

Quadratic Form $f(x) = ax^2 + bx + c$ FOIL and combine like terms Standard/Vertex Form $f(x) = A(x+B)^2 + C$

Vertex @ $\left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$ completing the square

Vertex @ $(-B, C)$

Axis of Symmetry
 $x = -\frac{b}{2a}$

$a > 0$ opens up $A > 0$ minimum
vertex

$a < 0$ opens down $A < 0$ maximum
vertex

Axis of Symmetry
 $x = -B$

ex $f(x) = -3x^2 + 12x + 4$

$a = -3$ $b = 12$ $c = 4$

Quadratic Form

vertex @ $(2, 16)$

Axis of Symmetry $x = 2$

Parabola opens up / down

vertex is max / min

$-\frac{b}{2a} = \frac{-12}{2(-3)} = \frac{-12}{-6} = 2$

$f(x) = -3(2)^2 + 12(2) + 4$
 $-12 + 24 + 4$
 16

Standard/Vertex Form

$(-3x^2 + 12x) + 4$

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

PSV: $\left(-\frac{-4}{2}\right)^2 = 4$

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

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

$-3(x-2)^2 + 12 + 4$

$f(x) = -3(x-2)^2 + 16$

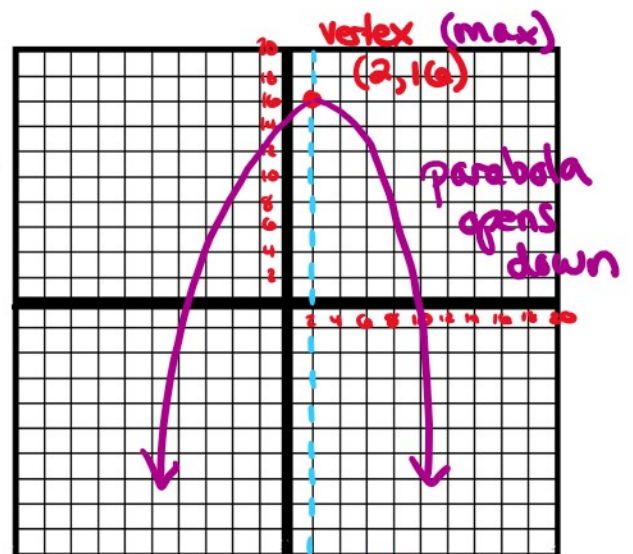
$A = -3$

$B = -2$

$C = 16$

Vertex @ $(2, 16)$

Axis of $x = 2$



Axis of Symmetry
 $x = 2$

Parabola opens down $\left. \begin{array}{l} \text{Parabola opens down} \\ \text{vertex is max} \end{array} \right\} A < 0$

1 vertex (2, 3)
Axis of Symmetry $x=2$

vertex is max $y=3$