

Algebra I
Piecewise Functions

date: _____

A **piecewise function** is defined by two or more rules. To decide the rule you need to use, determine which inequality describes each input value, and then use the corresponding rule.

Example 1 Evaluate the piecewise function, $p(x)$, for different input values:

talk to your group on how you might get these

$$p(x) = \begin{cases} 2x & \text{if } x < 0 \\ x + 5 & \text{if } x = 0 \\ 0.5x - 1 & \text{if } x > 0 \end{cases}$$

$p(10) = \frac{4}{0.5(10) - 1}$
 $p(-10) = \frac{-20}{2(-10)}$
 $p(0) = \frac{5}{0+5}$
 $p(2.48) = \frac{0.24}{0.5(2.48) - 1}$

What input value will give an output of -6?

$p(x) = -6$
 \uparrow ?

$2(-3) = -6 \Rightarrow \boxed{x = -3}$

Example 2 Complete the table for the following piecewise function:

$$f(x) = \begin{cases} 2x + 1 & \text{for } x < 2 \\ x^2 - 2 & \text{for } x \geq 2 \end{cases}$$

x	-3	-2	-1	0	1	1.5	2	$\sqrt{5}$	3
f(x)	-5	-3	-1	1	3	4	2	3	7

Which piece of $f(x)$ is not linear? $x^2 - 2$ is quadratic

Example 3 Consider the following scenario:

$12x + 40$ $x \leq 7$
 Bralen wants to join a gym. If he joins for seven months or less, it will cost him an initiation fee of \$40 plus \$12 per month (including the first month). If he joins for more than seven months, it will cost him \$130 for the whole year. If $x =$ months, complete the table to show how much Bralen can expect to pay depending on the number of months he plans to work out.

130 $x > 7$

x	1	2	3	4	5	6	7	8	9	10	11	12
g(x)												

Can you write the piecewise equation for $g(x)$? $g(x) =$

$$g(x) = \begin{cases} 12x + 40 & \text{if } x \leq 7 \\ 130 & \text{if } x > 7 \end{cases}$$

if $7 < x < 12$

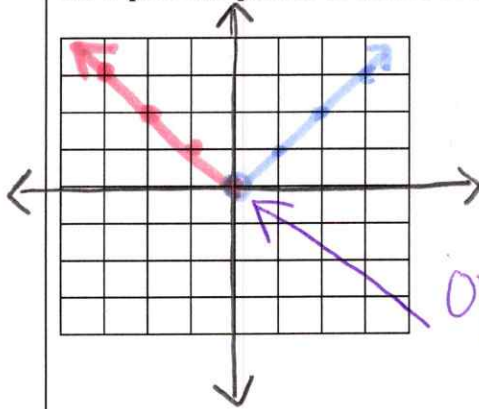
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Example 4 Graph the piecewise function $a(x) = \begin{cases} -x, & x \leq 0 \\ x, & x > 0 \end{cases}$

First make a table of values... include at least one fraction and one decimal input value.

x	-3	-2	-1	0	1	2	3	
$a(x)$	3	2	1	0	1	2	3	

Now plot the points to make the graph!



open purple circle at (0, 0)

Example 5 Timmy's T-Shirt Place has different prices depending on how many t-shirts you order.

The piecewise function $T(x) = \begin{cases} 9.00x, & 0 \leq x < 20 \\ 8.00x + 3, & 20 \leq x < 40 \\ 7.00x + 3, & x \geq 40 \end{cases}$

How much will an order of 25 t-shirts cost? $T(25) = \underline{\hspace{2cm}}$

How much will an order of 125 t-shirts cost? $T(125) = \underline{\hspace{2cm}}$

What is the price per shirt for an order of 10 t-shirts? $\underline{\hspace{2cm}}$

If the bill was \$171, how many t-shirts were ordered?