

Name: KEY Hour: _____ Date: _____

NOTES: Section 12.3 – Solving Radical Equations

Goals: #1 - I can solve a radical equation.

Homework: Section 12.3 Worksheet



Warm Up:

1. Simplify the expression.

a. $\sqrt{2(7\sqrt{3} + \sqrt{2})}$
 $7\sqrt{6} + \sqrt{4}$
 $7\sqrt{6} + 2$

c. $3\sqrt{17} + 9\sqrt{11} + \sqrt{17}$
 $4\sqrt{17} + 9\sqrt{11}$

b. $\sqrt{\frac{5}{6}}$
 $\frac{\sqrt{5}}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}}$
 $\frac{\sqrt{30}}{\sqrt{36}}$ $\frac{\sqrt{30}}{6}$

d. $\sqrt{80} - \sqrt{45}$
 $\sqrt{16 \cdot 5} - \sqrt{9 \cdot 5}$
 $4\sqrt{5} - 3\sqrt{5}$
 $\sqrt{5}$

Exploration #1: Work with a partner and answer the following questions.

1. Solve the following equations:

a. $x^2 = 25$
 $\sqrt{x^2} = \sqrt{25}$
 $x = \pm 5$

b. $3x^2 - 7 = 41$
 $3x^2 = 48$
 $x^2 = 16$
 $\sqrt{x^2} = \sqrt{16}$
 $x = \pm 4$

2. What operation "undoes" squaring a number?

square root

3. What operation "undoes" taking the square root of a number?

squaring

Name: _____ Hour: _____ Date: _____

Notes:

To solve radical equations, we square both sides of the equation.

Example #1: Solve the radical equation.

$$1. \sqrt{x} - 7 = 0$$

$$+7 \quad +7$$

$$\sqrt{x} = 7$$

$$(\sqrt{x})^2 = (7)^2$$

$$\boxed{x = 49}$$

$$2. \sqrt{2x-3} + 4 = 5$$

$$-4 \quad -4$$

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

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

$$2x - 3 = 1$$

$$2x = 4$$

$$\boxed{x = 2}$$

You practice: Solve the radical equation.

$$1. \sqrt{x-6} = 4$$

$$(\sqrt{x-6})^2 = (4)^2$$

$$x - 6 = 16$$

$$\boxed{x = 22}$$

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

$$+3 \quad +3$$

$$\sqrt{3x+1} = 4$$

$$(\sqrt{3x+1})^2 = (4)^2$$

$$3x + 1 = 16$$

$$3x = 15$$

$$\boxed{x = 5}$$

Notes:

Squaring both sides of an equation can introduce a solution that does NOT satisfy the original equation. This is called an extraneous solution.

When we solve by squaring both sides of an equation, we need to check each solution in the original equation.

Example #2: Solve the radical equation.

1. $\sqrt{x+2} = x$

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

$$x+2 = x^2$$

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

$$0 = (x-2)(x+1)$$

$$x = 2$$

~~$$x = -1$$~~

extraneous

$$\sqrt{2+2} = 2$$

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

$$\sqrt{4} = 2$$

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

$$2 = 2 \checkmark$$

$$1 \neq -1$$

You practice: Solve the radical equation.

1. $x = \sqrt{8-2x}$

$$(x)^2 = (\sqrt{8-2x})^2$$

$$x^2 = 8 - 2x$$

$$x^2 + 2x - 8 = 0$$

$$(x+4)(x-2) = 0$$

~~$$x = -4$$~~

$$x = 2$$

extraneous

$$-4 = \sqrt{8-2(-4)}$$

$$2 = \sqrt{8-2(2)}$$

$$-4 = \sqrt{8+8}$$

$$2 = \sqrt{4}$$

$$-4 = \sqrt{16}$$

$$2 = 2 \checkmark$$

$$-4 \neq 4$$

2. $\sqrt{x} + 13 = 0$

$$-13 \quad -13$$

$$\sqrt{x} = -13$$

$$(\sqrt{x})^2 = (-13)^2$$

~~$$x = 169$$~~

$$\sqrt{169} + 13 = 0$$

$$13 + 13 = 0$$

$$26 \neq 0$$

NO SOLUTION

2. $\sqrt{x} + 4 = 0$

$$-4 \quad -4$$

$$\sqrt{x} = -4$$

$$(\sqrt{x})^2 = (-4)^2$$

~~$$x = 16$$~~

$$\sqrt{16} + 4 = 0$$

$$4 + 4 = 0$$

$$8 \neq 0$$

NO SOLUTION