8.6: Radical Equations

Now that we have learned how to work with radical expressions and rational exponents, we will turn our attention to radical equations to apply

I. Solving Radical Equations

A **radical equation** is an equation in which the variable is under a radical sign.

Example 1: Solve these radical equations

a) $\sqrt{x} = 5$

b) $\sqrt{2x+5} = 12$

c) $\sqrt{x+4} + 5 = 13$

d) $\sqrt[3]{x+3} + 7 = 4$

e) $2\sqrt{x} + 10 = 4$

Example 2: *Solve by isolating the radical first*

$\sqrt{6x+7} - x = 2$

Example 3. The following equation has two Radicals. Solve by isolating one radical at a time.

$$\sqrt{x+5} - \sqrt{x-3} = 2$$

Example 4: *Equations with Rational Exponents*

$$(2x-3)^{\frac{1}{3}} + 3 = 0$$

II. Applications of Radical Equations

Example

In the production of steel and other metals, the temperature of the molten metal is so great that conventional thermometers melt. Instead, sound is transmitted across the surface of the metal to a receiver on the far side and the speed of the sound is measured. The formula

$$S(t) = 1087.7\sqrt{\frac{9t+2617}{2457}}$$

Gives the speed of sound $S(t)$, in feet per second, at a temperature of t degrees Celsius.

Find the temperature of a blast furnace where sound travels 1880 ft/sec.