

Lesson 2–2

Example 1 Identify Linear Functions

State whether each function is a linear function. Explain.

- a. $g(x) = \frac{4}{3x}$ This is not a linear function because x is in the denominator.
- b. $f(x) = \sqrt{2x - 3}$ This is not a linear function because x is under a radical sign.
- c. $h(x) = \frac{2}{3}x + 5$ This is a linear function because it is in the form $f(x) = mx + b$.
 $m = \frac{2}{3}, b = 5$

Example 2 Evaluate a Linear Function

WEATHER The highest temperature ever recorded in the state of Nevada was 125°F . The linear function $C(t) = \frac{5}{9}(t - 32)$ can be used to find the temperature in degrees Celsius for any temperature given in degrees t in Fahrenheit. Source: The World Almanac

- a. Express the highest temperature ever recorded in Nevada in degrees Celsius.

$$C(t) = \frac{5}{9}(t - 32) \quad \text{Original function}$$
$$C(125) = \frac{5}{9}(125 - 32) \quad \text{Substitute.}$$
$$\approx 52 \quad \text{Simplify.}$$

The temperature was about 52°C .

- b. The lowest temperature ever recorded in Nevada was -50°F . Find the difference between the highest and lowest recorded temperatures for Nevada in degrees Celsius.

First, find the temperature in degrees Celsius for the lowest recorded temperature.

$$C(t) = \frac{5}{9}(t - 32) \quad \text{Original function}$$
$$C(-50) = \frac{5}{9}(-50 - 32) \quad \text{Substitute.}$$
$$\approx -46 \quad \text{Simplify.}$$

Then find the difference between the two temperatures in degrees Celsius.

$$52 - (-46) = 98$$

The difference in the two temperatures is about 98°C .

Example 3 Standard Form

Write each equation in standard form. Identify A , B , and C .

a. $y = 3x - 10$

$$\begin{array}{ll} y = 3x - 10 & \text{Original equation} \\ -3x + y = -10 & \text{Subtract } 3x \text{ from each side.} \\ 3x - y = 10 & \text{Multiply each side by } -1 \text{ so that } A \geq 0. \end{array}$$

So, $A = 3$, $B = -1$, and $C = 10$.

b. $\frac{2}{3}x = -6y + 1$

$$\begin{array}{ll} \frac{2}{3}x = -6y + 1 & \text{Original equation} \\ \frac{2}{3}x + 6y = 1 & \text{Add } 6y \text{ to each side.} \\ 2x + 18y = 3 & \text{Multiply each side by } 3 \text{ so that the coefficients are} \\ & \text{integers.} \end{array}$$

So, $A = 2$, $B = 18$, and $C = 3$.

c. $7y - 28x + 14 = 0$

$$\begin{array}{ll} 7y - 28x + 14 = 0 & \text{Original equation} \\ 7y - 28x = -14 & \text{Subtract } 14 \text{ from each side.} \\ 4x - y = 2 & \text{Divide each side by } -7 \text{ so that the coefficients have a} \\ & \text{GCF of } 1 \text{ and } A \geq 0. \end{array}$$

So, $A = 4$, $B = -1$, and $C = 2$.

Example 4 Use Intercepts to Graph a Line

Find the x -intercept and the y -intercept of the graph of $9x - 3y = 27$. Then graph the equation.

The x -intercept is the value of x when $y = 0$.

$$\begin{array}{ll} 9x - 3y = 27 & \text{Original equation.} \\ 9x - 3(0) = 27 & \text{Substitute 0 for } y. \\ 9x = 27 & \text{Simplify.} \\ x = 3 & \text{Divide each side by 9.} \end{array}$$

The x -intercept is 3. The graph crosses the x -axis at $(3, 0)$.

Likewise, the y -intercept is the value of y when $x = 0$.

$$\begin{array}{ll} 9x - 3y = 27 & \text{Original equation.} \\ 9(0) - 3y = 27 & \text{Substitute 0 for } x. \\ -3y = 27 & \text{Simplify.} \\ y = -9 & \text{Divide each side by } -3. \end{array}$$

The y -intercept is -9 . The graph crosses the y -axis at $(0, -9)$.

Use these ordered pairs to graph the equation.

