Name Key
CC Algebra

Date _____
Period _____

## Writing Piecewise Functions from a Given Graph

Procedures:

1. Set up your piecewise function like this. It all depends on how many pieces there are.

$$f(x)=\begin{cases} \quad ,if \\ \quad ,if \\ \quad ,if \end{cases}$$

2. If the functions are linear, find the slope (m) and y-intercept (b) of each piece and write it in the form y = mx + b. Only the expression part of the equation will be written in the final answer.

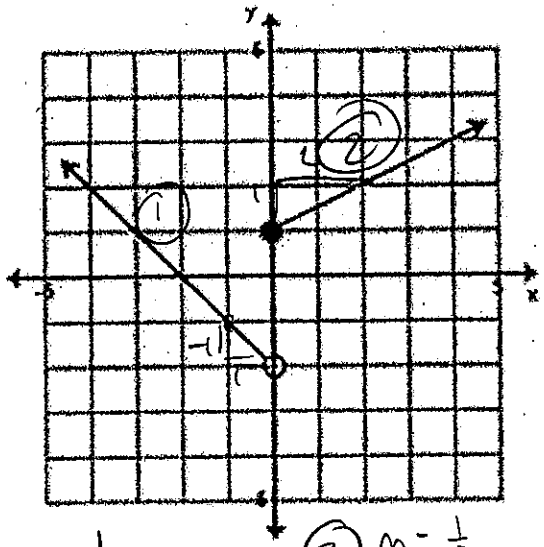
3. Find the domain (x-values) for each piece. Write the domain next to its corresponding expression.

* arrow a 1 end, dot on the other = single constraint ** dots on both ends (No arrows) = Compound inequalities (double constraints)

★ Read graphs from left to right ★

Write the piecewise function for each graph shown.

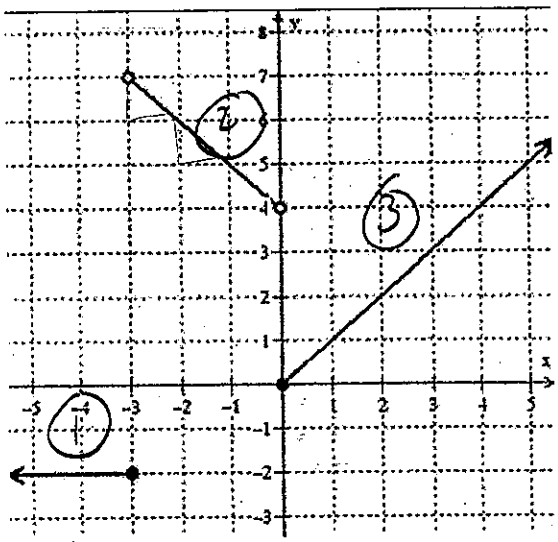
★ Always figure out the equations of the lines as they appear from left to right on the graph so your domain will always be in numerical order ★




① $m=\frac{-1}{1}$
$b=-2$
$y=-x-2$
$x<0$ (open)

② $m=\frac{1}{2}$
$b=1$
$y=\frac{1}{2}x+1$
$x\geq 0$ (closed)

$$f(x)=\begin{cases} -x-2, & \text{if } x<0 \\ \frac{1}{2}x+1, & \text{if } x\geq 0 \end{cases}$$



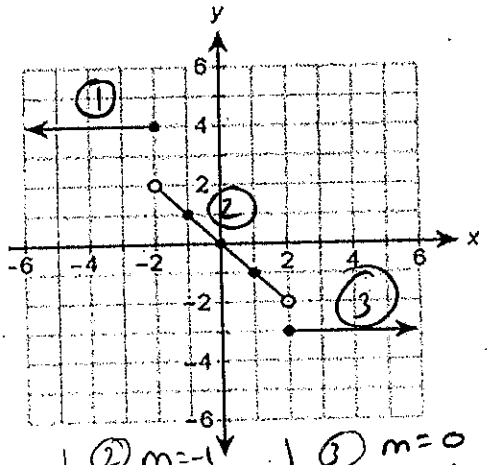

① $m=0$
$b=-2$
$y=-2$
$x\leq -3$ (closed)

② $m=\frac{-1}{1}$
$b=4$
$y=-x+4$
$-3<x<0$ (open)

③ $m=\frac{1}{1}$
$b=0$
$y=x$
$x\geq 0$ (closed)

$$f(x)=\begin{cases} -2, & \text{if } x\leq -3 \\ -x+4, & \text{if } -3<x<0 \\ x, & \text{if } x\geq 0 \end{cases}$$

3.



