

Objectives:

- By the end of class, students will be able to evaluate and graph piecewise defined functions.

Warm-Up: What plan is best??? When I first got a cellphone, the Sprint text messaging plans looked like this:

Blue	Purple	Red	Green
Pay as you go	250 messages per month	500 messages per month	Unlimited per month
\$0.25 per message	\$5 \$0.10 per message overage	\$10 \$0.10 per message overage	\$20

Let's make a **piecewise function** that would help someone choose the best plan according to how many text messages they are going to send!

$$f(x) = \begin{cases} \text{Blue if} \\ \text{Purple if} \\ \text{Red if} \\ \text{Green if} \end{cases}$$

depending on input (x)
determines the "best" output (y)

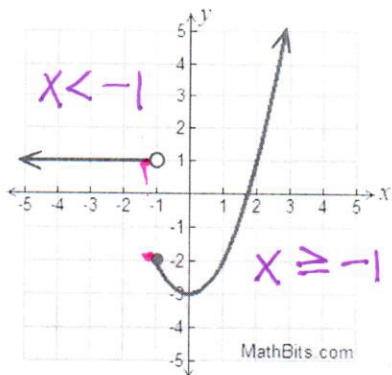


Example 1: Evaluate the following Piecewise function given the equation

$f(x) = \begin{cases} x + 5, & \text{if } x \leq 3 \\ 2x - 1, & \text{if } x > 3 \end{cases}$		$g(x) = \begin{cases} x^2 - 4, & \text{if } x < 10 \\ 5x, & \text{if } x \geq 10 \end{cases}$		
$f(7)$ $x=7$ use $2x-1$ $2(7)-1 = 13$	$g(7)$ $x=7$ use x^2-4 $(7)^2-4 = 45$	$g(10)$ $5(10) = 50$	$f(-2)$ $-2+5 = 3$	$f(3)$ $3+5 = 8$

Example Set 2: Evaluate the following Piecewise function given the picture.

1. $h(x)$



a) $h(-3)$ $x=-3$

$h(-3) = 1$ $y=?$

b) $h(1) = -2$

c) $h(0) = -3$

d) $h(-1) = -2$

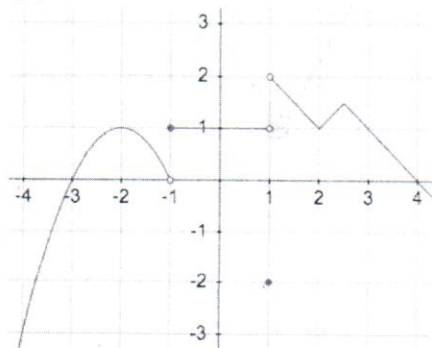
e) What does x equal when $h(x) = 5$?

$x = 3$

f) What does x equal when $h(x) = -2$?

$x = -1$
 $x = 1$

2. $m(x)$



a) $m(-4) = -3$

b) $m(3) = 1$

c) $m(1) = -2$

d) $m(-1) = 1$

e) What does x equal when $m(x) = -1$?

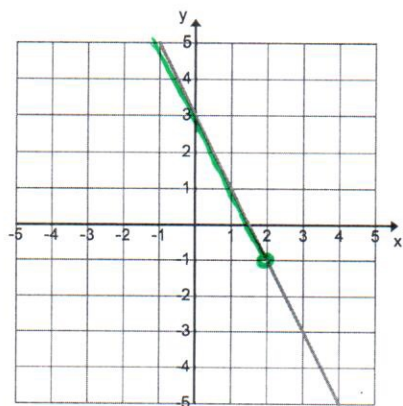
$x \approx -3.5$

f) What does x equal when $m(x) = 0$?

