8.4 Piecewise Functions

What is a piecewise function? A function that takes pieces of other functions over specific values of x

Graphing Piecewise Functions

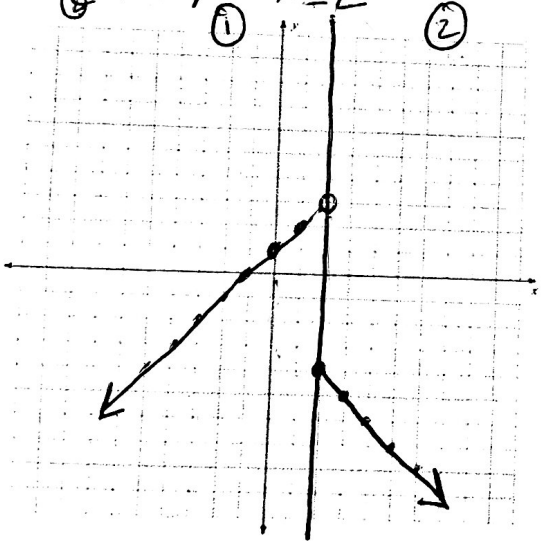
1) Divide graph based on sections of domain
2) Graph each equation in its specified section

Open hole: $<, >$

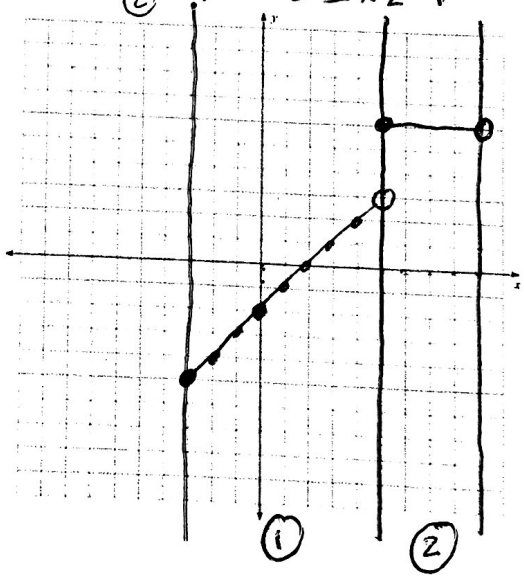
Closed point: $\leq, \geq$

1. Graph the following piecewise functions.

a) $y = \begin{cases} x+1, & x<2 \\ -x-2, & x \geq 2 \end{cases}$



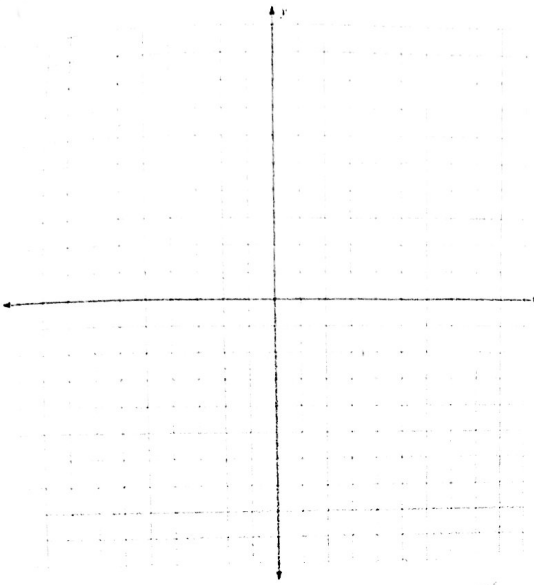
b) $y = \begin{cases} x-2, & -3 \leq x < 5 \\ 6, & 5 \leq x < 9 \end{cases}$



c)

d)

c) $y = \begin{cases} \frac{1}{2}|x+4|, & -6 \le x < 2 \\ 2x+9, & 2 \le x < 7 \end{cases}$



① V: (-4, 0)

a = 2

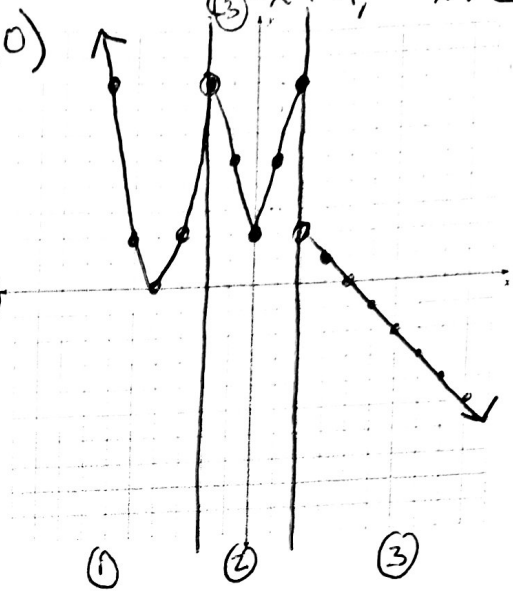
|a| = 2

3a = 6

② V: (0, 2)

