

3.7 Graph Linear Functions

Remember: $y = mx + b$

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

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

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

- 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

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

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

$$f(-3) = -24 \leftarrow \text{output/range}$$

input/domain

plug in
↓
(-3, -24)

got out
↓

Example 2

Evaluate the function

$$h(x) = -7x \text{ when } x = 8. \quad \text{plug in } 8 \text{ for } x$$

$$h(8) = -7(8)$$

$$h(8) = -56$$

Example 3

$f(x)$ is the same as y

For the function $f(x) = 2x - 10$, find

the value of x so that $f(x) = 6$.

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

$$6 = 2x - 10$$

$$\begin{array}{r} +10 \\ \hline 16 = 2x \end{array}$$

$$\boxed{x = 8}$$

Example 4

For the function $g(x) = -2x + 4$, find

the value of x so that $g(x) = 16$.

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

$$16 = -2x + 4$$

$$\begin{array}{r} -4 \\ \hline 12 = -2x \end{array}$$

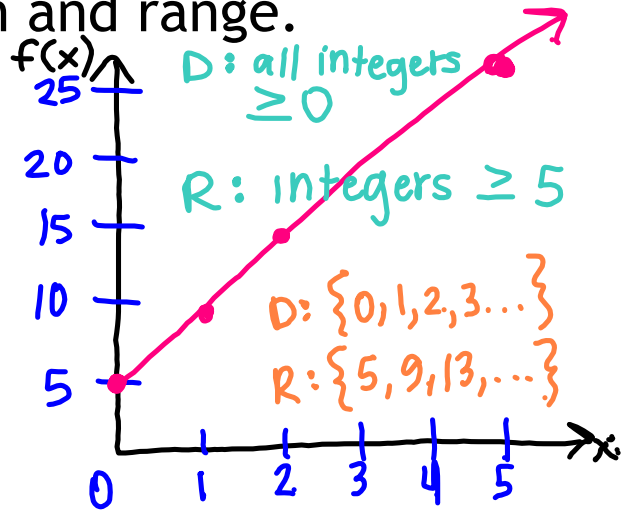
$$\begin{array}{r} \frac{12}{-2} = \frac{-2x}{-2} \end{array}$$

$$\boxed{x = -6}$$

Example 5

A bowling alley charges \$5 to rent shoes and \$4 per game. The cost after playing x games is given by $f(x) = 4x + 5$. Graph the function and identify its domain and range.

x	$f(x)$
0	$4(0) + 5$ = 5
1	$4(1) + 5$ = 9
2	$4(2) + 5$ = 13
5	$4(5) + 5$ = 25

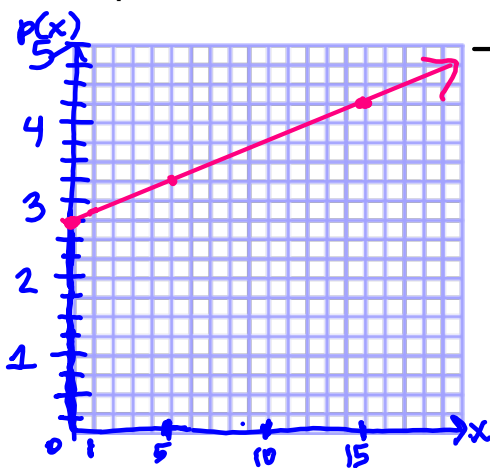


Example 6

The average price for a movie ticket in the US from 1980 to 2000 can be modeled by the function $p(x) = 0.10x + 2.75$, where x is the number of years since 1980.

- a) Graph the function and identify its domain and range.
- b) Find the value of x so that $p(x) = 4.55$.

Explain what the solution means in this situation.



x	$p(x)$
0	$.10(0) + 2.75$ = 2.75
1	$.10(1) + 2.75$ = 2.85
5	$.10(5) + 2.75$ = 3.25
15	$.10(15) + 2.75$ = 4.25

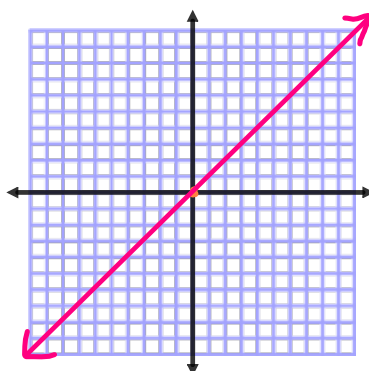
$p(x) = .10x + 2.75$
 $4.55 = .10x + 2.75$
 $-2.75 \quad -2.75$
 \hline
 $1.80 = .10x$
 $\cdot .10 \quad \cdot .10$
 $18 = x$

In 1998, the price of a ticket was \$4.55.

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

$$f(x) = mx + b \longrightarrow \text{family of linear functions}$$

The most basic linear function in the family of all linear functions, called the **parent linear function**, is $f(x) = x$.



$$m = 1$$

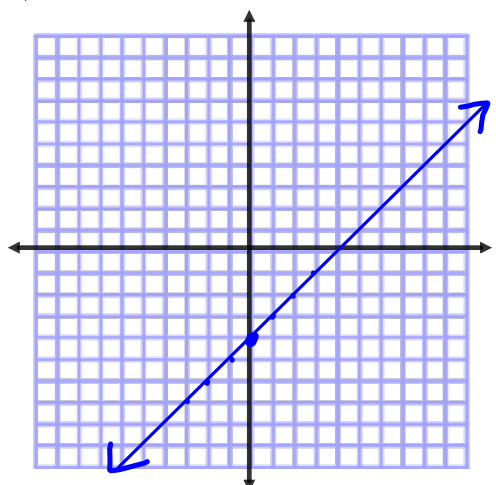
$$y\text{-int} = 0$$

Example 7

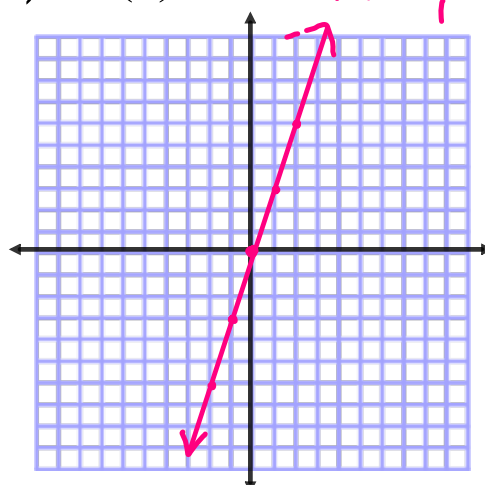
Graph each function.

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

a) $k(x) = x - 4$ $y\text{-int} = -4$ b) $w(x) = 3x$ $m = \frac{3}{1}$



Same slope, diff. y -int (down 4)



Same y -int, diff. slope (steeper)