

## How to solve equations with radicals

1. If the equation has only one radical,
  - Isolate the radical.
  - If the radical is a square root, square both sides.
  - If the radical is a cube root, cube both sides.
  - If the radical is a  $n$ th root, raise both sides to the  $n$ th power.
  - Solve the resulting equation.
  - Check your answer. (Required Check)
  
2. If the equation has two radicals,
  - Need the radicals on opposite sides of the equation.
  - Square both sides.
  - If you still have a radical in your equation, go to #1 above.
  - Solve the resulting equation.
  - Check your answer. (Required Check)
  
3. If the equation has more than two radicals,
  - Square both sides.
  - You will still have a radical in your equation.
  - Go to #1 above.

Example:

$$\sqrt{x+3} - 6 = 0$$

$$\sqrt{x+3} = 6$$

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

$$x+3 = 36$$

$$x = 33$$

Chk :

$$\sqrt{33+3} = \sqrt{36} = 6 \text{ ck}$$

$$x = 33$$

{33}

Example:

$$\sqrt{x^2 - 15} = \sqrt{x + 5}$$

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

$$x^2 - 15 = x + 5$$

$$x^2 - x - 20 = 0$$

$$(x - 5)(x + 4) = 0$$

$$x - 5 = 0 \text{ or } x + 4 = 0$$

$$x = 5 \text{ or } x = -4$$

ck :

$$x = 5$$

$$\sqrt{25 - 15} = \sqrt{10} = \sqrt{5 + 5} \text{ ck}$$

$$x = -4$$

$$\sqrt{16 - 15} = \sqrt{1} = \sqrt{-4 + 5} \text{ ck}$$

$$\{-4, 5\}$$

Example:

$$\sqrt{x+6} + \sqrt{2-x} = 4$$

$$\sqrt{x+6} = 4 - \sqrt{2-x}$$

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

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

$$x+6 = 16 - 4\sqrt{2-x} - 4\sqrt{2-x} + 2-x$$

$$x+6 = 18 - x - 8\sqrt{2-x}$$

$$2x - 12 = -8\sqrt{2-x}$$

$$(2(x-6))^2 = (-8\sqrt{2-x})^2$$

$$4(x^2 - 12x + 36) = 64(2-x)$$

$$4x^2 - 48x + 144 = 128 - 64x$$

$$4x^2 + 16x + 16 = 0$$

$$x^2 + 4x + 4 = 0$$

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

$$x+2 = 0$$

$$x = -2$$

ck :

$$\sqrt{-2+6} + \sqrt{2+2} = \sqrt{4} + \sqrt{4} = 2 + 2 = 4 \text{ ck}$$

$$\{-2\}$$