

LESSON 3.7

NOTES

GOAL

Use function notation.

Vocabulary

You have seen linear functions written in the form $y = mx + b$. By naming a function f , you can write it using **function notation**: $f(x) = mx + b$.

A **family of functions** is a group of functions with similar characteristics.

The most basic linear function in the family of all linear functions is called the **parent linear function** and has the following form: $f(x) = x$.

Key Concept

You can use function notation to write a linear function. Graphs of linear functions can be analyzed and categorized in terms of their relation to the graph of the parent functions $f(x) = x$.

Common Student Errors

- Misunderstanding the meaning of function notation; Thinking that $f(x)$ really means “ f times x ”

Tip Stress that $f(x)$ is just another way of writing the y -coordinate.

Example: Evaluate $f(x) = x + 3$ when $x = 2$.

Student answer:

$$f(x) = x + 3 \rightarrow 2f = 5 \rightarrow f = 2.5 \quad \times$$

Correct answer:

$$f(x) = x + 3 \rightarrow f(2) = 2 + 3 = 5 \quad \checkmark$$

EXAMPLE 1
Standardized Test Practice

What is the value of the function $f(x) = -2x - 7$ when $x = -2$?

- A. -11
- B. -3
- C. 3
- D. 11

Solution

$f(x) = -2x - 7$	Write original function.
$f(-2) = -2(-2) - 7$	Substitute -2 for x .
$= -3$	Simplify.

The correct answer is B.

Exercises for Example 1

Evaluate the function for the given value of x .

1. $f(x) = 0.3x - 1.2$; 7
2. $g(x) = -\frac{2}{5}x + \frac{1}{10}$; 4

EXAMPLE 2**Find an x -value**

For the function $f(x) = -3x + 2$, find the value of x so that $f(x) = -13$.

Solution

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

$$-13 = -3x + 2$$

$$5 = x$$

Write original function.

Substitute -13 for $f(x)$.

Solve for x .

When $x = 5$, $f(x) = -13$

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Study Guide *continued*

Exercises for Example 2

Find the value of x so that the function has the given value.

3. $g(x) = -\frac{1}{2}x - 3; 4$

4. $h(x) = 5x - 3; -13$

EXAMPLE 3

Compare graphs with the graph of $f(x) = x$

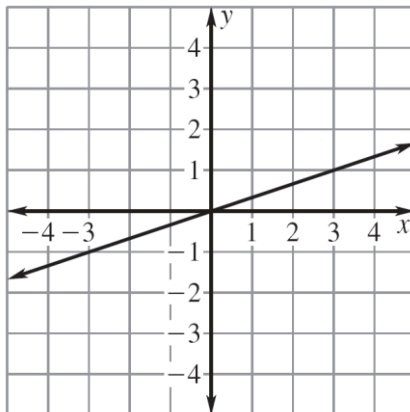
Graph the function. Compare the graph with the graph of $f(x)$.

a. $m(x) = \frac{1}{3}x$

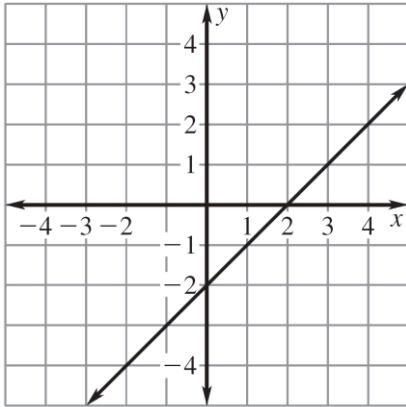
b. $n(x) = x - 2$

Solution

- a. Because the slope of the graph of m is less than the slope of the graph of f , the graph of m rises slower from left to right. The y -intercept for both graphs is 0, so both lines pass through the origin.



- b. Because the graphs of n and f have the same slope, $m = 1$, the lines are parallel. Also, the y -intercept of the graph of n is 2 less than the y -intercept of the graph of f .



Exercises for Example 3

5. Graph $g(x) = 4x$. Compare the graph with the graph of $f(x) = x$.

Answer Key

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Study Guide

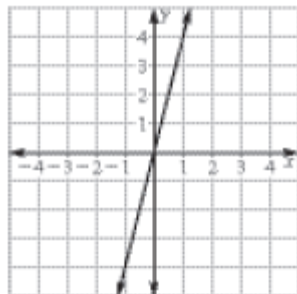
1. 0.9

2. $-1\frac{1}{2}$

3. -14

4. -2

5.



Because the slope of the graph of g is greater than the slope of the graph of f , the graph of g rises faster from left to right. The y -intercept for both graphs is 0, so the lines pass through the origin