



Solve
RADICAL
equations

Steps for solving radical equations:

- 1) Get radical by itself
 - 2) Square or cube both sides
 - 3) Solve for x
 - 4) Check your answers!!! (Extraneous)
- *You will have some that don't work*

Example 1:

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

+4 +4

$$\left(\sqrt[3]{x}\right)^3 = (4)^3$$

$$\left(x^{\frac{1}{3}}\right)^3$$

$x = 64$

Check:

$$\sqrt[3]{64} - 4 = 0$$

$$4 - 4 = 0$$

$$0 = 0 \checkmark$$

Example 2:

$$\sqrt{4x-7} + 2 = 5$$

$$\begin{array}{r} \underline{-2} \quad \underline{-2} \\ (\sqrt{4x-7})^2 = (3)^2 \end{array}$$

$$\begin{array}{r} 4x - 7 = 9 \\ +7 \quad +7 \end{array}$$

Check

$$\sqrt{4(4)-7} + 2 = 5$$

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

$$3 + 2 = 5$$

$$5 = 5 \checkmark$$

$$4x = 16$$

$$\boxed{x=4}$$

Example 3:

$$\left((2x+5)^{\frac{1}{2}} \right)^2 = (4)^2 \quad \left(2\left(\frac{11}{2}\right) + 5 \right)^{\frac{1}{2}} = 4$$

$$2x+5=16$$

$$2x=11$$

$$x = \frac{11}{2}$$

Check:

$$16^{\frac{1}{2}} = 4$$

$$4=4\checkmark$$

Example 4:

$$\left(\sqrt{x+4}\right)^2 = \left(\sqrt{2x-1}\right)^2$$

Check:

$$\sqrt{5+4} = \sqrt{2(5)-1}$$

$$3 = 3 \checkmark$$

$$\begin{array}{r} x+4 = 2x-1 \\ -x \quad -x \end{array}$$

$$\begin{array}{r} y = x-1 \\ +1 \quad +1 \end{array}$$

$$\boxed{x=5}$$

Example 5:

$$\sqrt{3x+2} - 2\sqrt{x} = 0$$

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

$$3x+2 = 4x$$

$$\boxed{2=x}$$

Check

$$\sqrt{6+2} - 2\sqrt{2} = 0$$

$$\sqrt{8} - 2\sqrt{2} = 0$$

$$2\sqrt{2} - 2\sqrt{2} = 0$$

$$0 = 0 \checkmark$$

Example 6:

$$\left(\sqrt[3]{x+6}\right)^3 = \left(2\sqrt[3]{x-1}\right)^3$$

$$\sqrt[3]{8} = \sqrt[3]{\underbrace{2 \cdot 2 \cdot 2}_2}$$

Check:

$$x+6 = 8(x-1)$$

$$x+6 = 8x-8$$

$$14 = 7x$$

$$\boxed{x=2}$$

$$\sqrt[3]{8} = 2\sqrt[3]{1}$$

$$2 = 2\checkmark$$

Example 7:

Solve the equation. Check for extraneous solutions.

$$(x)^2 = (\sqrt{42 - x})^2 \quad \text{Check:}$$

$$x^2 = 42 - x$$

$$x^2 + x - 42 = 0$$

$$(x+7)(x-6) = 0$$

$$\cancel{x = -7} \quad \boxed{x = 6}$$

$$-7 = \sqrt{42 + 7}$$

$$-7 = \sqrt{49}$$

$$-7 \neq 7$$

$$6 = \sqrt{42 - 6}$$

$$6 = \sqrt{36}$$

$$6 = 6 \checkmark$$

Example 8:

Solve the equation. Check for extraneous solutions.

$$\left(\sqrt{2-x}\right)^2 = (x+4)^2 \rightarrow (x+4)(x+4)$$

$$2-x = x^2 + 8x + 16$$

$$-2 + x$$

$$x^2 + 9x + 14 = 0$$

$$(x+7)(x+2) = 0$$

$$\cancel{x=-7} \quad \boxed{x=-2}$$

check:

$$\sqrt{2+7} = -3$$

$$3 \neq -3$$

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

$$2 = 2 \checkmark$$

Homework #1 - #12