EXAMPLE 3 **Graph a function of the form $y = ax^2 + bx + c$**

Graph $y = 2x^2 - 8x + 6$.

Solution

STEP 1 **Identify** the coefficients of the function. The coefficients are $a = 2$, $b = -8$, and $c = 6$. Because $a > 0$, the parabola opens up.

**STEP 2** **Find** the vertex. Calculate the x-coordinate.

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

Then find the y-coordinate of the vertex.

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

So, the vertex is $(2, -2)$. Plot this point.

STEP 3 **Draw** the axis of symmetry $x = 2$.

STEP 4 **Identify** the y-intercept c, which is 6. Plot the point $(0, 6)$. Then reflect this point in the axis of symmetry to plot another point, $(4, 6)$.

STEP 5 **Evaluate** the function for another value of x, such as $x = 1$.

$$y = 2(1)^2 - 8(1) + 6 = 0$$

Plot the point $(1, 0)$ and its reflection $(3, 0)$ in the axis of symmetry.

STEP 6 **Draw** a parabola through the plotted points.

AnimatedAlgebra at classzone.com
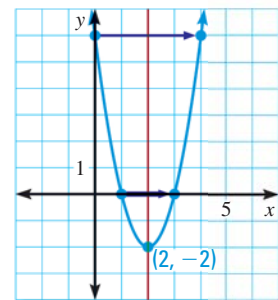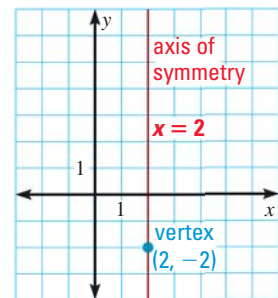
> **AVOID ERRORS**
> Be sure to include the negative sign before the fraction when calculating the x-coordinate of the vertex.

axis of symmetry

$x = 2$

vertex $(2, -2)$

$(2, -2)$

✓ **GUIDED PRACTICE** for Example 3

Graph the function. Label the vertex and axis of symmetry.

4. $y = x^2 - 2x - 1$
5. $y = 2x^2 + 6x + 3$
6. $f(x) = -\frac{1}{3}x^2 - 5x + 2$

KEY CONCEPT   *For Your Notebook*

Minimum and Maximum Values

Words For $y = ax^2 + bx + c$, the vertex's y-coordinate is the **minimum value** of the function if $a > 0$ and the **maximum value** if $a < 0$.

Graphs

minimum

a is positive

maximum

a is negative