6.6 Solve Radical Equations

EXAMPLE 1 Solve a radical equation

Solve $\sqrt[3]{2x+7} = 3$.

$$\left((2x+7)^{\frac{1}{3}}\right)^3 = 3^3$$

$$\left(\sqrt[3]{2x+7}\right)^3 = 3^3$$

$$2x+7=27$$
$$-7 \quad -7$$

$$\frac{2x}{2} = \frac{20}{2}$$

$$x = 10$$

EXAMPLE 1 **Solve a radical equation**

Solve the equation. Check your solution.

$(\sqrt{x+25})^2 = 4^2$

$x + 25 = 16$

$-25 \quad -25$

$x = -9$

$2\sqrt[3]{x-3} = 4$

$\frac{2(x-3)^{\frac{1}{3}}}{2} = \frac{4}{2}$

$(x-3)^{\frac{1}{3}3} = 2^3$

$x - 3 = 8$

$x = 11$

EXAMPLE 3

What is the solution of the equation $4x^{2/3} = 36$?

$$\frac{4x^{\frac{2}{3}}}{4} = \frac{36}{4}$$

$$x^{\frac{2}{3}} = 9$$

$$x = 9^{\frac{3}{2}} = (3^2)^{\frac{3}{2}} = 3^3 = \pm 27$$

$$4(\pm 27)^{2/3} = 36$$

$$4\left(\sqrt[3]{\pm 27}\right)^2 = 36$$

$$4(\pm 3)^2 = 36$$

$$4(9) = 36$$

$$36 = 36$$

EXAMPLE 4 **Solve an equation with a rational exponent**

Solve $(x + 2)^{3/4} - 1 = 7$.

$$(x+2)^{\frac{3}{4}} - 1 = 7$$
$$+1 \quad +1$$
$$(x+2)^{\frac{3}{4}\cdot\frac{4}{3}} = 8^{\frac{4}{3}}$$
$$x+2 = 8^{\frac{4}{3}} = (2^3)^{\frac{4}{3}} = 2^4 = 16$$
$$x+2 = 16$$
$$\boxed{x = 14}$$

EXAMPLE 4 **Solve an equation with a rational exponent**

Solve the equation. Check your solution.

$$(x + 2)^{2/3} + 3 = 7$$

$-3 \quad -3$

$(x+2)^{\frac{2}{3}\cdot\frac{3}{2}} = 4^{\frac{3}{2}} = (2^2)^{\frac{3}{2}} = 2^3 = \pm 8$

$x + 2 = \pm 8$

$x = \pm 8 - 2$

$x = 6$ $x = -10$