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Piecewise Functions



Cell phone plan:

Up to 200 minutes - \$10 per month

Over 200, but less than 1000 minutes - \$10 per month for the first 200 minutes, plus \$0.05 per minute (beyond 200 minutes)

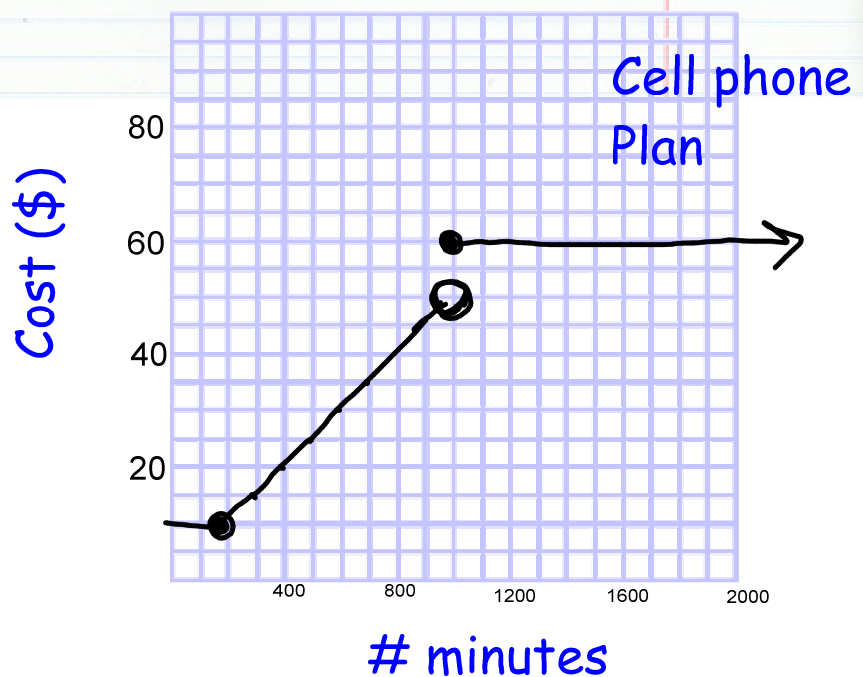
1000 minutes or over - \$60 per month

#min	100	200	300	400	500	600	700	800	900	1000	1100	1200
cost	10	10	15	20	25	30	35	40	45	60	60	60

For the domain: $0 \leq x \leq 200$ $y = 10$

For the domain: $200 < x < 1000$ $y = 10 + .05(x - 200)$

For the domain: $x \geq 1000$ $y = 60$



26 Piecewise Functions

A piecewise function:

is defined by at least two equations, each of which applies to a different part of the function's domain.

Example 1: Evaluate the function

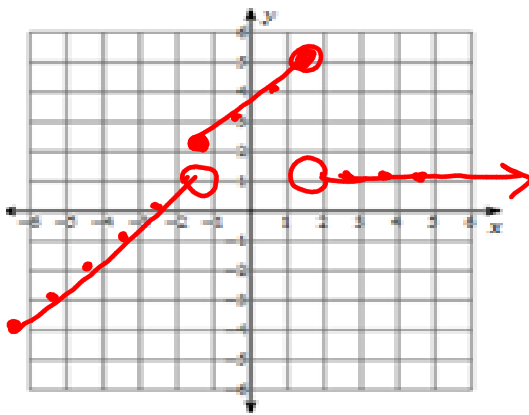
$$g(x) = \begin{cases} 4x - 3, & \text{if } x > 3 \\ 5x + 2, & \text{if } x \leq 3 \end{cases}$$

when $x = -2$ and $x = 5$

$$\begin{array}{l|l} 5(-2) + 2 & 4(5) - 3 \\ -10 + 2 & 20 - 3 \\ -8 & 17 \end{array}$$

Example 2: Graph the function:

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



x	y = f(x)
-6	-6
-5	-5
-4	-4
-3	-3
-2	-2
-1	0
0	1
1	2
2	3
3	-1
4	-1
5	-1

From the piecewise worksheet - speeding ticket problem

STEP 2 Write equations

Let x represent the number of miles per hour by which the speed limit is exceeded. Let y represent the fine in dollars.

For the domain ...	An equation for the fine is ...
$1 \leq x < 10$	$y = \underline{75}$
$10 \leq x < 25$	$y = \underline{130} + \underline{10}(x - \underline{10})$ This simplifies to $y = \underline{30 + 10x}$.
$x \geq 25$	$y = \underline{375}$