Graphing Piecewise Functions

I. Piecewise Functions

Example 1

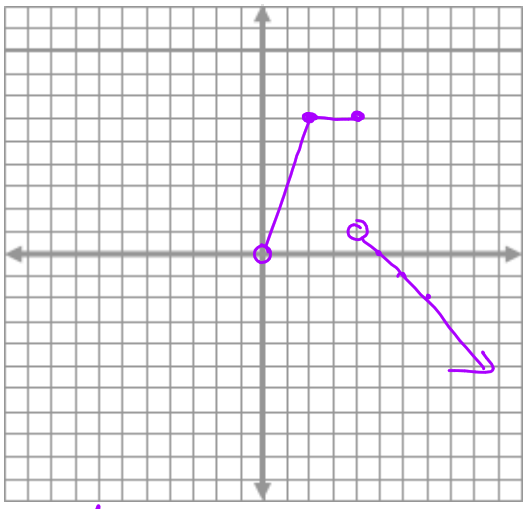
open closed

$$f(x)=\begin{cases} 3x & \text{if } 0<x\leq 2 \\ 6 & \text{if } 2<x\leq 4 \\ -x+5 & \text{if } 4<x \end{cases}$$

open

f(x)

x	y	
0	3(0)=0 open	3x
2	3(2)=6 closed	3x
2	6	f(x)=6
4	6	f(x)=6
4	-4+5=1	open slope -1

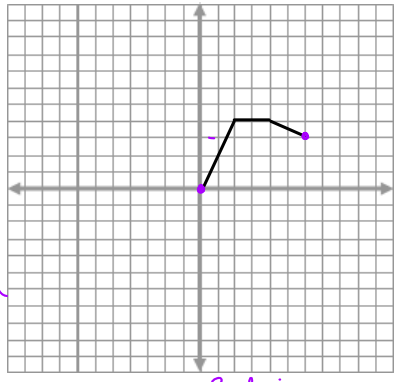


discontinuous function

Example 2: Given the graph, what is the function?

mx+b 1st piece

2x+0



$$f(x)=\begin{cases} 2x & \text{if } 0\leq x<2 \\ 4 & \text{if } 2\leq x<4 \\ -\frac{1}{2}x+6 & \text{if } 4\leq x\leq 6 \end{cases}$$

★ this is a continuous function since you don't have to lift your pencil/pen to draw it.

3rd piece

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

point (4,4) and solve for b

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

$4=-\frac{1}{2}(4)+b$

$4=-2+b$

$+2 \quad +2$

$6=b$

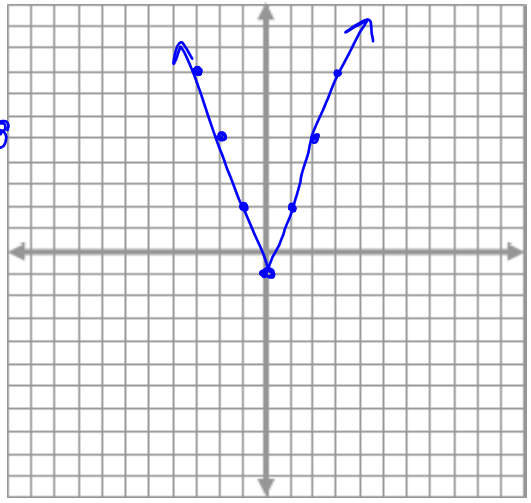
so $y=-\frac{1}{2}x+6$

II. Graph g(x)

looks like a "V"

1. $g(x) = 3|x| - 1$

x	g(x)
-3	$3\|-3\|-1 = 3(3)-1 = 8$
-2	$3\|-2\|-1 = 3(2)-1 = 5$
-1	$3\|-1\|-1 = 3(1)-1 = 2$
0	$3\|0\|-1 = -1$
1	$3\|1\|-1 = 2$
2	$3\|2\|-1 = 5$
3	$3\|3\|-1 = 8$



parent function $f(x) = |x|$

g(x) is vertically stretched by a factor of 3, and vertically translated down 1 unit.

Graph g(x)

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

-4	$\frac{1}{2}\|-4\|+1 = 3$
-2	$\frac{1}{2}\|-2\|+1 = 2$
0	$\frac{1}{2}\|0\|+1 = 1$
2	$\frac{1}{2}\|2\|+1 = 2$
4	$\frac{1}{2}\|4\|+1 = 3$