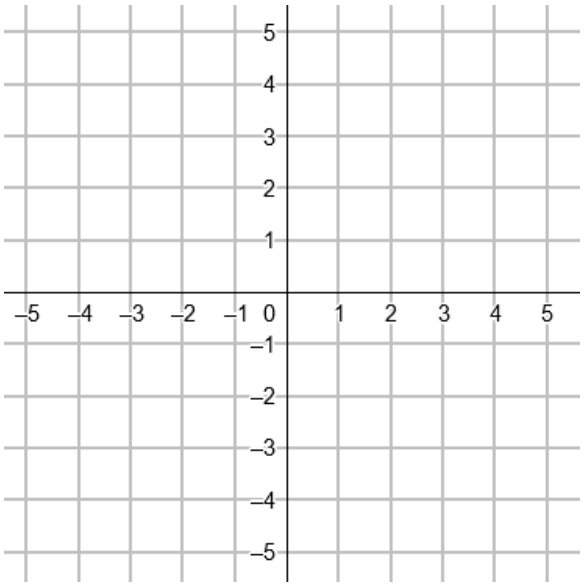
12] $h(-2) =$

$f(x)=\begin{cases}4(x+3)^2-5, x\le -3\\ -2\lvert x+2\rvert+4, -3<x<-1\\ x^2-3, -1\le x\le 1\\ -2\lvert x-2\rvert+4, 1<x<3\\ 4(x-3)^2-5, x\ge 3\end{cases}$	$g(x)=\begin{cases}\sqrt[3]{x+3}-2, x\le -2\\ {}^{2}/_{x}, -2<x<2\\ 2\sqrt{x-2}+1, 2\le x<3\\ 3, x\ge 3\end{cases}$	$h(x)=\begin{cases}-\frac{1}{2}x-5, -4<x\le -2\\ \frac{1}{2}x^3, -2<x<2\\ -\frac{1}{2}x+5, 2\le x<4\end{cases}$
		
Domain: / Range:	Domain: / Range:	Domain: / Range:
Increasing:	Increasing:	Increasing:
Decreasing:	Decreasing:	Decreasing:
Constant:	Constant:	Constant:
End Behavior: $x\to -\infty, y\to$ $x\to \infty, y\to$ / Extrema:	End Behavior: $x\to -\infty, y\to$ $x\to \infty, y=$ / Extrema:	End Behavior: $x\to -4^{+}, y\to$ $x\to 4^{-}, y\to$ / Extrema:

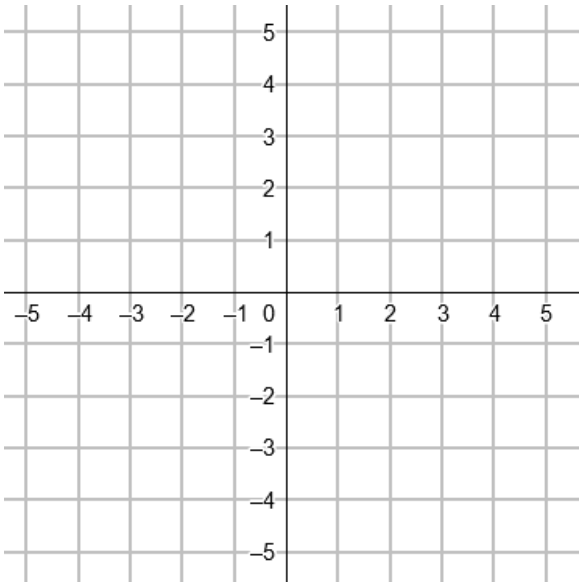
$y = 4(x+3)^2 - 5$ (RED)



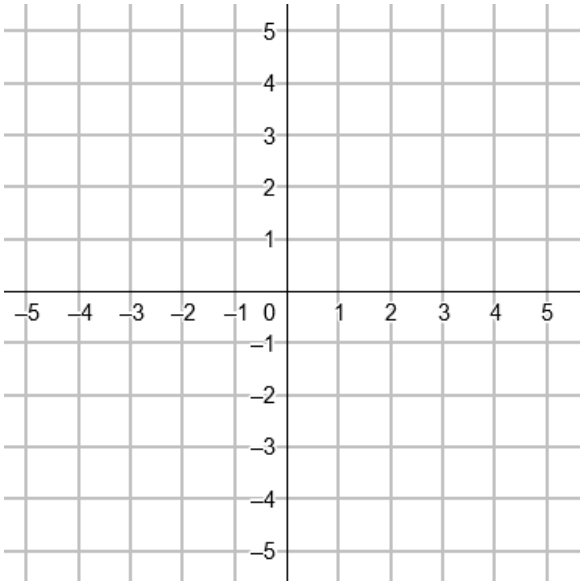
$y = -2|x+2| + 4$ (BLUE)



