Solving a radical equation

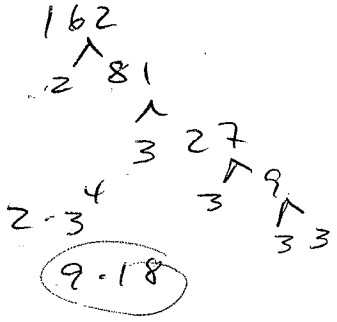
Ex 1 $\sqrt{x+7} = x-13$

square both sides $(x-13)^2$

$x+7 = x^2-26x+169$

$0 = x^2-27x+162$

$0 = (x-?)(x-?)$



$0 = (x-9)(x-18)$

$x = 9, 18$

But, you must always check both solns. in a radical eqn.

Check $x=9 \rightarrow \sqrt{9+7} \stackrel{?}{=} 9-13 = -4$

$\sqrt{16} \neq -4$

Soln $\boxed{x=18} \rightarrow \sqrt{18+7} \stackrel{?}{=} 18-13$

$\sqrt{25} = 5$ ✓

Ex When 2 radicals are on one side, it's best to bring one over before squaring.

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

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

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

$$x+3 = (6-\sqrt{2x-3})(6-\sqrt{2x-3})$$ FOIL it

$$x+3 = 36 - 6\sqrt{2x-3} - 6\sqrt{2x-3} + 2x-3$$

combine $\quad 30 + x = 12\sqrt{2x-3}$

square again $\quad (30+x)^2 = (12\sqrt{2x-3})^2$

$$(x+30)(x+30) = (12\sqrt{2x-3})^2$$

$$x^2 + 60x + 900 = 144(2x-3)$$

$$x^2 + 60x + 900 = 288x - 432$$

combine $\quad x^2 - 228x + 1332 = 0$ omg!!

factor (you're kidding) $\quad (x-?)(x-?) = 0$

$$(x-6)(x-222) = 0$$

↳ This would not be the numbers on a test — too stressful)

$$x = 6, \quad x = 222$$

Check $\quad x = 6: \quad \sqrt{6+3} + \sqrt{12-3} = 6$ ✓

$x = 222: \quad \sqrt{225} + \sqrt{441} = ??$

$15 + 21 \neq 6$

$$\boxed{x = 6}$$