Lesson 3-8

Example 1

Solve each equation. Check the solutions.

a. $x^2 = 25$ **b.** $\sqrt{x} = 9$

Solution

a.
$$x^2 = 25$$
$$\sqrt{x^2} = \sqrt{25}$$
$$x = 5 \text{ or } x = -5$$

Find each square root. Include the positive and negative solution.

Check

$x^2 = 25$ $\quad$ $x^2 = 25$
$5^2 = 25$ $\quad$ $(-5)^2 = 25$
$25 = 25$ ✓ $\quad$ $25 = 25$ ✓

b.
$$\sqrt{x} = 9$$
$$(\sqrt{x})^2 = 9^2$$
$$x = 81$$

Check

$\sqrt{x} = 9$
$\sqrt{81} = 9$
$9 = 9$ ✓

Example 2

Solve each equation. Check the solutions.

a. $x^2 = 2.25$ **b.** $\sqrt{x} = \frac{2}{5}$

Solution

a.
$$x^2 = 2.25$$
$$\sqrt{x^2} = \sqrt{2.25}$$
$$x = 1.5 \text{ or } x = -1.5$$

Check

$x^2 = 2.25$ $\quad$ $x^2 = 2.25$
$(1.5)^2 = 2.25$ $\quad$ $(-1.5)^2 = 2.25$
$2.25 = 2.25$ ✓ $\quad$ $2.25 = 2.25$ ✓

b.
$$\sqrt{x} = \frac{2}{5}$$
$$(\sqrt{x})^2 = \left(\frac{2}{5}\right)^2$$
$$x = \frac{4}{25}$$

Check

$$\sqrt{x} = \frac{2}{5}$$
$$\sqrt{\frac{4}{25}} = \frac{2}{5}$$
$$\frac{2}{5} = \frac{2}{5} \quad ✓$$

Example 3

Solve each equation. Check the solutions.

a. $x^2 - 7 = 9$

b. $\sqrt{w+1} = 6$

Solution

a.
$$\begin{aligned} x^2 - 7 &= 9 \\ x^2 - 7 + 7 &= 9 + 7 \\ x^2 &= 16 \\ \sqrt{x^2} &= \sqrt{16} \\ x &= 4 \quad \text{or} \quad x = -4 \end{aligned}$$

Check

$x^2 - 7 = 9$ | $x^2 - 7 = 9$
$4^2 - 7 = 9$ | $(-4)^2 - 7 = 9$
$16 - 7 = 9$ | $16 - 7 = 9$
$9 = 9$ ✓ | $9 = 9$ ✓

b.
$$\begin{aligned} \sqrt{w+1} &= 6 \\ (\sqrt{w+1})^2 &= 6^2 \\ w + 1 &= 36 \\ w + 1 - 1 &= 36 - 1 \\ w &= 35 \end{aligned}$$

Check
$$\begin{aligned} \sqrt{w+1} &= 6 \\ \sqrt{35+1} &= 6 \\ \sqrt{36} &= 6 \\ 6 &= 6 \quad ✓ \end{aligned}$$

Example 4

SAFETY The formula $d = 0.13v^2$, gives the distance in feet needed to stop a car after the brakes are applied. In the formula, v is the velocity of the car, in miles per hour, when the brakes are applied. If a car traveled 52 feet after the brakes were applied, how fast was the car going when the driver applied the brakes?

Solution

$$\begin{aligned} d &= 0.13v^2 \\ 52 &= 0.13v^2 \\ \frac{52}{0.13} &= v^2 \\ 400 &= v^2 \\ \sqrt{400} &= \sqrt{v^2} \\ \pm 20 &= v \end{aligned}$$

Since v represents velocity, it doesn't make sense to have a negative solution. So the car was traveling at a speed of 20 miles per hour when the driver applied the brakes.