

# Solving Linear Equations

To determine whether a value is a solution of an equation, substitute the value into the equation and simplify.

**Example 1** Determine whether (a)  $x = 1$  or (b)  $x = -2$  is a solution of  $5x - 1 = 4$ .

a.  $5x - 1 = -2x + 6$

$5(1) - 1 \stackrel{?}{=} -2(1) + 6$  *Substitute.*

$4 = 4$  ✓ *Simplify.*

▶ So,  $x = 1$  is a solution.

b.  $5x - 1 = -2x + 6$

$5(-2) - 1 \stackrel{?}{=} -2(-2) + 6$  *Substitute.*

$-11 \neq 10$  ✗ *Simplify.*

▶ So,  $x = -2$  is *not* a solution.

To solve a linear equation, isolate the variable.

**Example 2** Solve each equation. Check your solution.

a.  $4x - 3 = 13$

$4x - 3 + 3 = 13 + 3$  *Add 3.*

$4x = 16$  *Simplify.*

$\frac{4x}{4} = \frac{16}{4}$  *Divide by 4.*

$x = 4$  *Simplify.*

**Check**

$4x - 3 = 13$

$4(4) - 3 \stackrel{?}{=} 13$

$13 = 13$  ✓

b.  $2(y - 8) = y + 6$

$2y - 16 = y + 6$  *Distributive Property*

$2y - y - 16 = y - y + 6$  *Subtract y.*

$y - 16 = 6$  *Simplify.*

$y - 16 + 16 = 6 + 16$  *Add 16.*

$y = 22$  *Simplify.*

**Check**

$2(y - 8) = y + 6$

$2(22 - 8) \stackrel{?}{=} 22 + 6$

$28 = 28$  ✓

## Practice

Check your answers at [BigIdeasMath.com](http://BigIdeasMath.com).

Determine whether (a)  $x = -1$  or (b)  $x = 3$  is a solution of the equation.

1.  $5x + 7 = 2$  (a) yes (b) no      2.  $-4x + 8 = -4$  (a) no (b) yes      3.  $2x - 1 = 3x - 4$  (a) no (b) yes

Solve the equation. Check your solution.

4.  $x - 9 = 24$   $x = 33$

5.  $n + 14 = 0$   $n = -14$

6.  $-16 = 4y$   $y = -4$

7.  $-\frac{5}{6}t = -15$   $t = 18$

8.  $81 = 46 - x$   $x = -35$

9.  $4x + 5 = 1$   $x = -1$

10.  $x + 5 = 11x$   $x = \frac{1}{2}$

11.  $9(y - 3) = 45$   $y = 8$

12.  $6 = 7k + 8 - k$   $k = -\frac{1}{3}$

13.  $6n + 3 = -4n + 7$   $n = \frac{2}{5}$

14.  $2c + 5 = 3(c - 8)$   $c = 29$

15.  $18m + 3(2m + 8) = 0$   $m = -1$

16.  $\frac{w - 6}{5} = 8$   $w = 46$

17.  $\frac{15 + h}{3} = 10$   $h = 15$

18.  $\frac{8 - 3x}{5} = x$   $x = 1$

19.  $(8r + 6) + (4r - 1) = 14$   $r = \frac{3}{4}$

20.  $\frac{2}{3}y - 3 = 9$   $y = 18$

21.  $\frac{1}{2}x - \frac{3}{10} = \frac{5}{2}x + \frac{7}{10}$   $x = -\frac{1}{2}$

22. **MONEY** You have a total of \$3.25 in change made up of 25 pennies, 6 nickels, 2 dimes, and  $x$  quarters. How many quarters do you have? **10**