

- Learning Target(s):**
- I am able to solve radical equations with rational exponents.
 - I am able to solve radical equations with extraneous solutions.
 - I am able to solve equations with two radicals.

Notes: 6.6 Solve Radical Equations

Radical Equation – an equation with a radical that has variables in the radicand.

Solving Radical Equations

- isolate the radical on one side of the equation, if necessary.
- Raise each side to the same power to eliminate the radical.
- Finish solving. Check your solution.

Ex 1: Solve $(\sqrt{x+6})^2 = 3^2$

$$\sqrt{x+6} = 3$$

$$\sqrt{3+6} = 3$$

$$\sqrt{9} = 3$$

$$x+6 = 9$$

$$\begin{array}{r} x+6 = 9 \\ -6 \quad -6 \\ \hline x = 3 \end{array}$$

Ex 2: Solve $(3x+4)^{3/2} = 16$
 ** raise each side to the 3/2 power!!

$$\left((3x+4)^{2/3} \right)^{3/2} = (16)^{3/2}$$

$\frac{2}{3}$ flip $\rightarrow \frac{3}{2}$ power

$$\sqrt{(3 \cdot 20 + 4)^{2/3}} = 16$$

$$3x+4 = 64$$

$$\begin{array}{r} 3x+4 = 64 \\ -4 \quad -4 \\ \hline 3x = 60 \\ \frac{3x}{3} = \frac{60}{3} \end{array}$$

$x = 20$

Ex 3: Solve $(x-2)^2 = (x+10)^2$

FOIL

$$(x-2)(x-2) = x+10$$

$$x^2 - 4x + 4 = x + 10$$

$$\begin{array}{r} x^2 - 4x + 4 = x + 10 \\ -x - 10 \quad -x - 10 \\ \hline \end{array}$$

$$x^2 - 5x - 6 = 0$$

$$(x-6)(x+1) = 0$$

$$\begin{array}{l} x-6=0 \\ x=6 \\ x+1=0 \\ x=-1 \end{array}$$

set = to 0

$$6-2 = \sqrt{6+10}$$

$$4 = \sqrt{16}$$

$$-1-2 = \sqrt{-1+10}$$

$$\cancel{-3 = \sqrt{9}}$$

extraneous solution

FOIL

Ex 4: Solve $(\sqrt{x+6} + 2)^2 = (\sqrt{10-3x})^2$

- isolate one of the two radicals.
- square both sides!
- Repeat ☺

$$(\sqrt{x+6} + 2)(\sqrt{x+6} + 2) = 10 - 3x$$

$$x+6 + 2\sqrt{x+6} + 2\sqrt{x+6} + 4 = 10 - 3x$$

isolate $\rightarrow 4\sqrt{x+6} + x + 10 = 10 - 3x$

$$\begin{array}{r} -x-10 \\ \hline -16 -x \end{array}$$

$$\frac{4\sqrt{x+6}}{4} = \frac{-4x}{4}$$

$$(\sqrt{x+6})^2 = (-x)^2$$

$$x+6 = x^2 \quad \text{Quadratic set} = 0$$

$$0 = x^2 - x - 6$$

Factor

$$0 = (x-3)(x+2)$$

~~$x=3$~~ , $x=-2$

✓

$$\sqrt{3+6} + 2 \stackrel{?}{=} \sqrt{10-3(3)}$$

$$5 \neq 1 \quad \text{No}$$

Plicker Questions:

1. What is the solution of $\sqrt{2x+4} = x - 27$

2. What is the solution of $\sqrt{-8x^3} = 16$?

- a. 0 b. -6 c. 6 d. 2

- a. -24 b. no solution c. -8 d. -2