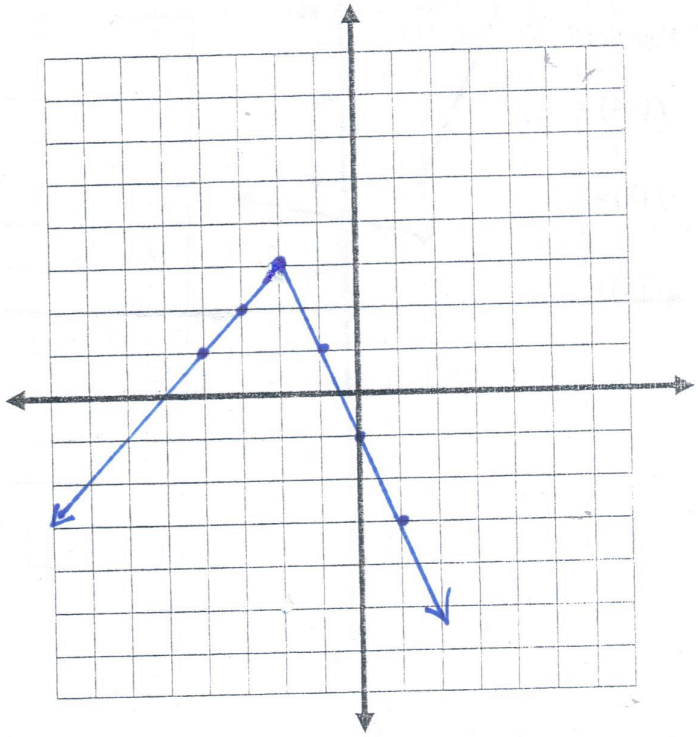
Section 4-3 HW

Worksheet Piecewise Functions

Name: KEY!

Part I. Carefully graph each of the following. Identify whether or not the graph is a function. Then, evaluate the graph at any specified domain value. You may use your calculators to help you graph, but you must sketch it carefully on the grid!

