FACTORING When factoring a trinomial, first consider the signs of p and q.

$(x + p)(x + q)$	$x^2 + bx + c$	Signs of b and c
$(x + 2)(x + 3)$	$x^2 + 5x + 6$	b is positive; c is positive.
$(x + 2)(x + (-3))$	$x^2 - x - 6$	b is negative; c is negative.
$(x + (-2))(x + 3)$	$x^2 + x - 6$	b is positive; c is negative.
$(x + (-2))(x + (-3))$	$x^2 - 5x + 6$	b is negative; c is positive.

By observing the signs of b and c in the table, you can see that:

- b and c are positive when both p and q are positive.
- b is negative and c is positive when both p and q are negative.
- c is negative when p and q have different signs.

EXAMPLE 2 Factor when b is negative and c is positive

Factor $n^2 - 6n + 8$.

Because b is negative and c is positive, p and q must both be negative.

Factors of 8	Sum of factors	
$-8, -1$	$-8 + (-1) = -9$	✗
$-4, -2$	$-4 + (-2) = -6$	← Correct sum

▶ $n^2 - 6n + 8 = (n - 4)(n - 2)$

EXAMPLE 3 Factor when b is positive and c is negative

Factor $y^2 + 2y - 15$.

Because c is negative, p and q must have different signs.

Factors of −15	Sum of factors	
$-15, 1$	$-15 + 1 = -14$	✗
$15, -1$	$15 + (-1) = 14$	✗
$-5, 3$	$-5 + 3 = -2$	✗
$5, -3$	$5 + (-3) = 2$	← Correct sum

▶ $y^2 + 2y - 15 = (y + 5)(y - 3)$

GUIDED PRACTICE for Examples 2 and 3

Factor the trinomial.

4. $x^2 - 4x + 3$ **5.** $t^2 - 8t + 12$ **6.** $m^2 + m - 20$ **7.** $w^2 + 6w - 16$