MUST HAVE!

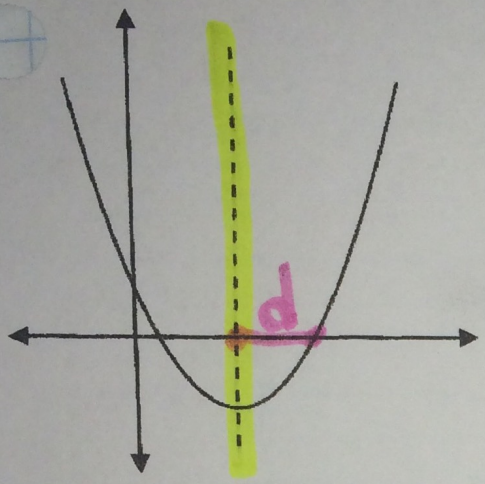
If $ax^2 + bx + c = 0$, then

Quadratic Formula

$$x = \frac{-b}{2a} \pm \frac{\sqrt{b^2-4ac}}{2a}$$

$\frac{-b}{2a}$: line of symmetry

$\frac{\sqrt{b^2-4ac}}{2a}$: distance from line of symmetry to the x-intercepts



Examples: Solve for x.

1. $x^2 + 8x - 4 = 0$

① Standard form ✓

② Identify a, b, c

$a=1 \quad b=8 \quad c=-4$

③ General Quadratic Formula

$$x = \frac{-b}{2a} \pm \frac{\sqrt{b^2-4ac}}{2a}$$

④ Substitute

$$x = \frac{-8}{2} \pm \frac{\sqrt{64-4(1)(-4)}}{2}$$

⑤ Simplify

$$= -4 \pm \frac{\sqrt{64+16}}{2}$$

$$= -4 \pm \frac{\sqrt{80}}{2}$$

$\sqrt{8 \cdot 10}$

$\sqrt{2^4 \cdot 5}$

$\sqrt{2^2 \cdot 2^2 \cdot 5}$

$2 \cdot 2\sqrt{5}$

$$= -4 \pm \frac{4\sqrt{5}}{2}$$

$$x = -4 \pm 2\sqrt{5}$$ EXACT!!!

$x \approx 0.47, -8.47$ Approximations

2. $-6x = -2x^2 - 3$

$+2x^2+3 \quad +2x^2+3$

$2x^2 - 6x + 3 = 0$

$a=2 \quad b=-6 \quad c=3$

$$x = \frac{-b}{2a} \pm \frac{\sqrt{b^2-4ac}}{2a}$$

$$x = \frac{6}{4} \pm \frac{\sqrt{36-4(2)(3)}}{4}$$

$$= \frac{3}{2} \pm \frac{\sqrt{36-24}}{4}$$

$$= \frac{3}{2} \pm \frac{\sqrt{12}}{4}$$

$$= \frac{3}{2} \pm \frac{2\sqrt{3}}{4}$$

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

$x \approx 2.37, 0.63$

* Solutions are the values of x when $f(x) = 0 \rightarrow$ (x intercepts)