Ex: 3/9/18

$$f(x) = -2x^2 + 4x + 6$$

$A = -2 \quad B = 4 \quad C = 6$

$\boxed{\text{Opens down}}$ because $A < 0$.

AOS: $x = \dfrac{-B}{2A} = \dfrac{-4}{2(-2)} = \dfrac{-4}{-4} = 1$

$\boxed{x = 1}$ ← x-value of vertex

y-value vertex: $f(1) = -2(1)^2 + 4(1) + 6 = 8$

Vertex: $\boxed{(1, 8)}$ ← Absolute Max

Domain: $\mathbb{R}$ or $(-\infty, \infty)$

Range: $\boxed{y \leq 8}$ or $(-\infty, 8]$

y-intercept: $f(0) = ax^2 + bx + c$

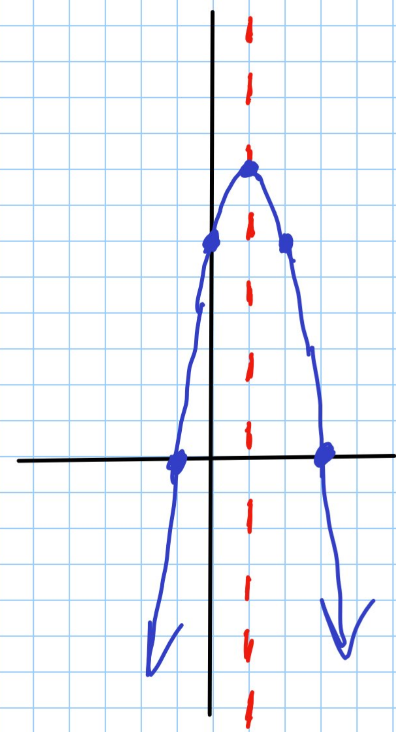
$= \cancel{a(0)^2} + \cancel{b(0)} + c$

$= c$

* Always c

(0, c)

$\boxed{(0,6)}$



x	$f(x)$
3	$f(3) = -2(3)^2 + 4(3) + 6 = 0$

$(3, 0)$

x-intercepts (solutions, roots, zeros)

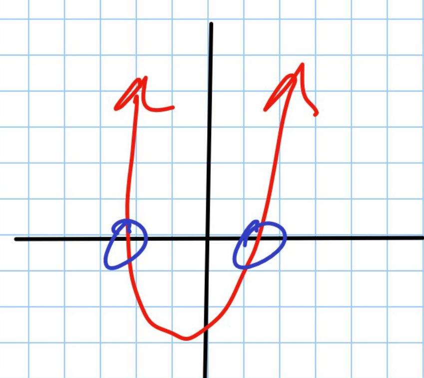
The Solutions of

$$ax^2 + bx + c = 0$$

Factor and Solve
(ZPP)

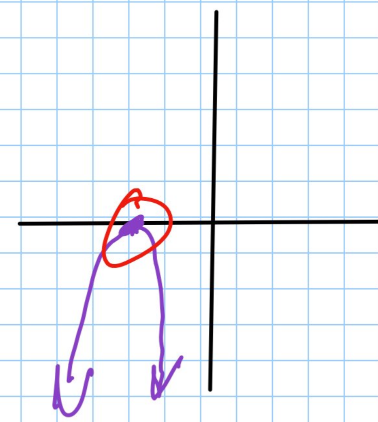
Types of Solutions:

① Two Real Solutions



② One Real Solution

- vertex is on the x-axis

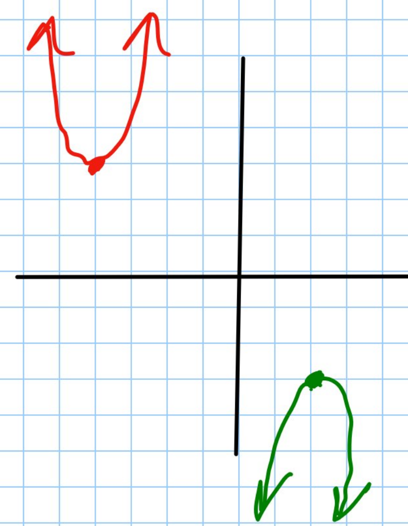


③ No Real Solutions

- vertex below the axis and opens down

or

- vertex above the axis and opens up



Ex: $2x^2 - 5x - 3$

$A = 2 \qquad B = -5 \qquad C = -3$

Opens Up

y-int: $(0, -3)$

x-ints: $2x^2 - 5x - 3 = 0$

$x^2 - 5x - 6 = 0$

$(x-6)(x+1) = 0$

I ↑ 2

$$(x-3)(2x+1)=0$$

$$x-3=0 \qquad 2x+1=0$$

$$x=3 \qquad x=-\frac{1}{2}$$

$$\boxed{(3,0)} \qquad \boxed{\left(-\frac{1}{2},0\right)}$$

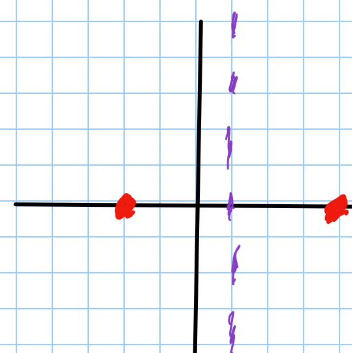
AoS: $x=\frac{-B}{2A}=\frac{5}{2(2)}=\frac{5}{4}$ $\boxed{x=\frac{5}{4}}$

Ex: Given: $(x-4)(x+2)=y$

Find the x-ints and vertex.

$$x-4=0 \qquad x+2=0$$

$$x=4 \qquad x=-2$$



AoS: $x=1$

$$y=(1-4)(1+2)=-9$$

vertex: $(1,-9)$