

UNIT 3 LESSON 4 SOLVING RADICAL EQUATIONS

Solving Radical Equations

A "RADICAL" equation is when the VARIABLE is in the radicand.

How to:

Step 1: ISOLATE the radical

Step 2: RAISE each side to power equal to index

Step 3: SOLVE the resulting equation

Step 4: CHECK answers to avoid extraneous solutions (EXTRANEIOUS MEANS SOLUTIONS THAT DON'T WORK)

Ex 1) Simplify $\sqrt{x-5} = 2$

Step 1: Radical is already isolated

Step 2: index is equal to 2 \rightarrow Raise each side to power of 2

$$(\sqrt{x-5})^2 = (2)^2$$

Step 3: Solve $x-5 = 4$
 $x = 9$

Step 4: Check \rightarrow plug $x=9$ back into original equation

$$\sqrt{x-5} = 2$$

$$\sqrt{9-5} = 2$$

$$\sqrt{4} = 2$$

$$2 = 2 \checkmark$$

So $x=9$ is a solution

Ex 2) Simplify $\sqrt[3]{3x+6} + 10 = 7$

Step 1: Isolate the radical $\sqrt[3]{3x+6} = -3$

Step 2: Index is equal to 3 \rightarrow Raise each side to power of 3

$$(\sqrt[3]{3x+6})^3 = (-3)^3$$

Step 3: Solve $3x+6 = -27$

$$3x = -33$$

$$x = -11$$

Step 4: Check \rightarrow plug $x = -11$ back into original equation

$$\sqrt[3]{3x+6} + 10 = 7$$

$$\sqrt[3]{3(-11)+6} + 10 = 7$$

$$\sqrt[3]{-27} + 10 = 7$$

$$-3 + 10 = 7$$

$$7 = 7 \checkmark$$

So $x = -11$ is a solution

Ex 3) Simplify $\sqrt{2x+15} = x$

Step 1: Radical is already isolated

Step 2: Index is equal to 2 \rightarrow Raise each side to power of 2

$$(\sqrt{2x+15})^2 = (x)^2$$

Step 3: Solve $2x+15 = x^2$

$$0 = x^2 - 2x - 15$$

$$0 = (x-5)(x+3)$$

$$x = 5 \text{ and } x = -3$$

Step 4: Check \rightarrow plug $x = 5$ and $x = -3$ back into original equation

$$x = 5$$

$$\sqrt{2x+15} = x$$

$$\sqrt{2(5)+15} = 5$$

$$\sqrt{25} = 5$$

$$5 = 5 \checkmark$$

So $x = 5$ is a solution

$$x = -3$$

$$\sqrt{2x+15} = x$$

$$\sqrt{2(-3)+15} = -3$$

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

$$3 \neq -3 \text{ NO}$$

EXTRANEIOUS
SOLUTION