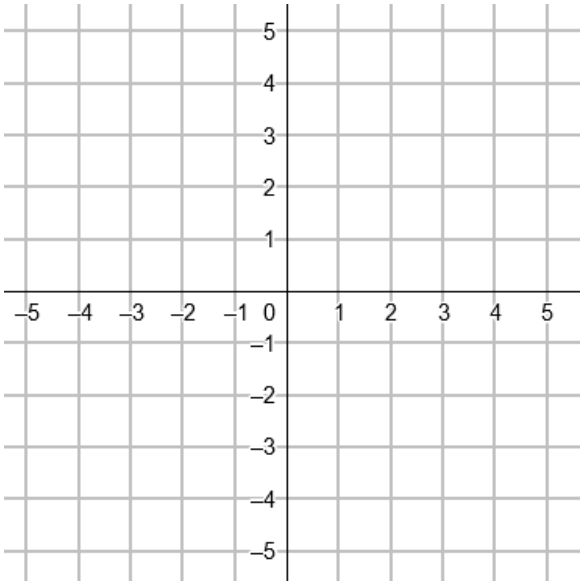
$y = -\frac{1}{2}x + 5$ (GREEN)



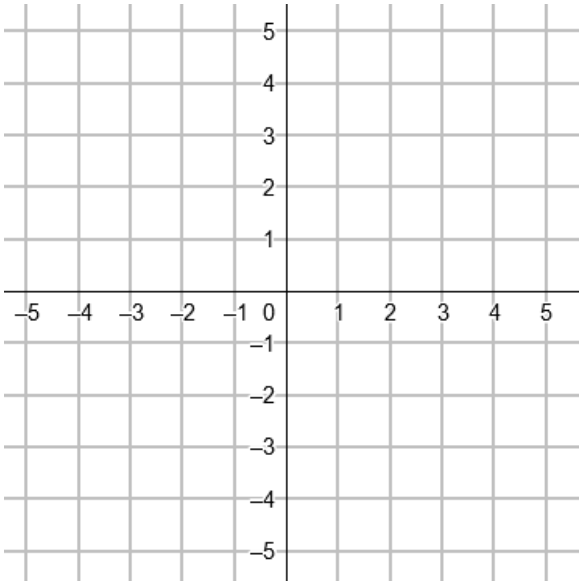
$y = \sqrt[3]{x+3} - 2$ (RED)



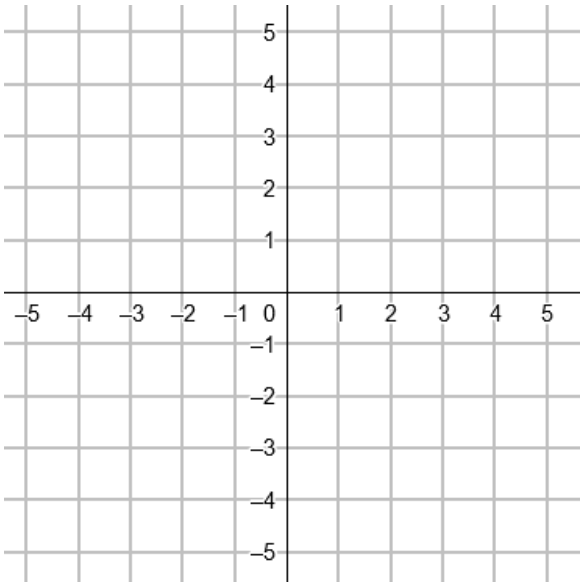
$y = 3$ (BLUE)