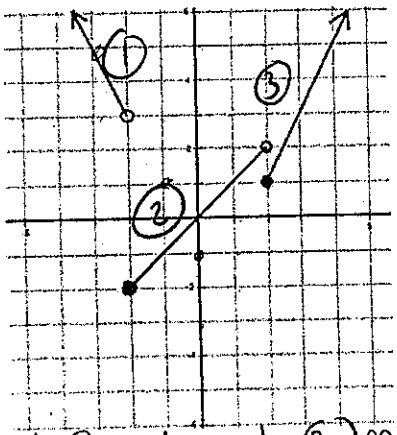
① $m = 0$, $b = 4$, $y = 4$, $x \leq -2$ closed

② $m = -1$, $b = 0$, $y = -x$, $-2 < x < 2$ open

③ $m = 0$, $b = -3$, $y = -3$, $x \geq 2$ closed

$$f(x) = \begin{cases} 4, & \text{if } x \leq -2 \\ -x, & \text{if } -2 < x < 2 \\ -3, & \text{if } x \geq 2 \end{cases}$$

4.



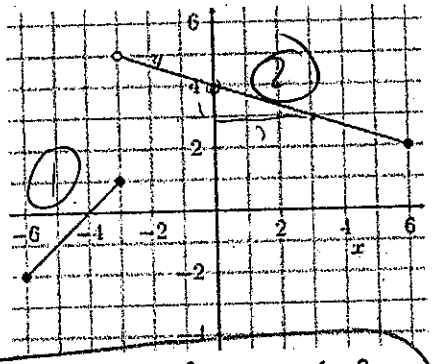
① $m = -2$, $b = -1$, $y = -2x - 1$, $x \leq -2$ closed

② $m = 1$, $b = 0$, $y = x$, $-2 \leq x < 2$ closed, open

③ $m = 2$, $b = -3$, $y = 2x - 3$, $x \geq 2$ closed

$$f(x) = \begin{cases} -2x - 1, & \text{if } x \leq -2 \\ x, & \text{if } -2 \leq x < 2 \\ 2x - 3, & \text{if } x \geq 2 \end{cases}$$

5.

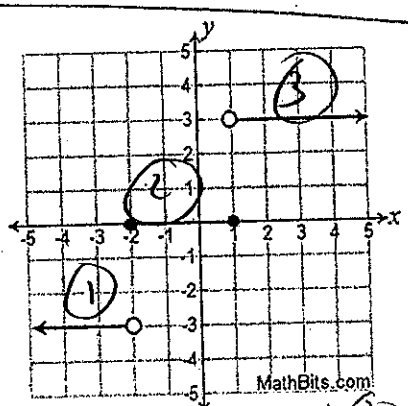


① $m = 1$, $b = 4$, $y = x + 4$, $-6 \leq x \leq -3$ closed, closed

② $m = -\frac{1}{3}$, $b = 4$, $y = -\frac{1}{3}x + 4$, $-3 < x \leq 6$ open, closed

$$f(x) = \begin{cases} x + 4, & \text{if } -6 \leq x \leq -3 \\ -\frac{1}{3}x + 4, & \text{if } -3 < x \leq 6 \end{cases}$$

6.



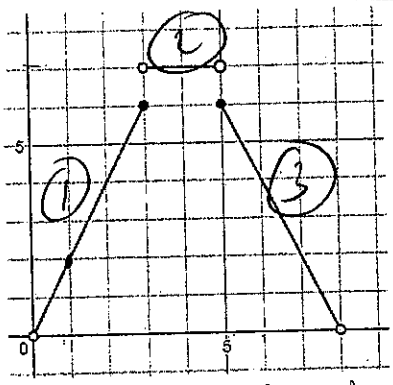

① $m = 0$, $b = -3$, $y = -3$, $x < -2$ open

② $m = 0$, $b = 0$, $y = 0$, $-2 \leq x \leq 1$ closed, closed

③ $m = 0$, $b = 3$, $y = 3$, $x > 1$ open

$$f(x) = \begin{cases} -3, & \text{if } x < -2 \\ 0, & \text{if } -2 \leq x \leq 1 \\ 3, & \text{if } x > 1 \end{cases}$$

7.



① $m = 2$, $b = 0$, $y = 2x$, $0 < x \leq 3$ open, closed

② $m = 0$, $b = 7$, $y = 7$, $3 < x < 5$ open, open

③ $m = -2$, point: $(5, 6)$ → use filled in dot, $y = -2x + 16$, $5 \leq x < 8$ closed, open

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

$y - 6 = -2(x - 5)$

$y - 6 = -2x + 10$

$+6 \quad +6$

$y = -2x + 16$

Use this method to get the equation b/c there is no "b" (y-intercept)

$$f(x) = \begin{cases} 2x, & \text{if } 0 < x \leq 3 \\ 7, & \text{if } 3 < x < 5 \\ -2x + 16, & \text{if } 5 \leq x < 8 \end{cases}$$