9.6 Factor $ax^2 + bx + c$

TEKS *A.4.A, A.10.A*

Before	You factored trinomials of the form $x^2 + bx + c$.
Now	You will factor trinomials of the form $ax^2 + bx + c$.
Why?	So you can find the dimensions of a building, as in Ex. 61.

Key Vocabulary
- **trinomial,** *p. 555*

When factoring a trinomial of the form $ax^2 + bx + c$, first consider the signs of b and c, as in Lesson 9.5. This approach works when a is positive.

EXAMPLE 1 Factor when b is negative and c is positive

Factor $2x^2 - 7x + 3$.

Solution

REVIEW FACTORING
For help with determining the signs of the factors of a trinomial, see p. 584.

Because b is negative and c is positive, both factors of c must be negative. Make a table to organize your work.

You must consider the order of the factors of 3, because the x-terms of the possible factorizations are different.

Factors of 2	Factors of 3	Possible factorization	Middle term when multiplied	
1, 2	−1, −3	$(x - 1)(2x - 3)$	$-3x - 2x = -5x$	✗
1, 2	−3, −1	$(x - 3)(2x - 1)$	$-x - 6x = -7x$	← Correct

▶ $2x^2 - 7x + 3 = (x - 3)(2x - 1)$

EXAMPLE 2 Factor when b is positive and c is negative

Factor $3n^2 + 14n - 5$.

Solution

Because b is positive and c is negative, the factors of c have different signs.

Factors of 3	Factors of −5	Possible factorization	Middle term when multiplied	
1, 3	1, −5	$(n + 1)(3n - 5)$	$-5n + 3n = -2n$	✗
1, 3	−1, 5	$(n - 1)(3n + 5)$	$5n - 3n = 2n$	✗
1, 3	5, −1	$(n + 5)(3n - 1)$	$-n + 15n = 14n$	← Correct
1, 3	−5, 1	$(n - 5)(3n + 1)$	$n - 15n = -14n$	✗

▶ $3n^2 + 14n - 5 = (n + 5)(3n - 1)$