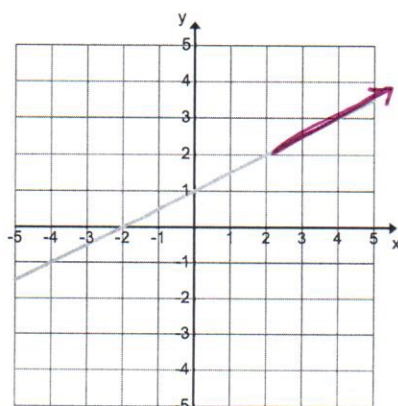
$x = -3$
 $x = 4$

Example 3: Use the two functions to make a new piecewise graph;

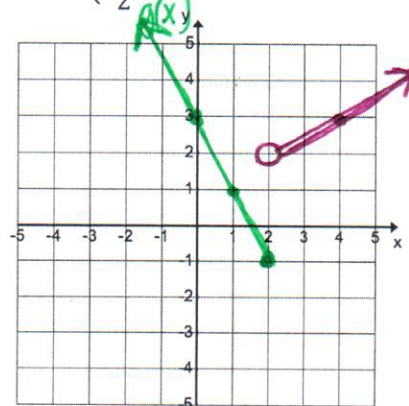
$$f(x) = -2x + 3$$



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

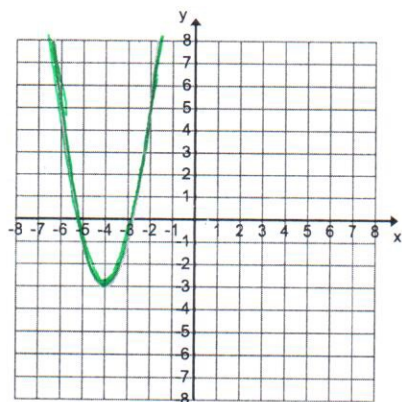


$$h(x) = \begin{cases} -2x + 3, & \text{if } x \leq 2 \\ \frac{1}{2}x + 1, & \text{if } x > 2 \end{cases}$$

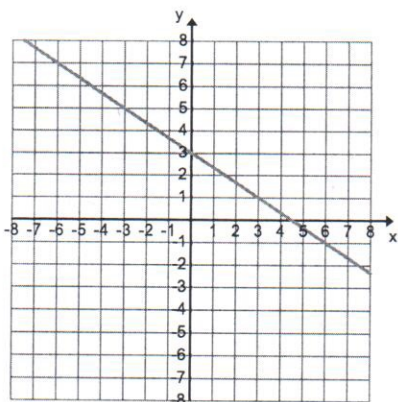


Example 4: Use the two functions to make a new piecewise graph;

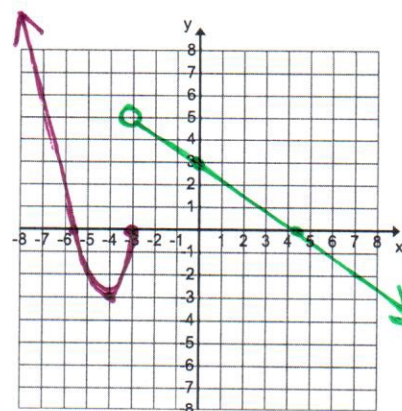
$$f(x) = 2(x + 4)^2 - 3$$



$$g(x) = -\frac{2}{3}x + 3$$

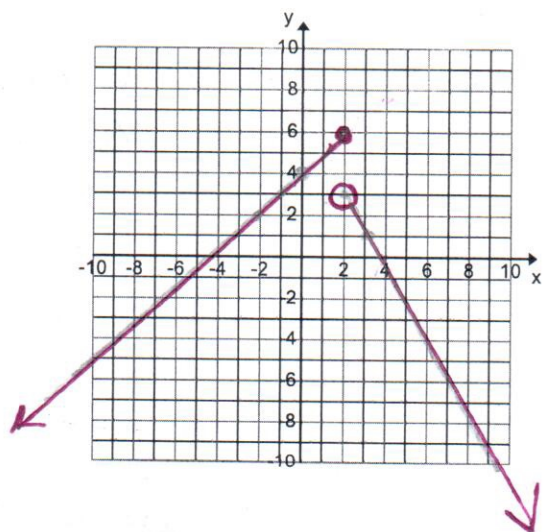


$$f(x) = \begin{cases} 2(x + 4)^2 - 3, & \text{if } x \leq -3 \\ -\frac{2}{3}x + 3, & \text{if } x > -3 \end{cases}$$



Example Set 5: Graph the following piecewise functions

1. $f(x) = \begin{cases} x + 4, & \text{if } x \leq 2 \\ -2x + 7, & \text{if } x > 2 \end{cases}$



2. $f(x) = \begin{cases} -\frac{3}{2}x - 8, & \text{if } x < -4 \\ 3x + 10, & \text{if } x \geq -4 \end{cases}$

