Example: $f(x) = 2x^2 - 12x + 16$

$a = 2 \Rightarrow$ opens up, stretch

$b = -12$

$c = 16 \rightarrow$ y-int $(0, 16)$

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

$x = \frac{-(-12)}{2(2)}$ $\quad x = \frac{12}{4}$ $\quad \boxed{x = 3}$

$y = f\left(\frac{-b}{2a}\right)$ $\quad y = f(3)$

$y = 2(3)^2 - 12(3) + 16$

$y = 18 - 36 + 16$

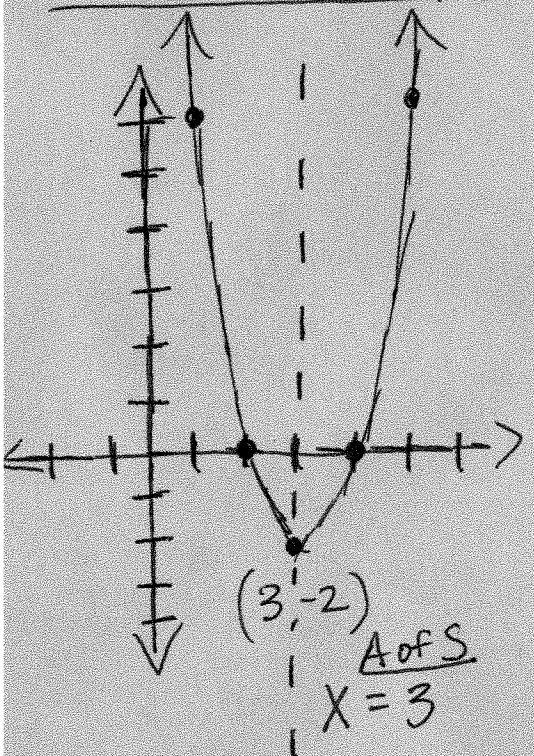
$\boxed{y = -2}$

Vertex: $(3, -2)$

- Parabola has y-intercept at $(0, c)$.
- Parabola has a vertex of $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$.

Result of plugging in $\frac{-b}{2a}$ into the original function.

Sketch Graph



Table

x	f(x)	
0	16	→ y-int
1	6	
2	0	→ x-int
3	-2	Vertex (min)
4	0	→ x-int
5	6	

Solutions / Zeros / Roots / x-intercepts: Two

The graph crosses the x-axis twice and $f(x) = 0$ when