1. $f(x) = \begin{cases} x+5 & x < -2 \\ -2x-1 & x \geq -2 \end{cases}$



Function? (Yes) or No

$f(3) = -2(3)-1 = -7$

$f(-4) = -4+5 = 1$

$f(-2) = -2(-2)-1 = 3$

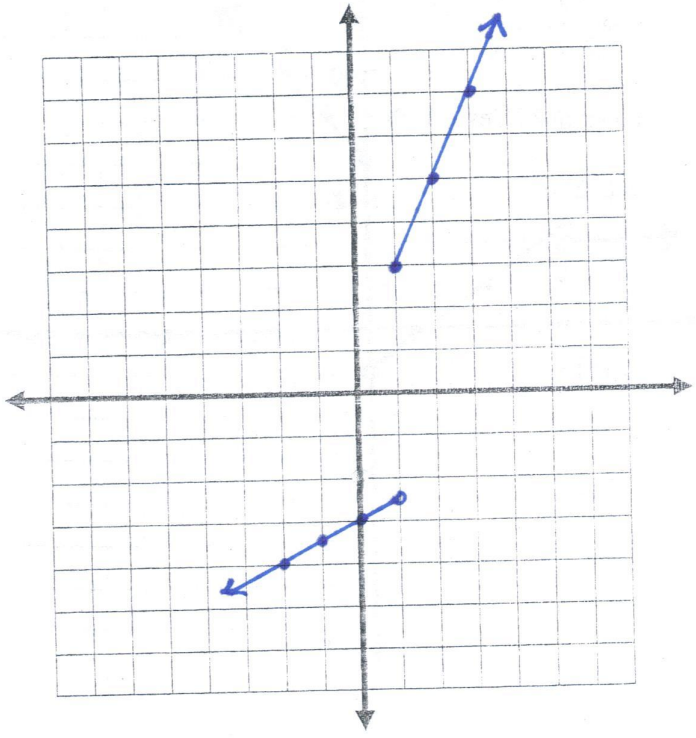
x	y
-4	1
-3	2
* -2	3

open circle

x	y
-2	3
-1	1
0	-1
1	-3

← closed circle

2. $f(x) = \begin{cases} 2x+1 & x \geq 1 \\ \frac{x}{2}-3 & x < 1 \end{cases}$



Function? (Yes) or No

$f(-2) = \frac{-2}{2}-3 = -4$

$f(6) = 2(6)+1 = 13$

$f(1) = 2(1)+1 = 3$

closed circle →

x	y
1	3
2	5
3	7
4	9

x	y
-2	-4
-1	-3.5
0	-3
* 1	-2.5

3. $f(x)=\begin{cases}4x-2 & x\geq 2\\ -\frac{x}{3}+4 & x<2\end{cases}$

Function? (Yes) or No

$f(-4)=\frac{-(-4)}{3}+4=5.\overline{3}$

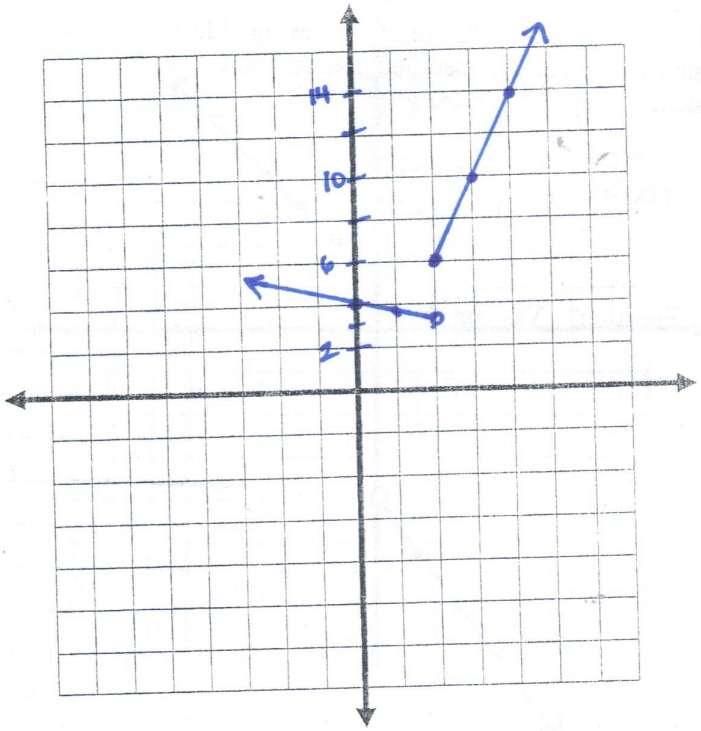
$f(8)=4(8)-2=30$

$f(2)=4(2)-2=6$

x	y
2	6
3	10
4	14

closed circle

x	y
0	4
1	$3.\overline{6}$
* 2	$3.\overline{3}$



4. $\begin{cases}-x+4 & x\leq 0\\ \frac{2x}{3}-1 & 0<x\leq 5\\ 2 & x>5\end{cases}$

