

## Solving Radical Equations

Steps:

1. Isolate the radical on one side of the equation
2. raise each side of the equation to the same power to eliminate the radical
3. solve the equation
4. check your solution

$$\begin{aligned} 1.) \quad & 5 + \sqrt{x+1} = 16 \\ & \quad \quad \quad -5 \quad \quad \quad -5 \\ & (\sqrt{x+1})^2 = (11)^2 \\ & x+1 = 121 \\ & \quad \quad \quad -1 \quad \quad \quad -1 \\ & \boxed{x=120} \end{aligned}$$

$$\begin{aligned} 2.) \quad & \sqrt[3]{z} - 4 = 0 \\ & \quad \quad \quad +4 \quad +4 \\ & (\sqrt[3]{z})^3 = (4)^3 \\ & \boxed{z=64} \end{aligned}$$

$$\begin{aligned} 3.) \quad & 2\sqrt{x+12} - 3 = 5 \\ & \quad \quad \quad +3 \quad +3 \\ & \frac{2\sqrt{x+12}}{2} = \frac{8}{2} \\ & (\sqrt{x+12})^2 = (4)^2 \\ & x+12 = 16 \\ & \quad \quad \quad -12 \quad -12 \\ & \boxed{x=4} \end{aligned}$$

$$\begin{aligned} 4.) \quad & 2\sqrt[3]{5-11x} = 6 \\ & \quad \quad \quad \frac{\quad}{2} \quad \quad \quad \frac{\quad}{2} \\ & (\sqrt[3]{5-11x})^3 = (3)^3 \\ & 5-11x = 27 \\ & \quad \quad \quad -5 \quad \quad \quad -5 \\ & \quad \quad \quad -11x = 22 \\ & \quad \quad \quad \frac{\quad}{-11} \quad \quad \quad \frac{\quad}{-11} \\ & \boxed{x=-2} \end{aligned}$$

$$5.) (\sqrt{3x})^2 = (\sqrt{x+6})^2$$

$$3x = x + 6$$

$$-x \quad -x$$

$$\frac{2x}{2} = \frac{6}{2}$$

$$\boxed{x=3}$$

$$6.) \sqrt{3x-2} - \sqrt{x} = 0$$

$$+\sqrt{x} \quad +\sqrt{x}$$

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

$$3x-2 = x$$

$$-3x \quad -3x$$

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

$$\boxed{x=1}$$

**Extraneous Solutions:**

\* an apparent solution that does not actually work when you check your answer

$$7.) (\sqrt{x-2})^2 = (-1)^2$$

$$x-2 = 1$$

$$+2 \quad +2$$

~~$$x=3$$~~

$\boxed{\text{no solution}}$

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

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

$$1 = -1 \quad \text{NO!}$$

$$9.) (x+2)^2 = (\sqrt{2x+7})^2$$

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

$$x^2 + 4x + 4 = 2x + 7$$

$$-2x \quad -7 \quad -2x \quad -7$$

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

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

~~$$x=3$$~~

$$\boxed{x=1}$$

extraneous

$$8.) (x)^2 = (\sqrt{x+12})^2$$

$$x^2 = x + 12$$

$$-x \quad -12$$

$$x^2 - x - 12 = 0$$

$$(x-4)(x+3) = 0$$

$$\boxed{x=4}$$

~~$$x=-3$$~~

Does not work!

$$10.) (x+1)^2 = (\sqrt{2x+5})^2$$

$$(x+1)^2 = 2x+5$$

$$x^2 + 2x + 1 = 2x + 5$$

$$-2x \quad -5 \quad -2x \quad -5$$

$$x^2 - 4 = 0$$

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

$$\boxed{x=2}$$

~~$$x=-2$$~~