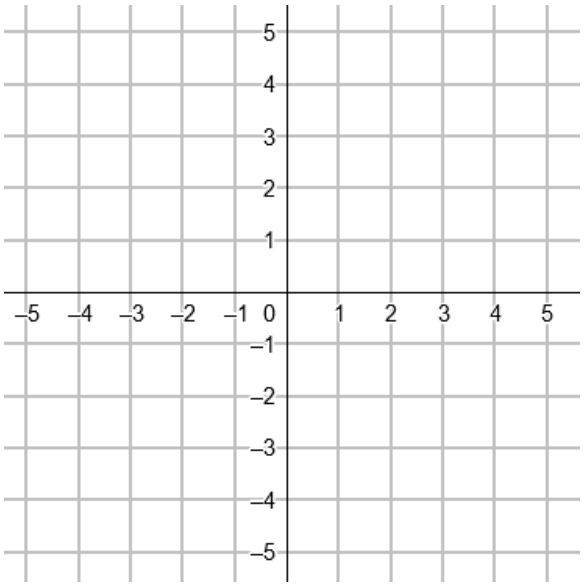
$y = x^2 - 3$ (RED)



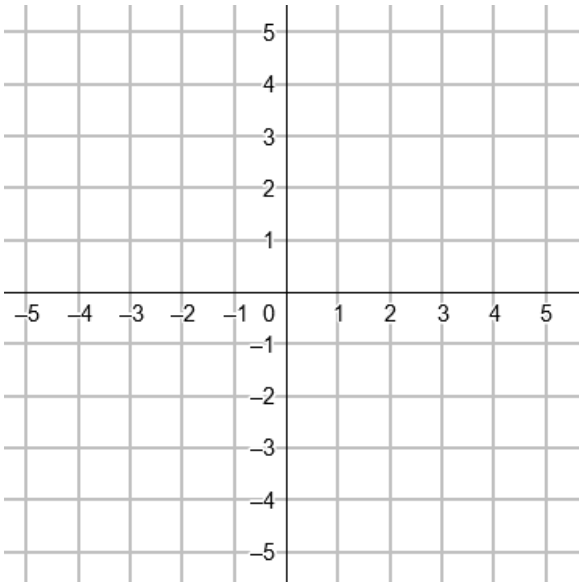
$y = {}^{2}/_{x}$ (GREEN)



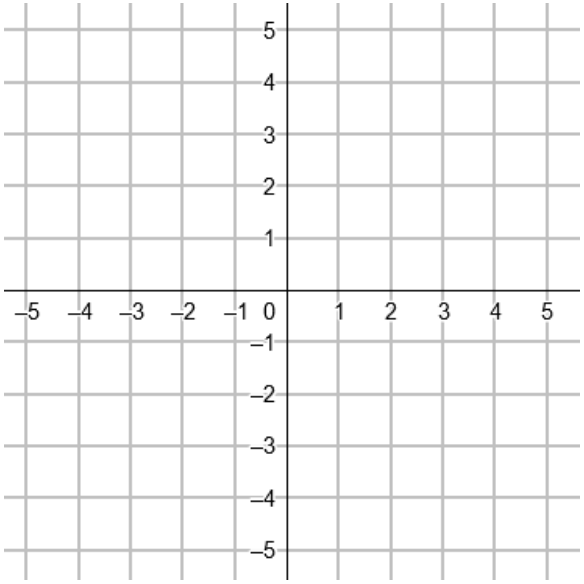
$y = -2|x - 2| + 4$ (BLUE)



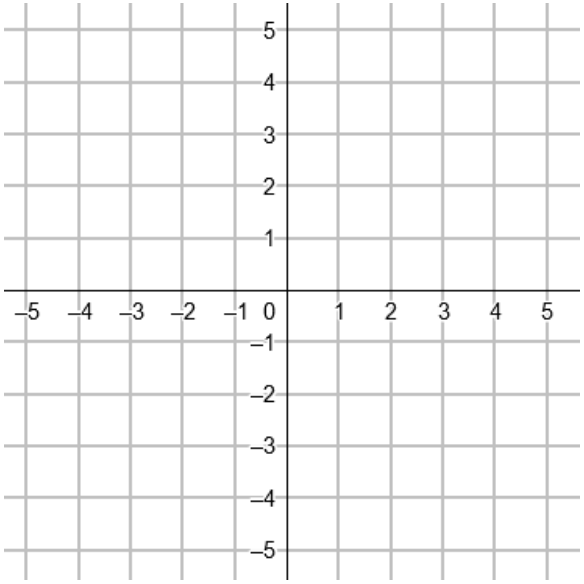
$y = -\frac{1}{2}x - 5$ (RED)



$y = \frac{1}{2}x^3$ (BLUE)



$y = 4(x - 3)^2 - 5$ (RED)



$y = 2\sqrt{x - 2} + 1$ (RED)