Function? (Yes) or No

$f(-2)=-(-2)+4=6$

$f(0)=-(0)+4=4$

$f(5)=\frac{2(5)}{3}-1=2.\overline{3}$

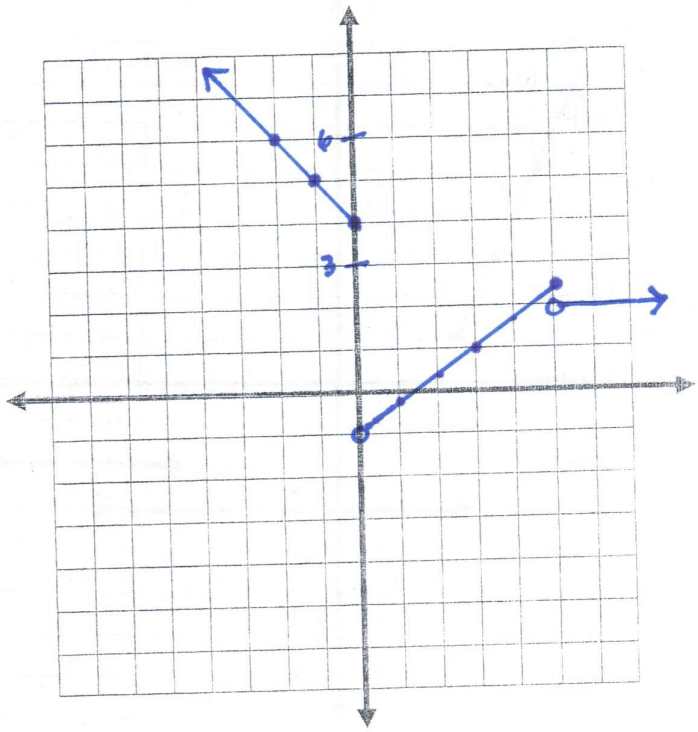
x	y
-2	6
-1	5
0	4

closed circle

x	y
* 0	-1
1	$-.\overline{3}$
2	$.\overline{3}$
3	1
4	$1.\overline{6}$
5	$2.\overline{3}$

closed circle

x	y
* 5	2
6	2
7	2



5. $f(x) = \begin{cases} -x+1 & x \le 0 \\ -\frac{4x}{3} - 4 & x > 0 \end{cases}$

