

81-9-11

Examples: Find the A.O.S. and vertex

1.  $y = 2x^2 + 4x - 5$

$a = 2$

$b = 4$

A.O.S. =  $\frac{-4}{2(2)} = \frac{-4}{4} = -1$

$x = -1$

Vertex:  $y = 2(-1)^2 + 4(-1) - 5$

$y = 2(1) - 4 - 5$

$y = 2 - 4 - 5$

$y = -7$

Vertex =  $(-1, -7)$

2.  $y = x^2 - 8x - 9$

$a = 1$

$b = -8$

A.O.S. =  $\frac{-(-8)}{2(1)} = \frac{8}{2} = 4$

$x = 4$

Vertex:  $y = (4)^2 - 8(4) - 9$

$y = 16 - 32 - 9$

$y = -25$

Vertex =  $(4, -25)$

3.  $y = 3x^2 - 9x + 5$

$a = 3$

$b = -9$

A.O.S. =  $\frac{-(-9)}{2(3)} = \frac{9}{6} = \frac{3}{2}$

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

OR  $x = 1.5$

Vertex:  $y = 3(1.5)^2 - 9(1.5) + 5$

$y = 3(2.25) - 13.5 + 5$

$y = 6.75 - 13.5 + 5$

$y = -1.75$

Vertex =  $(1.5, -1.75)$

4.  $y = 2x^2 + 4$

$a = 2$

$b = 0$

A.O.S. =  $\frac{0}{2(2)} = \frac{0}{4} = 0$

$x = 0$

Vertex:  $y = 2(0)^2 + 4$

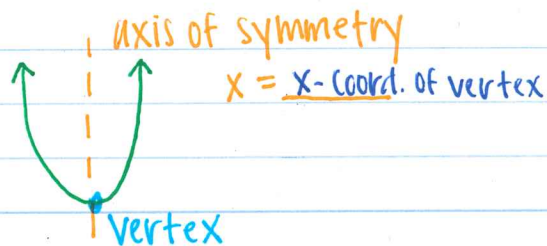
$y = 0 + 4$

$y = 4$

Vertex =  $(0, 4)$

## Axis of Symmetry & Vertex

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



### Quadratics: Axis of Symmetry and Vertex

Axis of Symmetry: The vertical line that splits a parabola into 2 equal parts

- Goes through the vertex

Equation:

$$x = \frac{-b}{2a}$$

Example:  $3x^2 + 6x - 8$

$$a = 3$$

$$b = 6$$

$$c = -8$$

$$x = \frac{-6}{2(3)} = \frac{-6}{6} = -1$$

$$x = -1$$

Vertex: The minimum or maximum point of a parabola

- An ordered pair  $(x, y)$  . .

$$x\text{-coordinate} = \frac{-b}{2a}$$

(same as axis of symmetry)

$y$ -coordinate = plug in  $x$ -coord. into the equation & solve for  $y$

Example:  $3x^2 + 6x - 8$

$x$ -coord =  $-1$  (from above)

$$y = 3(-1)^2 + 6(-1) - 8$$

$$y = 3(1) - 6 - 8$$

$$y = 3 - 6 - 8$$

$$y = -11$$

$$\text{VERTEX} = (-1, -11)$$