

# 3.3

## Learning Target: Understand how to write and graph linear functions.

- I can use function notation to evaluate and interpret functions.
- I can use function notation to solve and graph functions.
- I can model and solve real-life problems using function notation.

Write the meaning of each vocabulary term.

function notation - a different way to write an equation - by changing how you write the output/dependent variable.

$f(x)$  = "the value of the function  $f$  at  $x$ "

$$y = mx + b$$

$$y \rightarrow f(x)$$

$$f(x) = mx + b$$

not multiplication!!

" $f$  of  $x$ "

Why function notation?

$$y = 3x + 2 \quad y = 5x \quad y = -2x - 16$$

① Allows us to name functions

$$f(x) = -3x + 2 \quad g(x) = 5x \quad h(x) = -2x - 16$$

② Allows us to see input that generated output.

$$y = 3x - 2$$

$$f(1) = 3(1) - 2$$

$$y = 3(1) - 2 \quad y = 1$$

$$f(1) = 3 - 2$$

$$f(1) = 1 \quad (1, 1)$$

Practice: In Exercises 1-6, evaluate the function when  $x = -4, 0,$  and  $2$ .

1.  $f(x) = -x + 4$

2.  $g(x) = 5x$

3.  $h(x) = 7 - 2x$

$$f(-4) = -(-4) + 4$$

$$f(-4) = 4 + 4$$

$$f(-4) = 8 \quad (-4, 8)$$

$$f(0) = -(0) + 4$$

$$f(0) = 0 + 4$$

$$f(0) = 4 \quad (0, 4)$$

$$f(2) = -(2) + 4$$

$$f(2) = -2 + 4$$

$$f(2) = 2 \quad (2, 2)$$

**3.3 Notetaking with Vocabulary (continued)**

**Practice:** In Exercises 1–6, evaluate the function when  $x = -4, 0,$  and  $2$ .

4.  $s(x) = 12 - 0.25x$       5.  $t(x) = 6 + 3x - 2$       6.  $u(x) = -2 - 2x + 7$

$u(-4) = -2 - 2(-4) + 7$   
 $= -2 + 8 + 7$   
 $u(-4) = 13$        $(-4, 13)$

$u(0) = -2 - 2(0) + 7$   
 $= -2 + 7$   
 $u(0) = 5$        $(0, 5)$

$u(2) = -2 - 2(2) + 7$        $u(2) = 1$   
 $u(2) = -2 - 4 + 7$        $(2, 1)$

7. Let  $n(t)$  be the number of DVDs you have in your collection after  $t$  trips to the video store. Explain the meaning of each statement.

a.  $n(0) = 8$

Before making any trips to the video store, you have 8 DVD's in your collection.

b.  $n(3) = 14$

After 3 trips to the video, you have 14 DVD's in your collection.

c.  $n(5) > n(3)$

After 5 trips to the video store, you have more DVD's in your collection, than after 3 trips to the video store.

d.  $n(7) - n(2) = 10$

The difference in the # of DVD's between your 7<sup>th</sup> trip to the video store and your 2<sup>nd</sup> trip is 10.

In Exercises 8–11, find the value of  $x$  so that the function has the given value.

8.  $b(x) = -3x + 1; b(x) = -20$  ← output

$-20 = -3x + 1$

$-21 = -3x$   
 $-3 \quad -3$

$7 = x$

$b(7) = -20$   
 $(7, -20)$

9.  $r(x) = 4x - 3; r(x) = 33$

10.  $m(x) = \frac{3}{5}x - 4; m(x) = 2$

11.  $w(x) = \frac{5}{6}x - 3; w(x) = -18$

$-18 = \frac{5}{6}x - 3$   
 $+3 \quad +3$

$w(-18) = -18$

$\frac{-15}{5} = \frac{5}{6}x \cdot \frac{6}{5}$

$(-18, -18)$

$-18 = x$

**3.3 Notetaking with Vocabulary (continued)**

In Exercises 12 and 13, graph the linear function.

12.  $s(x) = \frac{1}{2}x - 2$   $D: \mathbb{R}$

13.  $t(x) = 1 - 2x$

$t(-2) = 1 - 2(-2)$

$t(-2) = 1 + 4$

$t(-2) = 5$   
 $(-2, 5)$

on hw  
choose 3  
inputs

-, 0, +

show at  
least 1  
substitution

$s(-4) = \frac{1}{2}(-4) - 2$

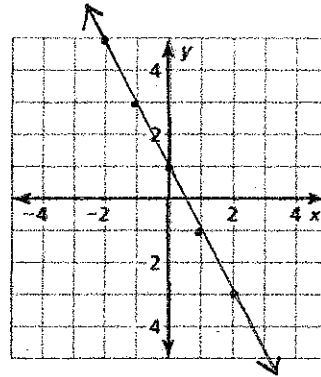
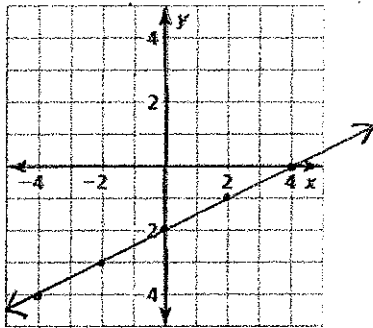
$s(-4) = -2 - 2$

$s(-4) = -4$

$(-4, -4)$

x	-4	-2	0	2	4
s(x)	-4	-3	-2	-1	0

x	-2	-1	0	1	2
t(x)	5	3	1	-1	-3



14. The function  $B(m) = 50m + 150$  represents the balance (in dollars) in your savings account after  $m$  months. The table shows the balance in your friend's savings account. Who has the better savings plan? Explain.

Month	Balance
2	\$330
4	\$410
6	\$490

+2 (between 2 and 4 months), +2 (between 4 and 6 months) on the left; +80 (between 2 and 4 months), +80 (between 4 and 6 months) on the right.

$B(2) = 50(2) + 150$

$B(2) = 250$

diff. b/t = \$80

$B(4) = 50(4) + 150$

$B(4) = 350$

diff. b/t = \$60

$B(6) = 50(6) + 150$

$= 450$

diff. b/t \$40

(you are catching up to your friend!)

In the short term, your friend has the better savings plan.

In the long term, you have the better savings plan.