

Lesson Solving Radical Equations

1) Solve. Check for extraneous solutions.

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

get the radical by itself first – add 2 to the right

$$\sqrt{2y + 3} = 3$$

Square both sides

$$2y + 3 = 9$$

subtract 3 on the right

$$2y = 6$$

divide by 2

$$y = 3$$

CHECK: $\sqrt{2(3) + 3} = 3$

$$\sqrt{9} = 3 \quad \checkmark$$

2) Solve. Check for extraneous solutions.

$$2\sqrt{x} = 22$$

get the radical by itself first – divide by 2

$$\sqrt{x} = 11$$

Square both sides

$$x = 121$$

CHECK: $2\sqrt{121} = 22$

$$2 \cdot 11 = 22 \quad \checkmark$$

3) Solve.

$$2\sqrt{x} - 14 = 8$$

get the radical by itself first – add 14 to the right

$$2\sqrt{x} = 22$$

Divide by 2

$$\sqrt{x} = 11$$

square both sides

$$x = 121$$

4) Solve.

$$\sqrt{9 - x} = 4$$

Square both sides

$$9 - x = 16$$

subtract 9 on the right

$$-x = 7$$

divide by -1

$$x = -7$$

5,6) Solve.

$$\sqrt{4x - 3} = 5$$

Square both sides

$$4x - 3 = 25$$

add 3 on the right

$$4x = 28$$

divide by 4

$$x = 7$$

7) Solve.

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

get the radical by itself first – add 3 to the right

$$\sqrt{4x + 5} = 5$$

Square both sides

$$4x + 5 = 25$$

subtract 5 on the right

$$4x = 20$$

divide by 4

$$y = 5$$

8) Solve.

$$\sqrt{2x + 5} - 6 = 1$$

get the radical by itself first – add 6 to the right

$$\sqrt{2x + 5} = 7$$

Square both sides

$$2x + 5 = 49$$

subtract 5 on the right

$$2x = 44$$

divide by 2

$$y = 22$$

9) Solve the radical equation.

$$\sqrt[3]{3x + 58} = 4$$

CUBE both sides

$$3x + 58 = 64$$

subtract 58 on the right

$$3x = 6$$

divide by 3

$$x = 2$$

10) Solve the radical equation.

$$\sqrt[3]{4x - 48} - 2 = 0$$

get the radical by itself first – add 2 to the right

$$\sqrt[3]{4x - 48} = 2$$

CUBE both sides

$$4x - 48 = 8$$

add 48 on the right

$$4x = 56$$

divide by 4

$$x = 14$$

$$\sqrt[n]{b} = b^{\frac{1}{n}}$$

$$\sqrt{x} = x^{1/2}$$

$$\sqrt[3]{x} = x^{1/3}$$

11) Solve the radical equation. get the radical by itself first – subtract 1 to the right

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

$$(2x + 2)^{1/3} = 3 \quad \text{CUBE both sides}$$

$$2x + 2 = 27 \quad \text{subtract 2 on the right}$$

$$2x = 25 \quad \text{divide by 2}$$

$$x = \frac{25}{2}$$

12) Solve the radical equation. get the radical by itself first – subtract 1 to the right

$$(3x + 3)^{1/3} + 1 = 6$$

$$(3x + 3)^{1/3} = 5 \quad \text{CUBE both sides}$$

$$3x + 3 = 125 \quad \text{subtract 3 on the right}$$

$$3x = 122 \quad \text{divide by 3}$$

$$x = \frac{122}{3}$$

13) Solve the radical equation. get the radical by itself first – subtract 7 to the right

$$(4x + 8)^{1/4} + 7 = 9$$

$$(4x + 8)^{1/4} = 2 \quad \text{Raise to the 4th both sides}$$

$$4x + 8 = 16 \quad \text{subtract 8 on the right}$$

$$4x = 8 \quad \text{divide by 4}$$

$$x = 2$$

14) Solve the radical equation. get the radical by itself first – subtract 4 to the right

$$(3x + 7)^{1/4} + 4 = 6$$

$$(3x + 7)^{1/4} = 2 \quad \text{Raise to the 4th both sides}$$

$$3x + 7 = 16 \quad \text{subtract 7 on the right}$$

$$3x = 9 \quad \text{divide by 3}$$

$$x = 3$$

15) Solve. Check for extraneous solutions.

$$\sqrt{3y+7} - \sqrt{2y+11} = 0$$

Move the right radical to the right side

$$\sqrt{3y+7} = \sqrt{2y+11}$$

Square both sides

$$3y + 7 = 2y + 11 \quad \text{subtract } y \text{ on the left}$$

$$y + 7 = 11 \quad \text{subtract } 7 \text{ to the right side}$$

$$y = 4$$

16) Solve. Check for extraneous solutions.

$$\sqrt{10y+6} - \sqrt{9y+7} = 0$$

Move the right radical to the right side

$$\sqrt{10y+6} = \sqrt{9y+7}$$

Square both sides

$$10y + 6 = 9y + 7 \quad \text{subtract } y \text{ on the left}$$

$$y + 6 = 7 \quad \text{subtract } 6 \text{ to the right side}$$

$$y = 1$$