Function? (Yes) or No

$f(-4) =$ $-(-4)+1 = 5$

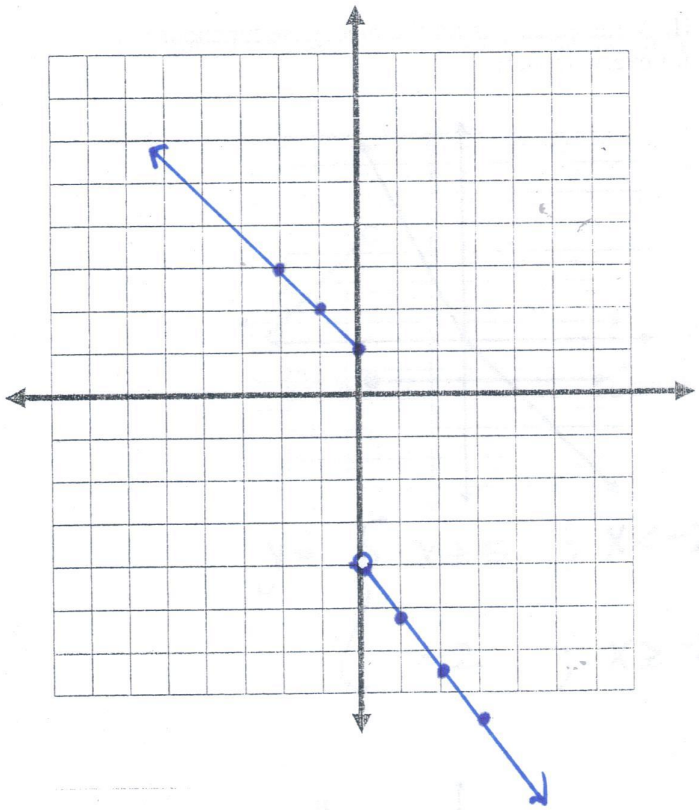
$f(0) =$ $-(0)+1 = 1$

$f(3) =$ $\frac{-4(3)}{3} - 4 = -8$

x	y
-2	3
-1	2
0	1

closed circle

x	y
* 0	-4
1	$-5.\overline{3}$
2	$-6.\overline{6}$
3	-8



6. $f(x) = \begin{cases} -3 & x \le 3 \\ 2x-5 & x > 3 \end{cases}$

Function? (Yes) or No

$f(-4) =$ -3

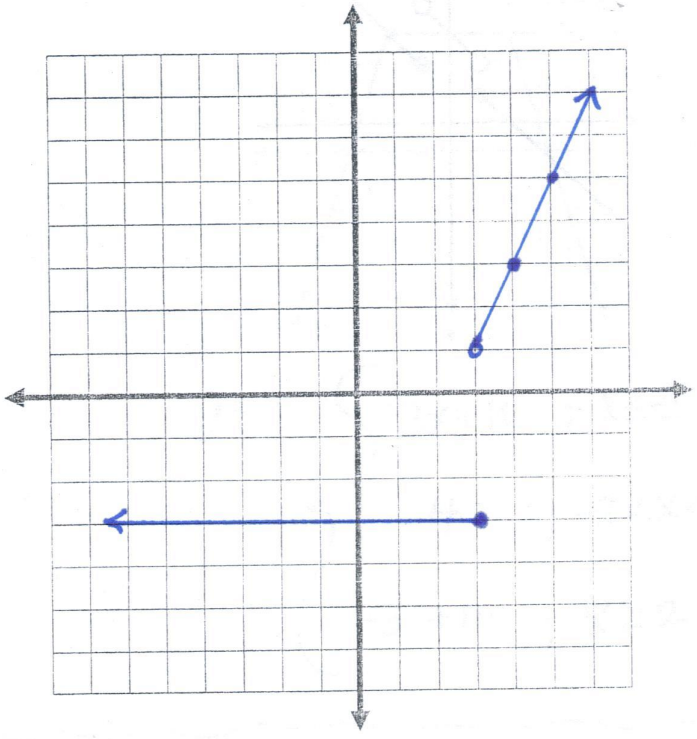
$f(0) =$ -3

$f(3) =$ -3

x	y
0	-3
1	-3
2	-3
3	-3

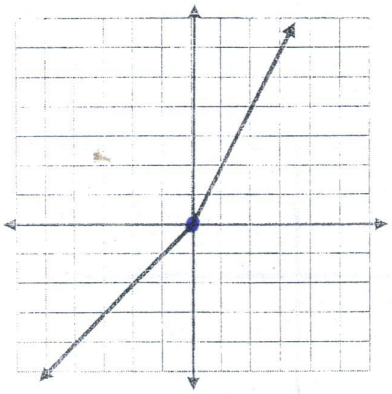
closed circle

x	y
* 3	$2(3)-5=1$
4	$2(4)-5=3$
5	5



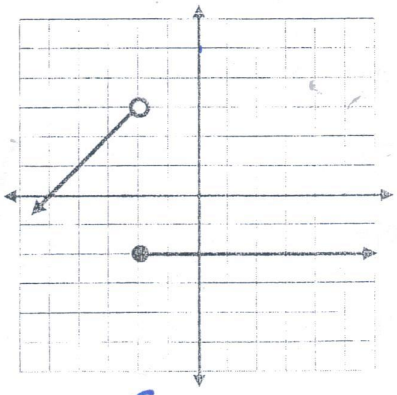
Part II. Write equations for the piecewise functions whose graphs are shown below. Assume that the units are 1 for every tic marc.

7.



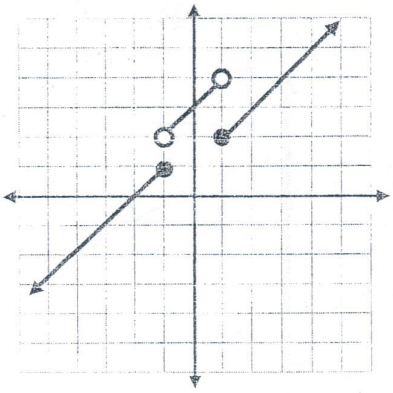
$$y = \begin{cases} x & ; x < 0 \\ 2x & ; x \geq 0 \end{cases}$$

8.



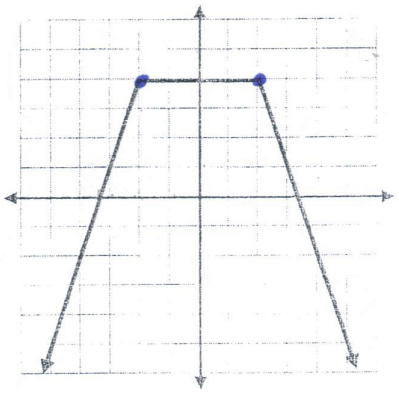
$$y = \begin{cases} x+5 & ; x < -2 \\ -2 & ; x \geq -2 \end{cases}$$

9.



$$y = \begin{cases} x+2 & ; x \leq -1 \\ x+3 & ; -1 < x < 1 \\ x+1 & ; x \geq 1 \end{cases}$$

10.



