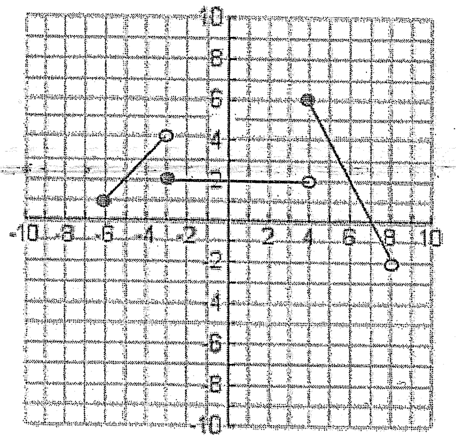
Name: ____________

Piecewise Functions Practice

Per: ____

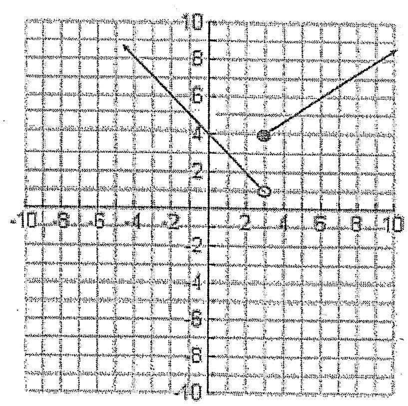
The following graph is called a **piecewise function** because the function is defined by two or more different equations applied to different parts of the function's domain.



Notice that it appears to be composed of three segments, each a different linear function over a particular domain. Please note a filled circle includes that point, while an open circle does not include that point.

1. What is the domain for the first (left) segment? ____________ the range? ____________
2. What is the domain for the second (middle) segment? ____________ the range? ____________
3. What is the domain for the third (right) segment? ____________ the range? ____________

4. How many equations do you think you would have to use to write the rule for the following piecewise function? ______



Notice that it appears to be composed of two rays, each a different linear function over a particular domain.

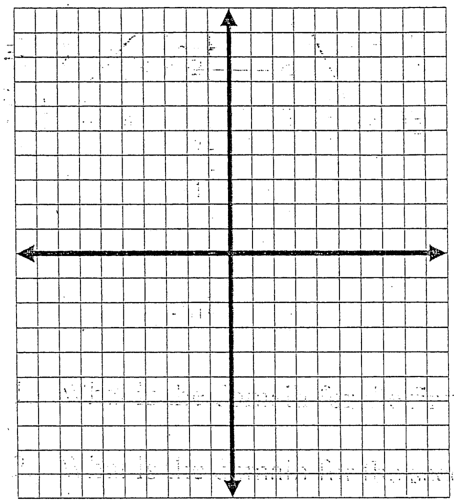
5. What is the domain for the first (left) ray? ____________ the range? ____________
6. What is the domain for the second (right) ray? ____________ the range? ____________

Given

$$f(x) = \begin{cases} 2x & ,-5 \le x < 2 \\ 5 & ,2 \le x \le 6 \end{cases}$$

1. Complete the following table of values for the piecewise function over the given domain.

x	$f(x)$
-5	
-3	
0	
1	
1.7	
1.9	
2	
2	
2.2	
4	
6	



2. Graph the ordered pairs from your table to hand sketch the graph of the piecewise function.

3. How many pieces does your graph have? _________ Why? _________________________

4. Are the pieces rays or segments? ____________________________ Why? ____________________

5. Are all the endpoints solid dots or open dots or some of each? _________Why? _______________________

6. Were all these x values necessary to graph this piecewise function, or could this have been graphed using less points? ____

7. Which x values were "critical" to include in order to sketch the graph of this piecewise function?

____

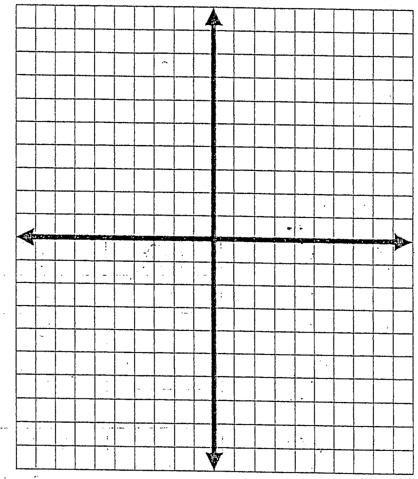
8. $f(x) = \begin{cases} x+3 & ,-8 \le x < 1 \\ 10-2x & ,1 \le x \le 7 \end{cases}$

   a. Make a table of values for the piecewise function over the given domain.

x	$f(x)$

b. Why did you choose the x values you placed into the table? ____________________

c. Graph the ordered pairs from your table to hand sketch the graph of the piecewise function.



d. How many pieces does your graph have? ______ Why? ____________________

e. Are the pieces rays or segments? ______________ Why? ____________________

f. Are all the endpoints filled circles or open circles or some of each? __________ Why? __________

g. Was it necessary to evaluate both pieces of the function for the x-value 1? ______

Why or why not? ____________________

h. Which x values were "critical" to include in order to graph this piecewise function? Explain.

