

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

$$x = \frac{-b}{2a} \quad \left(\frac{-b}{2a}, y \right)$$

General Form

$$y = a(x - h)^2 + k$$

vertex form
(h, k) vertex

$$y = (x + 3)^2 - 2$$

$(-3, -2)$

2A.2
Vertex Form
of Quadratic
Equations

OBJ:
Today you
will write
quadratic
equations
in vertex
form.

$$y = a(x - h)^2 + k$$

$$y = 4(x + 3)^2 + 2$$

$$4(x - (-3))^2 + 2$$

$$(-3, 2)$$

$$x^2 + 2x + 1 = (x+1)(x+1) = (x+1)^2$$

Perfect Square Trinomial

Binomial Squared

$$y = a(x-h)^2 + k$$

"end result"

EX1) Write the vertex form

$$f(x) = -2x^2 - 4x + 1$$

$$y = (-2x^2 - 4x) + 1$$

$$y = -2\left(x^2 + 2x + \frac{1}{2}\right) + 1 + 2$$

need to add +2 to balance the -2 added

$$y = -2(x+1)^2 + 3$$

"COMPLETE THE SQUARE"

- ① Group all x terms with ()
- ② Factor to make lead coefficient 1, put in "blanks"
- ③ add half the middle number squared
- ④ Balance the equation

$$x^2 + 2x + 1$$

$$(x+1)(x+1) = (x+1)^2$$

$$x^2 + 1x + 1x + 1$$

$$x^2 + 2x + 1$$

$$① y = x^2 + 16x + 71$$

$$y = (x^2 + 16x) + 71$$

$$y = \left(x^2 + 16x + \frac{8^2}{2} \right) + 71 + \frac{-64}{2}$$

$$y = (x+8)^2 + 7$$

$$(2.) y = x^2 - 2x - 5$$

$$y = (x-1)^2 - 6$$

$$y = (x^2 - 2x) - 5$$

$$y = \left(x^2 - 2x + \frac{1^2}{1^2}\right) - 5 + \frac{-1}{1}$$

$$y = (x-1)^2 - 6$$

$$(3.) y = -x^2 - 14x - 59$$

$$y = (-x^2 - 14x) - 59$$

$$y = -1 \left(x^2 + 14x + \frac{7^2}{1^2}\right) - 59 + \frac{49}{1}$$

$$y = -1(x+7)^2 - 10$$

Vertex $(-7, -10)$

$$\textcircled{4.} \quad y = 2x^2 + 36x + 170$$

$$y = 2 \left(x^2 + 18x + \frac{9^2}{4} \right) + 170 + \frac{-162}{4}$$

$81(2) = 162$

$$y = 2(x+9)^2 + 8$$

Vertex $(-9, 8)$

$$\begin{aligned} & x^2 + 18x + 81 \\ & (x+9)(x+9) \\ & x^2 + 9x + 9x + 81 \\ & x^2 + 18x + 81 \end{aligned}$$

$$\textcircled{8.} \quad y = (x+4)(x+5)$$

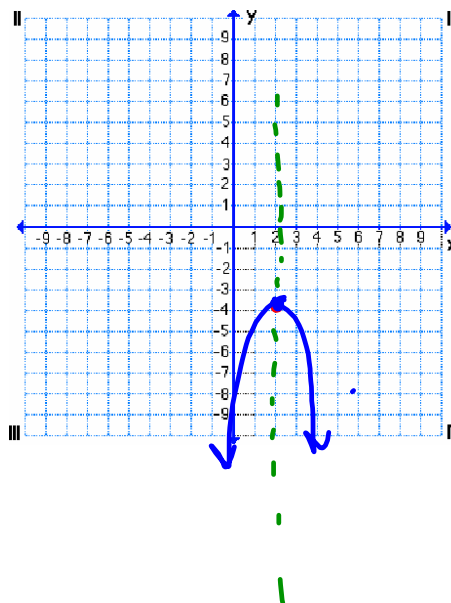
$$y = x^2 + 9x + 20$$

$$y = \left(x^2 + 9x + \frac{(9)^2}{4} \right) + 20 + \frac{-81}{4}$$

$81/4$

$$y = \left(x + \frac{9}{2} \right)^2 - \frac{1}{4}$$

15. $f(x) = -3(x-2)^2 - 4$

Vertex $(2, -4)$ axis of sym $x = 2$ 

16. $f(x) = -\frac{1}{4}(x-1)^2 + 4$

Vertex $(1, 4)$ axis of sym $x = 1$ 