$$y = \begin{cases} 3x+10 & ; x \leq -2 \\ 4 & ; -2 < x < 2 \\ -3x+10 & ; x \geq 2 \end{cases}$$

Work:

$-3x+c=4$ when $x=2$

$-3(2)+c=4$

$c=10$

$3x+c=4$ when $x=-2$

$3(-2)+c=4$

$c=10$

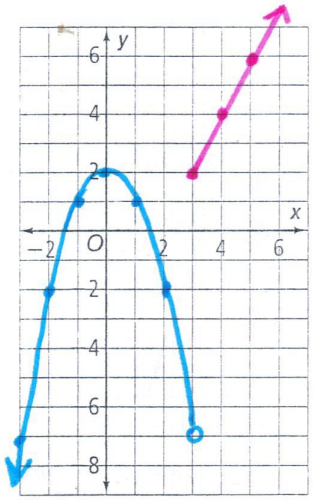
Name _____ Class _____ Date _____

Practice

Form G

Piecewise Functions

1. Graph the function $f(x) = \begin{cases} 2x - 4, & \text{for } x \geq 3 \\ -x^2 + 2, & \text{for } x < 3 \end{cases}$



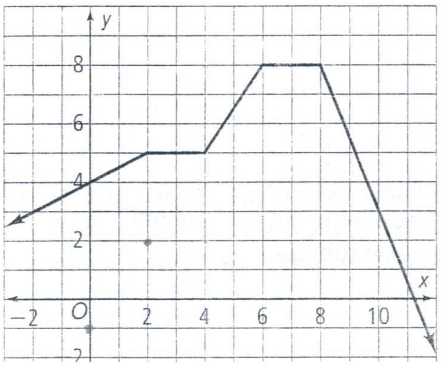
x	y
3	2
4	4
5	6
6	8

closed circle

x	y
3	-7
2	-2
1	1
0	2
-1	1
-2	-2

open circle

2. Write a piecewise function that represents the graph shown below.

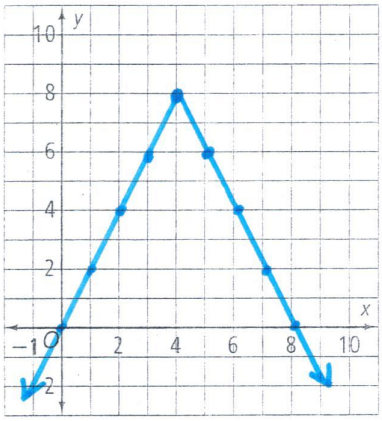


$$y = \begin{cases} \frac{1}{2}x + 4 & ; x \leq 2 \\ 5 & ; 2 < x \leq 4 \\ \frac{3}{2}x - 1 & ; 4 < x \leq 6 \\ 8 & ; 6 < x \leq 8 \\ -5x + 48 & ; x > 8 \end{cases}$$

3. Consider the absolute value function $f(x) = -2|x - 4| + 8$.

Flip, Stretch, RH, Ups

a. Graph the function.



b. What is the piecewise definition for the graph?

$$y = \begin{cases} 2x & ; x < 4 \\ -2x + 16 & ; x \geq 4 \end{cases}$$

$-5(8) + c = 8$

$-40 + c = 8$

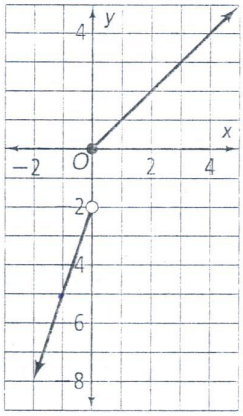
$c = 48$

Name _____ Class _____ Date _____

Practice (continued) Form G

Piecewise Functions

4. The graph of $f(x)$ is given below. What is the graph of $g(x) = f(x - 2)$?



$$y = \begin{cases} 3x - 2 & ; x < 0 \\ x & ; x \geq 0 \end{cases}$$

5. What is the graph of the step function $f(x) = 2\lfloor x - 3 \rfloor$?

6. **Reasoning** Define the greatest integer function $f(x) = \lceil x \rceil$ in your own words. Then use the definition to explain how you know where to place closed circles and open circles when graphing a greatest integer function.