4.7 Graph Linear Functions

Goal • Use function notation.

See Section 1.6 + 1.7

Your Notes

VOCABULARY $f(x)$ is read "f of x"

Function notation IS $f(x) \Leftrightarrow y$

$f(x)$ is another way to say "y"

SLOPE INTERCEPT FORM IN FUNCTION NOTATION IS

$f(x) = mx + b$

(y)

Example 1 *Find an x-value*

For the function $f(x) = 3x + 1$, find the value of x so that $f(x) = 10$.

Solution $f(x) = 10$

$f(x) = 3x + 1$	Write original equation.
$10 = 3x + 1$	Substitute 10 for $f(x)$.
$x = 3$	Solve for x.

When $x = 3$, $f(x) = 10$. (or also can say $y = 10$)

(1) 2 FUNCTIONS

$f(x) = 3x + 1$

$f(x) = 10$

(2) We want to find the value of "x"

Checkpoint Complete the following exercises.

1. For $f(x) = 6x - 6$, find the value of x so that $f(x) = 24$.

$24 = 6x - 6$

$+6 \quad +6$

$\frac{30}{6} = \frac{6x}{6}$

$x = 5$

2. For $f(x) = 7x + 3$, find the value of x so that $f(x) = 17$.

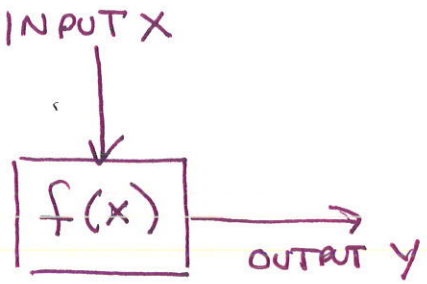
$7x + 3 = 17$

$-3 \quad -3$

$\frac{14}{7} = \frac{7x}{7}$

$x = 2$

4.7 Using Function Notation – f(x)



- f(x)…
  - Is read "f of x"
  - The input is "x"
  - The output is "f(x)" → aka "y"
  - f(x) is short hand for the variable (y) in the linear slope-intercept equation "y=mx+b"
  - Write the above linear equation in function notation: "f(x) = mx + b"

4 FUNCTIONS

Evaluate the following expressions given the functions below:

g(x) = -3x + 10	f(x) = x^2 + 5	h(x) = $\frac{12}{x}$	j(x) = 2x + 9

Evaluate

1) g(10) = $-3(10)+10 = -20$ (x=10) | g(10) = -20 | g(0) = 10 | g(1) = 7

2) f(3) = $3^2+5 = 14$ (x=3) | f(3) = 14 | f(0) = 5 | f(1) = 6

3) h(–2) = $\frac{12}{-2} = -6$

4) j(7) = $2(7)+9 = 23$

5) Find x if g(x) = 16

g(x) = -3x + 10 → FIND x:

$-3x+10 = 16$

$-10 \quad -10$

$-3x = 6$

$\frac{-3x}{-3} = \frac{6}{-3}$

x = -2

6) Find x if h(x) = 6

$h(x) = \frac{12}{x}$ → FIND x:

$\frac{6}{1} = \frac{12}{x}$ ← TIP cross multiply

$6x = 12$

$\frac{6x}{6} = \frac{12}{6}$

x = 2

EVALUATE

7) $g(4)+h(1) =$

$-2+12 = 10$

8) $f(5)-j(-2) =$

$30-5 = 25$

Your Notes

KI:

m = # of text msg (millions)

t = number years since 2002

FUNCTION

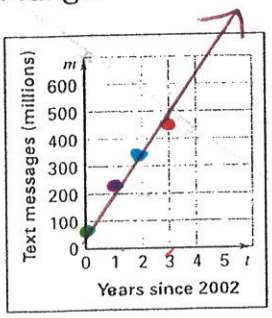
$m = 120t + 95$

Example 2 *Graph a function*

Text Messages A wireless communication provider estimates that the number of text messages m (in millions) sent over several years can be modeled by the function $m = 120t + 95$ where t represents the number of years since 2002. Graph the function and identify its domain and range.

t	m
0	95
1	215
2	335
3	455

2002 → 0
2003 → 1
2004 → 2
2005 → 3



The domain of the function is $t \geq 0$. From the graph or table, you can see that the range of the function is $m \geq 95$.

