

Reteaching 5-2

OBJECTIVE: Graphing a parabola using the vertex and axis of symmetry

MATERIALS: Graph paper

- The graph of a quadratic function, $y = ax^2 + bx + c$, where $a \neq 0$, is a parabola.
- The axis of symmetry is the line $x = -\frac{b}{2a}$.
- The x -coordinate of the vertex is $-\frac{b}{2a}$. The y -coordinate of the vertex is $y = f\left(-\frac{b}{2a}\right)$, or the y -value when $x = -\frac{b}{2a}$.
- The y -intercept is $(0, c)$.

Example

Graph $y = 2x^2 - 8x + 5$.

$$x = -\frac{b}{2a} = \frac{-(-8)}{2(2)} = \frac{8}{4} = 2$$

← Find the equation of the axis of symmetry.

x -coordinate of vertex: 2

$$\leftarrow -\frac{b}{2a}$$

$$\begin{aligned} f\left(-\frac{b}{2a}\right) &= f(2) = 2(2)^2 - 8(2) + 5 \\ &= 8 - 16 + 5 \\ &= -3 \end{aligned}$$

← Find the y -value when $x = 2$.

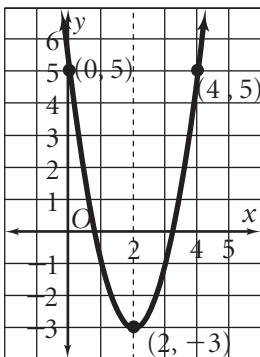
y -coordinate of vertex: -3

← The vertex is at $(2, -3)$.

y -intercept: $(0, 5)$

← The y -intercept is at $(0, c) = (0, 5)$.

← Since a is positive, the graph opens upward, and the vertex is at the bottom of the graph. Plot the vertex and draw the axis of symmetry. Plot $(0, 5)$ and its corresponding point on the other side of the axis of symmetry.



Exercises

Graph each parabola. Label the vertex and the axis of symmetry.

1. $y = x^2 - 4x + 7$

2. $y = x^2 + 8x + 11$

3. $y = -3x^2 + 6x - 9$

4. $y = -x^2 - 8x - 15$

5. $y = 2x^2 - 8x + 1$

6. $y = -2x^2 - 12x - 7$