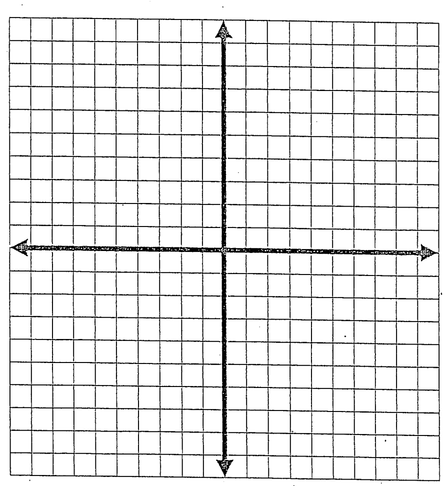
____

Complete a table of values for the piecewise functions over the given domains.

9.

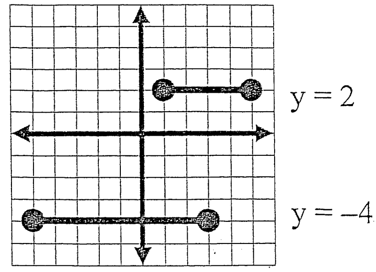
$$f(x)=\begin{cases} 2x+4 & \text{if } -10<x<-4 \\ \frac{3}{2}x-1 & -4\le x<2 \\ -x+5 & x\ge 2 \end{cases}$$

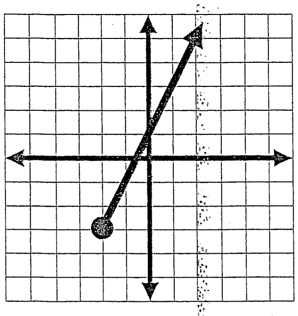
x	$f(x)$



Writing Equations of Piecewise Defined Functions

The EASIEST equation to write is that of a horizontal line. The equation of a horizontal line is always written like this: y = b, where b is the y-intercept. So the equation for the TOP line at the right would be y = 2 with a restricted domain of $1 \le x \le 5$.
The line at the bottom of the graph is y = –4 with a domain of $-5 \le x \le 3$.





This equation is linear. You can see where the line crosses the y-axis (the **y-intercept** or **b**) and you can easily count the slope of the line (**m**). This will allow you to write the equation in slope intercept form (**y = mx + b**). The graph at the left is y = 2x + 1 with a domain of $x \ge -2$.

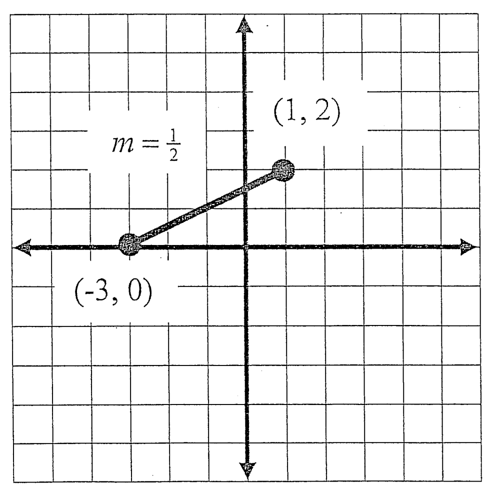
$$y = mx + b$$

$slope = \dfrac{rise}{run}$ ↗   ← *y-intercept*

Sometimes you don't have a y-intercept that is an integer, or the y-intercept cannot be seen on the graph. You always have a y-intercept unless the line is vertical. If this is the case, then you have to use point slope form. This requires you to know the slope of the line and 2 points on the line.

The graph at the right has a y-intercept that you can see, but it is not one that you can readily determine. You never want to guess what the y-intercept is if it is not an integer.
So we will use the point-slope formula to determine the equation of the line.

Point-slope Form: $y - y_1 = m(x - x_1)$



Step 1: Find the slope of the line. You can either....

a. count rise and run $m = \dfrac{rise}{run}$

b. use the two endpoints and slope formula $\dfrac{y_2 - y_1}{x_2 - x_1}$

Step 2: Take ONE of the endpoints and the slope and plug into the point slope form. $m = \frac{1}{2}$ and use (1, 2)

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

$y - 2 = \frac{1}{2}x - \frac{1}{2}$

$y = \frac{1}{2}x + 1\frac{1}{2}$

$y = \frac{1}{2}x + 1\frac{1}{2} \qquad -3 \le x \le 1$