

## Lesson 11-9

**Example 1**

Find FOIL coefficients for the trinomial  $8x^2 + 26x + 15$ .

**Solution**

The F-coefficient is 8 (the coefficient of the quadratic term). The L-coefficient is 15 (the last term or the constant). The grand product coefficient is  $(8)(15)$  or  $(1)(2)(4)(3)(5)$ , or 120. The cross-product (O- and I-) coefficients add to give 26, and multiply to give 120. The numbers  $6 (= 2 \times 3)$  and  $20 (= 4 \times 5)$  are the two coefficients you need. (Note: At this stage, you will not be able to tell which is the inner and which is the outer coefficient.)

**Example 2**

Given the four FOIL coefficients from the previous example, (F-8, O-I- 6 and 20, L-15) analyze their factor pairs to find the appropriate binomial coefficients for  $8x^2 + 26x + 15$ .

**Solution**

F-coefficient ( $ab$ ):	$8 = (1)(8)$ or $(2)(4)$
O- and I-coefficients:	$6 = (1)(6)$ or $(2)(3)$
( $an_2$ and $n_1b$ )	$20 = (1)(20)$ or $(2)(10)$ or $(4)(5)$
L-coefficient ( $n_1n_2$ ):	$15 = (1)(15)$ or $(3)(5)$

Among these pairs,  $(2)(4)$ ,  $(2)(3)$ ,  $(4)(5)$  and  $(3)(5)$  share only four numbers. Therefore, they are the binomial coefficients. Thus:

- 2 and 4 (the F pair) are the  $x$  coefficients  $(2x \quad )(4x \quad )$
- 2 and 3 are the cross-product pair  $(2x \quad )(4x \quad 3)$
- 4 and 5 are the other cross-product pair  $(2x \quad 5)(4x \quad 3)$
- Trinomial signs are both positive, so signs are  $(2x + 5)(4x + 3)$ .

**Example 3**

**SMALL BUSINESS** Amy designs and sells bracelets. Her gross profit is represented by the expression  $3x^2 - 7x - 6$ . The monomial factors represent the number of bracelets sold and the selling price per bracelet. Find the monomial factors.

**Solution**

The F-coefficient is 3, the L-coefficient is 6. The grand product coefficient is  $(3)(6) = 18$ . The L-coefficient sign is negative so you need numbers with a product of 18 and an apparent difference of 7. The O- and I-coefficients must be 9 and 2.

$$F: 3 = (1)(3)$$

$$O \text{ and } I: 9 = (1)(9) \text{ or } (3)(3)$$

$$L: 6 = (1)(6) \text{ or } (2)(3)$$

$$2 = (1)(2)$$

Binomial coefficients are  $(3)(1)$ ,  $(3)(3)$ ,  $(2)(1)$ , and  $(2)(3)$ .

Binomial factor values are  $(3x - 2)(x - 3)$ .

The second trinomial sign is negative, so the larger cross-product (9) must be negative. Factors with signs are  $(3x + 2)(x - 3)$ .