7.6 Equations with Rational Exponents or Radicals

std. 12.0

➡ *To solve an equation with a rational exponent:*
✦ *isolate the variable*
✦ *raise both sides of equation to the reciprocal power of the variable*
✦ *solve for the variable*
✦ *check for extraneous solutions*

$$\left(\sqrt{4}\right)^5 - 3 = 2$$

CK $\quad 4^{5/2} - 3 = 29$

ex. 1 $\quad 6x^{-2/7} = 24$

$$\left(x^{-2/7}\right)^{-7/2} = (4)^{-7/2}$$

$$x = \frac{1}{4^{7/2}} = \frac{1}{\left(\sqrt{4}\right)^7} = \frac{1}{128}$$

ex. 2 $\quad (x-4)^{5/2} - 3 = 29$

$$\left[(x-4)^{5/2}\right]^{2/5} = \left[32\right]^{2/5}$$

$$x - 4 = \left(\sqrt[5]{32}\right)^2$$

$$x = 4 + 4 = 8$$

➡ *To solve an equation with radicals:*
✦ *isolate radical or split up radicals*
✦ *raise both sides to a power to undo the root*
✦ *solve for the variable*
✦ *check for extraneous solutions*

CK $\sqrt[3]{63+1} - 4 = 0$ ✓

ex. 3 $\quad \sqrt[3]{2x+1} - 4 = 0$

$$\left(\sqrt[3]{2x+1}\right)^3 = (4)^3$$

$$2x + 1 = 64$$

$$x = \frac{63}{2}$$

$$31.5$$

$x = 9, \cancel{6}$

ex. 4 $\quad \sqrt{x-5} + 7 = x$

$$\left(\sqrt{x-5}\right)^2 = (x-7)^2$$

$$x - 5 = x^2 - 14x + 49$$

$$0 = x^2 - 15x + 54$$

$$0 = (x - 9)(x - 6)$$

ex. 5 $\sqrt{x} + \sqrt{x+16} = 8$

$$\left(\sqrt{x+16}\right)^2 = \left(8 - \sqrt{x}\right)^2$$

$$x + 16 = 64 - 16\sqrt{x} + x$$

$$-48 = -16\sqrt{x}$$

$$(3)^2 = \left(\sqrt{x}\right)^2$$

$$9 = x$$