

Lesson 39 Solving Radical Equations

Vocabulary:

Radical Equations: an equation that has a variable under the square root.

Extraneous Solution: extra solutions that don't really work. These may come up when you square the variable in the equation.

Note:

- Opposite operations: $(\sqrt{x})^2 = x$
- $\sqrt{x} \neq$ a negative value.
- Always get the square root by itself first, then square both sides of the equation.

Examples: Solve the equations using opposite operations.

$$\begin{array}{lcl}
 1. \quad \sqrt{x} - 5 = 4 & & x = 81 \\
 \quad \quad +5 \quad +5 & & \\
 \hline
 \quad \sqrt{x} = 9 & & \sqrt{81} - 5 = 4 \\
 (\sqrt{x})^2 = 9^2 & & 9 - 5 = 4 \\
 & & 4 = 4
 \end{array}$$

$$\begin{array}{lcl}
 2. \quad \sqrt{x-3} = 4 & & \\
 (\sqrt{x-3})^2 = 4^2 & & \\
 x-3 = 16 & & \\
 \quad +3 \quad +3 & & \\
 \hline
 x = 19 & &
 \end{array}$$

$$\begin{array}{lcl}
 3. \quad \sqrt{2a+3} - 4 = 5 & & \\
 \quad \quad +4 \quad +4 & & \\
 \hline
 \quad \sqrt{2a+3} = 9 & & \\
 (\sqrt{2a+3})^2 = 9^2 & & \frac{2a}{2} = \frac{78}{2} \\
 2a+3 = 81 & & a = 39 \\
 \quad -3 \quad -3 & & \\
 \hline
 2a = 78 & &
 \end{array}$$

Equations with two Radicals:

Examples: Solve the equations using opposite operations.

$$\begin{array}{lcl}
 4. \quad \sqrt{3n-2} = \sqrt{n+6} & & \\
 (\sqrt{3n-2})^2 = (\sqrt{n+6})^2 & & \\
 3n-2 = n+6 & & \\
 \quad +n \quad -n & & \\
 \hline
 2n-2 = 6 & & \\
 \quad +2 \quad +2 & & \\
 \hline
 2n = 8 & & \\
 \frac{2n}{2} = \frac{8}{2} & & \\
 n = 4 & &
 \end{array}$$

$$\begin{array}{lcl}
 5. \quad \sqrt{3t+4} = \sqrt{5t-6} & & \\
 (\sqrt{3t+4})^2 = (\sqrt{5t-6})^2 & & \\
 3t+4 = 5t-6 & & \\
 \quad -3t \quad -3t & & \\
 \hline
 4 = 2t-6 & & \\
 \quad +6 \quad +6 & & \\
 \hline
 10 = 2t & & \\
 \frac{10}{2} = \frac{2t}{2} & & \\
 5 = t & &
 \end{array}$$