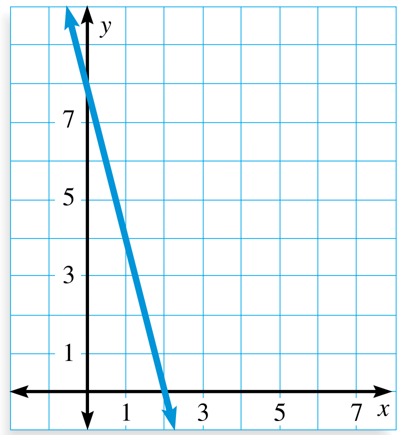
Extra Example 1 Verifying Solutions of an Equation

Use the graph to decide whether the point lies on the graph of $4x + y = 8$. Justify your answer algebraically.

a. (1, 4)

b. (3, 4)



SOLUTION

a. The point (1, 4) is on the graph of $4x + y = 8$. This means that (1, 4) is a solution. You can check this algebraically.

$4x + y = 8$	Write original equation.
$4(\mathbf{1}) + \mathbf{4} \stackrel{?}{=} 8$	Substitute 1 for *x* and 4 for *y*.
$8 = 8$	Simplify.

➧ Because $8 = 8$ is a true statement, you know that (1, 4) is a solution of the equation $4x + y = 8$, so it is on the graph.

b. The point (3, 4) is *not* on the graph of $4x + y = 8$. This means that (3, 4) is not a solution. You can check this algebraically.

$4x + y = 8$	Write the original equation.
$4(\mathbf{3}) + \mathbf{4} \stackrel{?}{=} 8$	Substitute 3 for *x* and 4 for *y*.
$16 \neq 8$	Simplify. 16 is not equal to 8.

➧ Because 16 is not equal to 8, you know that (3, 4) is not a solution of the equation $4x + y = 8$, so it is not on the graph.

Extra Example 2 Graphing an Equation

Use a table of values to graph the equation $5x = y - 2$.

SOLUTION

Rewrite the equation in function form by solving for y.

$5x = y - 2$	Write original equation.
$5x + 2 = y$	Add 2 to each side.
$y = 5x + 2$	$5x + 2 = y$ is equivalent to $y = 5x + 2$.

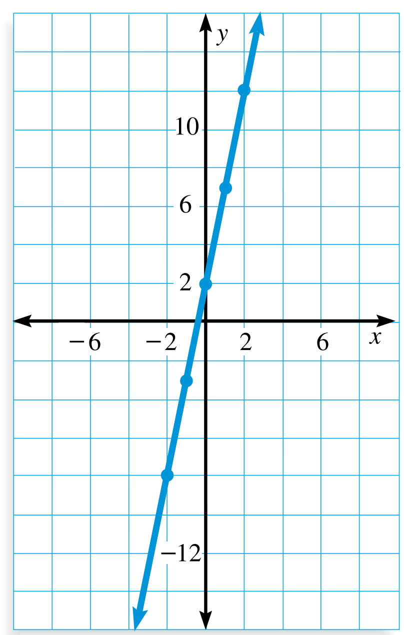
Choose a few values for x and make a table of values.

Choose x.	Substitute to find the corresponding y-value.
-2	$y = 5(-2) + 2 = -8$
-1	$y = 5(-1) + 2 = -3$
0	$y = 5(0) + 2 = 2$
1	$y = 5(1) + 2 = 7$
2	$y = 5(2) + 2 = 12$

With this table of values you have found five solutions.

$(-2, -8), (-1, -3), (0, 2),$
$(1,7), (2, 12)$

Plot the points. You can see that they all lie on a line.



➧ The line through the points is the graph of the equation.

Extra Example 3 Graphing a Linear Equation

Use a table of values to graph the equation $3x - 2y = 6$.

SOLUTION

Step 1 Rewrite the equation in function form by solving for y. This will make it easier to make a table of values.

$3x - 2y = 6$	Write original equation.
$-2y = -3x + 6$	Subtract $3x$ from each side.
$y = \frac{3}{2}x - 3$	Divide each side by -2.

Step 2 Choose a few values of x and make a table of values.

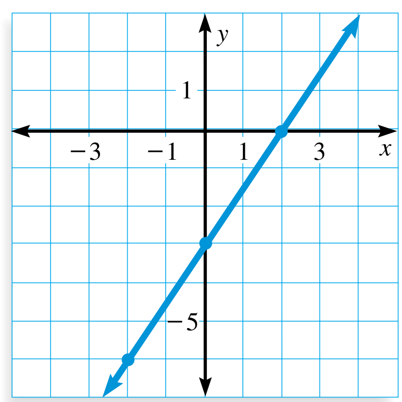
Choose x.	-2	0	2
Evaluate y.	-6	-3	0

With this table of values you have found three solutions.

(–2, 0), (0, 3), (2, 6)

Step 3 Plot the points and draw a line through them.

▶ The graph of $3x - 2y = 6$ is shown at the right.



Extra Example 4 Using the Graph of a Linear Model

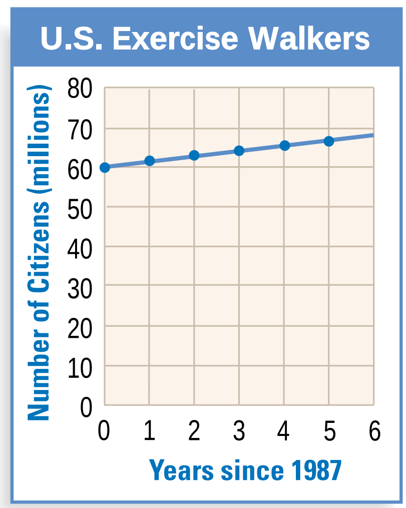
The number n of U.S. citizens (in millions) who exercise walk can be modeled by $n = 1.38t + 60.6$, where t represents the number of years since 1987. Graph this model. Describe the graph in the context of the real-life situation.

SOLUTION

Make a table of values. Use $0 \leq t \leq 5$ for 1987–1992.

t	0	1	2	3	4	5
n	60.6	62.0	63.4	64.7	66.1	67.5

You can use the table to make a graph as shown at the right.



➧ From the table and the graph, you can see that the number of people who exercise walk is projected to increase by about 1.4 million households per year, according to the model.

Extra Example 5 Graphing y = b

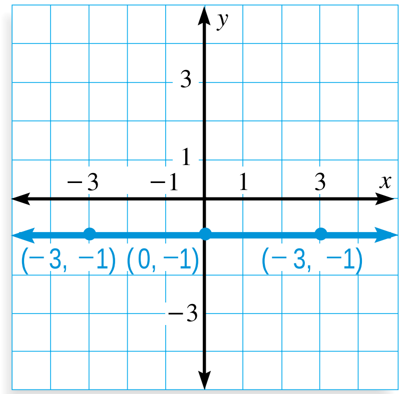
Graph the equation $y = -1$.

SOLUTION

The equation does not have x as a variable. The y-value is always -1, regardless of the value of x. For instance, here are some points that are solutions of the equation:

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

➧ The graph of the equation is a horizontal line 1 unit below the x-axis.



Extra Example 6 Graphing x = a

Graph the equation $x = 2$.

SOLUTION

The x-value is always 2, regardless of the value of y. For instance, here are some points that are solutions of the equation:

$$(2, -2), (2, 0), (2, 4)$$

➧ The graph of the equation is a vertical line 2 units to the right of the y-axis.