Solving Radical Equations

Ex: ①

$$\frac{\cancel{2}\sqrt{x+1}}{\cancel{2}} = \frac{4}{2}$$

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

$$x + \cancel{1} = 4$$
$$\cancel{-1} \quad -1$$

$$\boxed{x=3}$$

Ck:

$$2\sqrt{3+1} \stackrel{?}{=} 4$$

$$2\cdot\sqrt{4}$$

$$2\cdot 2$$

$$4 = 4 \checkmark$$

② $\sqrt[3]{2x-9} - 1 = 2$

$\quad\quad\quad\quad +1 \quad +1$

$\left(\sqrt[3]{2x-9}\right)^3 = 3^3$

$2x-9 = 27$

$\quad\quad +9 \quad +9$

$\frac{2x}{2} = \frac{36}{2}$

$\boxed{x=18}$

ck:

$\sqrt[3]{2\cdot 18-9} - 1 \stackrel{?}{=} 2$

$\sqrt[3]{27} - 1 = 2$

$3-1=2$

$2=2\checkmark$

③ $(x+1)^2 = (\sqrt{7x+15})^2$

$(x+1)(x+1) = 7x+15$

$x^2+2x+1 = 7x+15$

$\quad -7x-15 \quad -7x-15$

$1x^2-5x-14 = 0$

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

reject $x=-2$ | $x=7$ ✓

CK:

① $-2+1 \stackrel{?}{=} \sqrt{7(-2)+15}$

$-1 = \sqrt{1}$

$-1 = 1$ ✗

② $7+1 \stackrel{?}{=} \sqrt{7(7)+15}$

$8 = \sqrt{64}$

$8 = 8$ ✓

(4) $(2x)^{3/4} + 2 = 10$

$\quad\quad\quad\quad -2 \quad -2$

$\left[(2x)^{3/4}\right]^{4/3} = 8^{4/3}$

$2x = \sqrt[3]{8}^{\,4}$

$2x = 2^4$

$\frac{2x}{2} = \frac{16}{2}$

$x = 8$

$\sqrt[4]{(2x)^3} + 2 = 10$

$\quad\quad -2 \quad -2$

$\left(\sqrt[4]{(2x)^3}\right)^4 = 8^4$

$(2x)^3 = 4096$

$\frac{8x^3}{8} = \frac{4096}{8}$

$\sqrt[3]{x^3} = \sqrt[3]{512}$

$\boxed{x = 8}$

Procedure:

1) Isolate the radical to one side of the eq'n.
2) Raise both sides to the same power in order to eliminate the radical.
3) Solve the resulting eq'n.
4) Check.

* If using exponents, raise both sides to the Reciprocal power.

(10) $\sqrt{x+22}^2 = (x+2)^2$

$x + \cancel{22} = x^2 + 4x + 4$

$-\cancel{x} - 22 \qquad - x - 22$

$0 = x^2 + 3x - 18$

$0 = (x-3)(x+6)$

✓ 3	$\cancel{-6}$ reject

ck:

$4 = -4$

✗