3.3 Solve by Square Roots

Can only use this method if you have:

- only x^2 in the equation
- only $(x \pm c)^2$ in the equation
  (c is a #.)

and no other x's.

Steps:

1. Isolate the x^2 or $(x \pm c)^2$ (squared binomial).
2. Take the square root of both sides.
3. There will ALWAYS be a positive & a negative answer ($\pm$)
4. If necessary, solve for x

Ex.1 Solve $\frac{1}{2}x^2 + 3 = 12$

$-3 \quad -3$

$\frac{2}{1} \cdot \frac{1}{2}x^2 = 9 \cdot \frac{2}{1}$

$x^2 = 18$

$\sqrt{x^2} = \pm\sqrt{18}$

$\boxed{x = \pm 3\sqrt{2}}$

18
9 2
3 3

Ex.2 Solve

$\frac{1}{7}x^2 - 3 = 4$

$+3 \quad +3$

$7 \cdot \frac{1}{7}x^2 = 7 \cdot 7$

$x^2 = 49$

$\sqrt{x^2} = \pm\sqrt{49}$

$\boxed{x = \pm 7}$

Ex.3 Solve

$2x^2 - 338 = 0$

$+338 \quad +338$

$\frac{2x^2}{2} = \frac{338}{2}$

$\sqrt{x^2} = \pm\sqrt{169}$

$\boxed{x = \pm 13}$

Ex.4 Solve $(x+5)^2 + 7 = 3$

$-7 \quad -7$

$(x+5)^2 = -4$

$\sqrt{(x+5)^2} = \pm\sqrt{-4}$

from unit 1

$\sqrt{-4} = \sqrt{-1} \cdot \sqrt{4}$

$= i \cdot 2$

$= 2i$

$x + 5 = \pm 2i$

$-5 \quad -5$

$\boxed{x = -5 \pm 2i}$

2 solutions are

$\boxed{-5+2i \text{ & } -5-2i}$

Ex.5 Solve

$\frac{4(x+5)^2}{4} = \frac{64}{4}$

$\sqrt{(x+5)^2} = \pm\sqrt{16}$

$x + 5 = \pm 4$

$-5 \quad -5$

$x = -5 \pm 4$

$x = -5+4 \qquad x = -5-4$

$\boxed{x = -1 \qquad x = -9}$

Ex.6 Solve

$(x+3)^2 + 6 = 18$

$-6 \quad -6$

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

$x + 3 = \pm\sqrt{12}$

$x + 3 = \pm 2\sqrt{3}$

$-3 \quad -3$

$x = -3 \pm 2\sqrt{3}$

$\boxed{x = -3+2\sqrt{3} \qquad x = -3-2\sqrt{3}}$