SECTION 10.4

Solving Radical Equations

SWBAT:

- Solve a radical equation.

Solving a Radical Equation:

Key Concept

Power Property of Equality

Words   If you square both sides of a true equation, the resulting equation is still true.

Symbols   If $a = b$, then $a^2 = b^2$.

Example   If $\sqrt{x} = 4$, then $(\sqrt{x})^2 = 4^2$.

Square roots and Squares are inverses of each other and cancel each other out.

Solving a Radical Equation:

Examples:

*You need to isolate the radical first! Then square both sides.

1.) $\sqrt{x} - 10 = 0$

$$+10 \quad +10$$

$$\sqrt{x}^2 = 10^2$$

$$\boxed{x = 100}$$

* Very important to Check answers!

$$\sqrt{100} - 10 = 0$$

$$10 - 10 = 0$$

$$0 = 0 \checkmark$$

Solving a Radical Equation:

Examples:

2.) $2\sqrt{x} - 12 = 4$

$+12 \quad +12$

$\dfrac{2\sqrt{x}}{2} = \dfrac{16}{2}$

$\sqrt{x}^2 = 8^2$

$\boxed{x = 64}$

Check:

$2\sqrt{64} - 12 = 4$

$2(8) - 12 = 4$

$16 - 12 = 4$

$4 = 4 \checkmark$

Solving a Radical Equation:

Examples:

3.) $\sqrt{3x + 1} - 2 = 6$

$$+2 \quad +2$$

$$\sqrt{3x+1}^2 = 8^2$$

$$3x+1 = 64$$

$$-1 \quad -1$$

$$\frac{3x}{3} = \frac{63}{3}$$

$$\boxed{x = 21}$$

Check

$$\sqrt{3(21)+1} - 2 = 6$$

$$\sqrt{63+1} - 2 = 6$$

$$\sqrt{64} - 2 = 6$$

$$8 - 2 = 6$$

$$6 = 6 \checkmark$$

Checking for Extraneous Solutions.

Extraneous Solution:
a trial solution that does not satisfy the original equation

To find E.S. you ALWAYS have to check your answers!!!!!

Checking for Extraneous Solutions.

1.) $\sqrt{4x - 3}^2 = x^2$

$4x - 3 = x^2$

$-4x + 3 \qquad -4x + 3$

$0 = x^2 - 4x + 3$

$\begin{array}{c} -3 \\ \hline -1 \; -3 \end{array}$

$0 = (x - 1)(x - 3)$

$x - 1 = 0 \qquad x - 3 = 0$

$\boxed{x = 1} \quad \boxed{x = 3}$

Check

$\sqrt{4(1) \cdot 3} = 1$

$\sqrt{4 \cdot 3} = 1$

$\sqrt{1} = 1$

$1 = 1 \checkmark$

$\sqrt{4(3) - 3} = 3$

$\sqrt{12 - 3} = 3$

$\sqrt{9} = 3 \checkmark$

$3 = 3 \checkmark$

Checking for Extraneous Solutions.

2.) $\sqrt{4x + 45}^2 = x^2$

$$4x + 45 = x^2$$
$$-4x \quad -45 \qquad -4x -45$$

$+ \qquad -$

$\dfrac{-45}{\begin{array}{cc} 1 & -45 \\ 3 & -15 \\ 5 & -9 \end{array}}$

$$0 = x^2 - 4x - 45$$
$$0 = (x+5)(x-9)$$
$$x+5 = 0 \qquad x-9 = 0$$
$$x = -5 \qquad \boxed{x = 9}$$

extraneous Solution

Check

$$\sqrt{4(-5)+45} = -5$$
$$\sqrt{-20+45} = -5$$
$$\sqrt{25} = -5$$
$$5 \neq -5$$

$$\sqrt{4(9)+45} = 9$$
$$\sqrt{36+45} = 9$$
$$\sqrt{81} = 9$$
$$9 = 9 \checkmark$$

Variables on Both Sides:

Check Your Progress

Solve each equation. Check your solution.

3A. $\sqrt{t+5} = t+3$

3B. $(x-3)^2 = \sqrt{x-1}^2$

$(x-3)(x-3) = x-1$

$x^2 - 3x - 3x + 9 = x - 1$

$x^2 - 6x + 9 = x - 1$
$\quad - x + 1 \quad -x + 1$

$x^2 - 7x + 10 = 0$

$(x-2)(x-5) = 0$

$x = 2 \qquad \boxed{x = 5}$

extraneous solution

Check

$2 - 3 = \sqrt{2-1}$

$-1 = \sqrt{1}$

$-1 \neq 1$

$5 - 3 = \sqrt{5-1}$

$2 = \sqrt{4}$

$2 = 2 \checkmark$
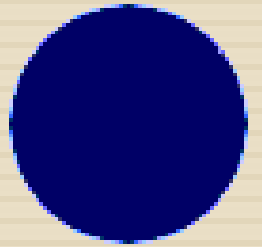
Did We Reach Our Objective?

- SWBAT understand solve radical equations.

HOMEWORK

- Section 10.4
  - #'s 9 – 20 odd