

Graphs of Linear Equations

Goal: Sketch the graphs of linear equations.

Vocabulary

Linear equation: An equation in two variables whose graph is a line or part of a line

EXAMPLE 1 Graphing a Linear Equation

Graph $y = \frac{1}{3}x - 1$.

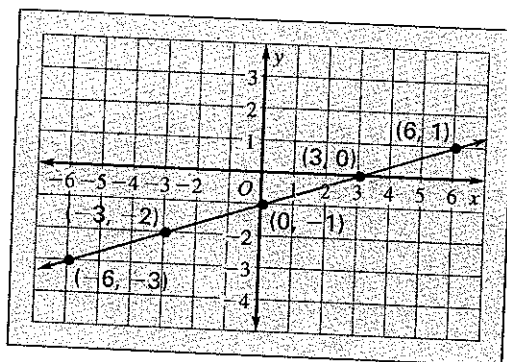
1. Choose several values to substitute for x . Then evaluate to find y and make a table of values.

x	-6	-3	0	3	6
y	-3	-2	-1	0	1

2. List the solutions as ordered pairs.

$(-6, -3)$, $(-3, -2)$, $(0, -1)$, $(3, 0)$, $(6, 1)$

3. Plot the ordered pairs. Then draw a line through them.



Answer: The line is the graph of $y = \frac{1}{3}x - 1$.

Make sure the arrowheads are drawn on the graph. They indicate that the line extends forever in both directions.

Guided Practice Graph the linear equation.

1. $y = x - 7$

2. $y = -2x + 3$

EXAMPLE 7 using the Graph of a Linear Equation

Music Lessons You are taking music lessons. The book used for the lessons costs \$15. If you are charged \$7.50 per lesson, you can model the total cost c of your lessons in dollars using the equation $c = 7.5n + 15$, where n is the number of lessons.

- a. Graph $c = 7.5n + 15$.
- b. Estimate how many lessons you will take for the total cost of your lessons to be \$75.

Think:
The graph of the equation through the given points is a ray, and not a line. Can you explain why?

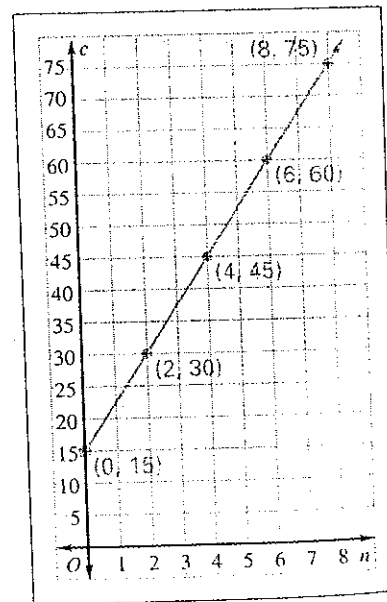
Solution

- a. Make a table of values.

n	0	2	4	6	8
c	15	30	45	60	75

- Plot each solution and draw a ray through the points.

- b. The graph shows that it will take 8 lessons for the total cost of your lessons to be \$75.



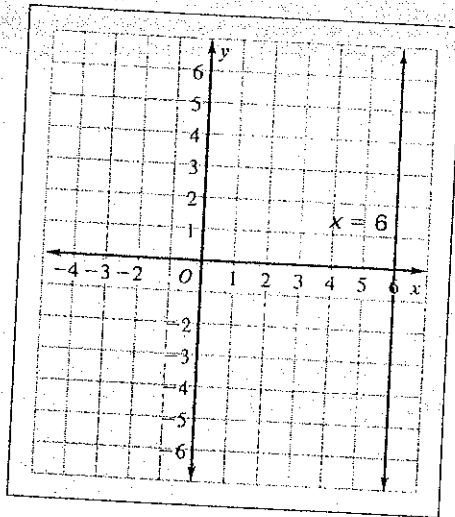
Vertical and Horizontal Lines

The graph of $x = a$ is the **vertical** line passing through $(a, 0)$.

The graph of $y = b$ is the **horizontal** line passing through $(0, b)$.

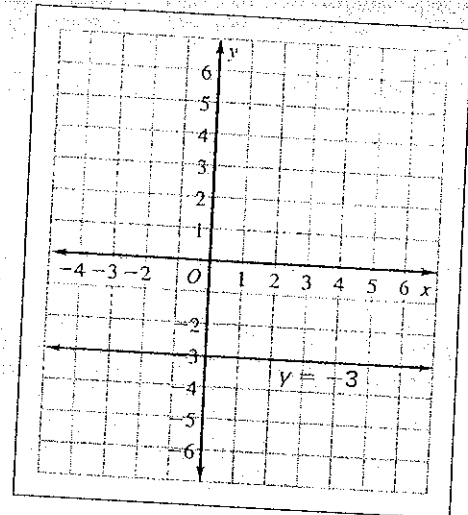
EXAMPLE 3 Graphing Vertical and Horizontal Lines

a. The graph of $x = 6$ is the
vertical line through $(6, 0)$.



For all values of y ,
the x -value is 6.

b. The graph of $y = -3$ is the
horizontal line through $(0, -3)$.



For all values of x ,
the y -value is -3 .

Guided Practice Graph the equation.

3. $y = 2.5$

4. $x = -5$