

LESSON 118 Practice

□ LEARN A SKILL: FINDING VERTICES OF PARABOLAS IN INTERCEPT FORM

A quadratic function $y = ax^2 + bx + c$ can also be written in the form $y = a(x - p)(x - q)$. This is called the **intercept form**, or **factored form**, of the quadratic function because p and q are the x -intercepts of its graph. The values p and q are the x -intercepts, or **zeros**, because y is 0 when x is p or q .

What is the vertex of a parabola in intercept form? Parabolas are symmetric, so the x -value of the vertex is halfway between the two x -intercepts. Its y -value can be found by plugging the x -value into the given function.

Intercept form
 $y = a(x - p)(x - q)$
Axis of symmetry: $x = \frac{p + q}{2}$

→ **EXAMPLE** Find the vertex of $y = -x(x - 4)$.

1. Find the x -intercepts. Here $p = 0$ and $q = 4$.
2. Find the x -value of the vertex.
$$x = \frac{p + q}{2} = \frac{0 + 4}{2} = 2$$
3. Find the y -value using the x -value.
$$y = -2(2 - 4) = 4$$
4. The vertex is $(2, 4)$, and the axis of symmetry is $x = 2$.

→ **TRY IT** Find the vertex.

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

□ EXERCISE YOUR SKILLS

Find the vertex, y -intercept, and x -intercepts (zeros).

4. $y = x(x - 4)$

5. $y = -x(x + 2)$

6. $y = (x + 1)(x - 5)$

7. $y = -(x - 1)(x - 7)$

8. $y = 2(x - 1)(x + 3)$

9. $y = -\frac{1}{2}(x + 2)(x + 6)$