Solving Radical Equations

① $(\sqrt{x})^2 = (6)^2$

$x = 36$

② $\sqrt{x^2} = \sqrt{49}$

$x = \pm 7$

③ $\sqrt{(x-3)^2} = \sqrt{16}$

$\sqrt{(x-3)^2} = \sqrt{16}$

$x - 3 = \pm 4$

$x = 3 \pm 4$

$x = 3+4$ → $x = 7$

$x = 3-4$ → $x = -1$

EVEN ROOT → plus/minus (when solving)

④ $\left(\sqrt[3]{x-2}\right)^3 = (4)^3$

$x - 2 = 64$

$+2 \quad +2$

$x = 66$

⑤ $\sqrt[4]{3x+1} - 5 = 0$

$+5 \quad +5$

$\left(\sqrt[4]{3x+1}\right)^4 = (5)^4$

$3x + 1 = 625$

$-1 \quad -1$

$\frac{3x}{3} = \frac{624}{3}$

$x = 208$

(6) $\sqrt{2x+7} - x = 2$

$+x \quad +x$

$\left(\sqrt{2x+7}\right)^2 = (x+2)^2$

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

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

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

$-2x \ -7 \qquad -2x \ -7$

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

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

$x-1=0$ $\qquad$ $x+3=0$

$x=1$ $\qquad$ ~~$x=-3$~~

Check

$\sqrt{2(1)+7} - 1 = 2$

$\sqrt{9} - 1 = 2$

$3-1=2$ ✓

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

$\sqrt{-6+7} + 3 = 2$

$\sqrt{1} + 3 = 2$

$1+3 \neq 2$

Extraneous Solutions:

Solutions that don't work in original eqn.