D: $t \geq 0$ R: $m \geq 95$

Checkpoint **Complete the following exercise.**

3. Use the model from Example 2 to find the value of t so that $m = 1055$. Explain what the solution means in this situation.

$m = 120t + 95$

$m = 1,055$

Solve for t:

$1055 = 120T + 95$

$-95 \qquad -95$

$\frac{960}{120} = \frac{120T}{120}$

$T = 8$

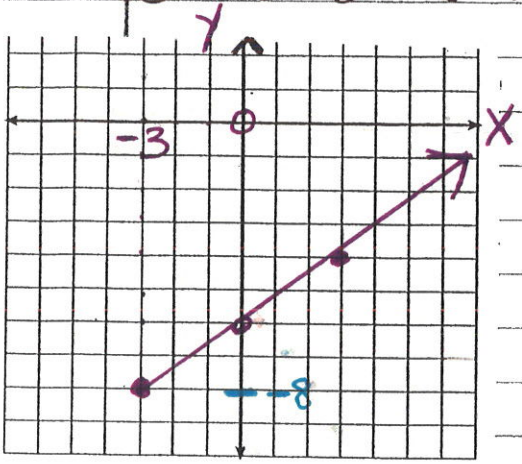
Answer: There will be over a billion (1,055,000) text messages in the year 2010.

4.7

Review Function Domains & Ranges

Instructions: For each function, graph using any method and define the range.

① $f(x) = \frac{2}{3}x - 6$ where domain $x \geq -3$



x	y
-3	-8
0	-6
3	-4

Smallest number "y" for

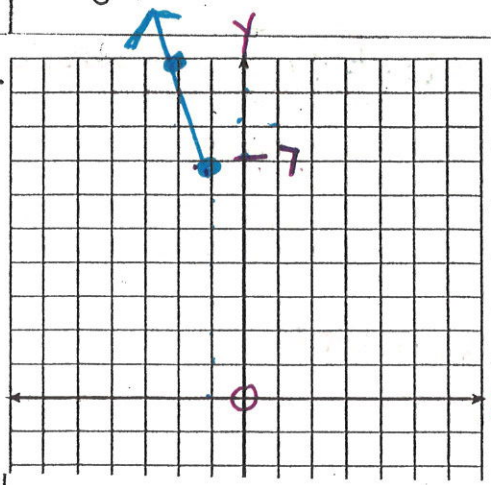
Scratchwork

$\frac{2}{1\cancel{3}}\left(\frac{-3}{1}\right)^{1} - 6 = -2 + -6$

$\frac{2}{3}\left(\frac{3}{1}\right)^{1} - 6 = 2 + -6$

Range: $y \geq -8$

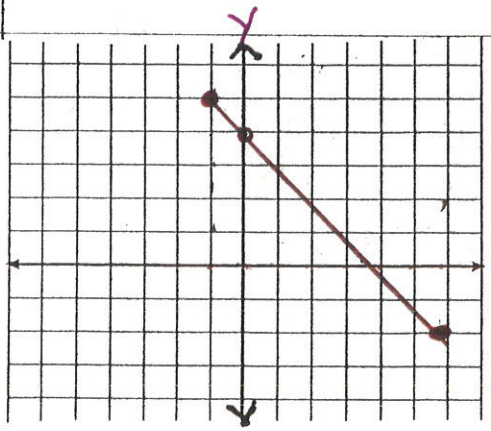
② $g(x) = -3x + 4$ where domain $x \leq -1$



x	y
-1	7
-2	10
-3	13

Range: $y \geq 7$

③ $h(x) = -x + 4$ where domain $-1 \leq x \leq 6$



x	y
-1	5
0	4
6	-2

R: $-2 \leq y \leq 5$