

## 3.7 Graph Linear Functions

Remember:  $y = mx + b$

By naming a function  $f$ ,  
you can write it using  
function notation.

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

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- The symbol  $f(x)$  is another name for  $y$
- "the value of  $f$  at  $x$ "
- " $f$  of  $x$ "
- DOES NOT MEAN " $f$  times  $x$ "
- Can use other letters ( $g, h$ , etc.)

**Example 1**

What is the value of the function

$$f(x) = 3x - 15 \text{ when } x = -3? \quad y = ?$$

$$f(-3) = 3(-3) - 15$$

$$f(-3) = -9 - 15$$

$$f(-3) = -24 \quad \text{When } x = -3, \text{ we get } y = -24.$$

**Example 2**

Evaluate the function

$$g(x) = -\frac{1}{2}x + 9 \text{ when } x = 8.$$

$$g(8) = -\frac{1}{2}(8) + 9$$

$$g(8) = -4 + 9$$

$$g(8) = 5$$

**Example 3**

For the function  $f(x) = 2x - 10$ , find the value of  $x$  so that  $f(x) = 6$ .

$$f(x) = 2x - 10$$

$$6 = 2x - 10$$

$$+10 \quad +10$$

$$16 = 2x$$

$$\div 2 \quad \div 2$$

$$8 = x$$

**Example 4**

For the function  $k(x) = -2x + 4$ , find the value of  $x$  so that  $k(x) = 16$ .

$$k(x) = -2x + 4$$

$$16 = -2x + 4$$

$$-4 \quad -4$$

$$12 = -2x$$

$$\div -2 \quad \div -2$$

$$-6 = x$$

### Example 5

Anthropologists use the length of certain bones of the human skeleton to estimate the height of the living person. One of these bones is the femur. To estimate the height in centimeters of a female with a femur length of  $x$ , the function  $h(x) = 2.32x + 61.41$  can be used. Find  $h(46)$  and explain its meaning.

$$h(x) = 2.32x + 61.41$$

$$h(46) = 2.32(46) + 61.41$$

$$h(46) = 106.72 + 61.41$$

$$h(46) = 168.13$$

length  
of femur

person's  
height

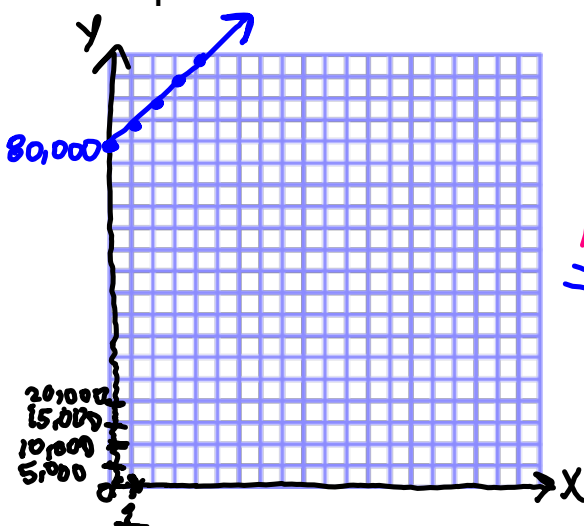
When a person's femur length is 46 cm, then that person's height is 168.13 cm.

### Example 6

The value of Sally's house from 1996 to 2021 can be modeled by the function  $v(x) = 5000x + 80,000$ , where  $x$  is the number of years since 1996.

a) Graph the function and identify its domain and range.

b) Find the value of  $x$  so that  $v(x) = 195,000$ . Explain what the solution means in this situation.



$$v(x) = 5000x + 80,000$$

$$m = \frac{5000}{1} \quad y\text{-int} = 80,000$$

starting point

$$\begin{array}{r} 195,000 = 5000x + 80,000 \\ -80,000 \quad -80,000 \\ \hline 115,000 = 5000x \end{array}$$

$$\begin{array}{r} 115,000 = 5000x \\ \underline{5000} \quad \underline{5000} \\ 23 = x \end{array}$$

$$23 = x$$

$$\begin{array}{r} 1996 \\ + 23 \\ \hline \end{array}$$

In 2019, the house's value was \$195,000.