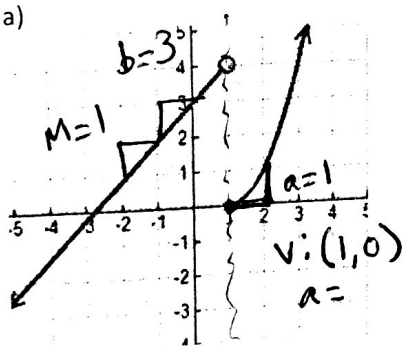
Slope 3

d) $f(x) = \begin{cases} ① \; 2(x+4)^2, & x < -2 \\ ② \; 3|x| + 2, & -2 \le x \le 2 \\ ③ \; -x + 4, & x > 2 \end{cases}$



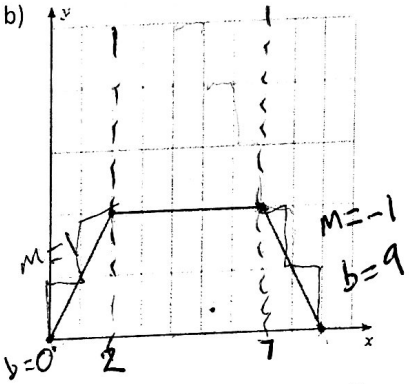
2. Write an equation for the graphs below:

a)



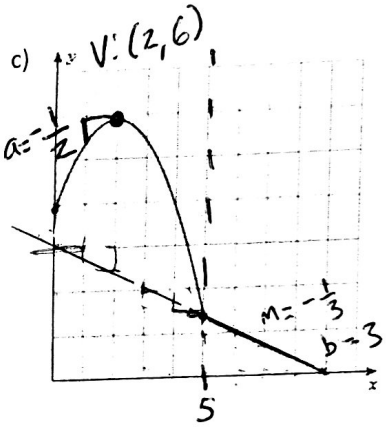
$f(x) = \begin{cases} x+3, & x < 1 \\ (x-1)^2, & x \ge 1 \end{cases}$

b)



$f(x) = \begin{cases} x, & 0 \le x \le 2 \\ 2, & 2 < x \le 7 \\ -x+9, & 7 < x \le 9 \end{cases}$

c)



$f(x) = \begin{cases} -\frac{1}{2}(x-2)^2 + 6, & 0 \le x < 5 \\ -\frac{1}{3}x + 3, & 5 \le x \le 9 \end{cases}$

Writing Piecewise Equations

1) Section off graph anytime the graph shape changes
2) Write equation for each section
3) Write domain for each section

$y = mx + b$
m: slope b: y-int

$y = a(x-h)^2 + k$
a: Growth rate (h, k): Vertex

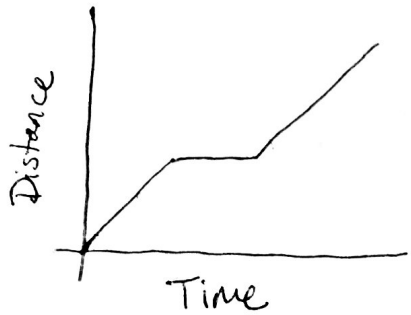
$y = a|x-h| + k$
a: slope (h, k): Vertex

3. Sketch a function that will model the following situations

a) John is taking his dog for a walk. He stops to

b) A ball is thrown from standing height. It

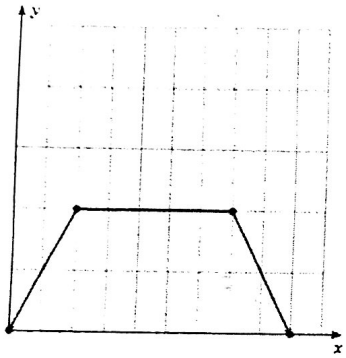
John is taking his dog for a walk. He stops to tie his shoes, then continues walking.



A ball is thrown from standing height. It bounces 3 times (each bounce smaller than the one before) before rolling down the street.

4. Describe a situation that could be modeled by the following graph:

a)



b)