Chapter II
Polynomials

Factoring of polynomials

Factoring Trinomials

Some trinomials of the form $x^2 + bx + c$ can be factored by a trial procedure. This method makes use of the FOIL method in reverse. For example, consider the following products.

$$(x + 3)(x + 5) = x^2 + 5x + 3x + (3)(5) = x^2 + 8x + 15$$

$$(x - 2)(x - 7) = x^2 - 7x - 2x + (-2)(-7) = x^2 - 9x + 14$$

$$(x + 4)(x - 9) = x^2 - 9x + 4x + (4)(-9) = x^2 - 5x - 36$$

The coefficient of x is the sum of the constant terms of the binomials.

The constant term of the trinomial is the product of the constant terms of the binomials.

Question • Is $(x - 2)(x + 7)$ the correct factorization of $x^2 - 5x - 14$?

Answer • No. $(x - 2)(x + 7) = x^2 + 5x - 14$.

Factoring Trinomials

Points to Remember to Factor $x^2 + bx + c$

1. The constant term c of the trinomial is the product of the constant terms of the binomials.
2. The coefficient b in the trinomial is the sum of the constant terms of the binomials.
3. If the constant term c of the trinomial is positive, the constant terms of the binomials have the same sign as the coefficient b in the trinomial.
4. If the constant term c of the trinomial is negative, the constant terms of the binomials have opposite signs.

EXAMPLE 2 Factor a Trinomial

Factor.

a. $x^2 + 7x - 18$ **b.** $x^2 + 7xy + 10y^2$

Solution

a. Find two integers whose product is -18 and whose sum is 7. The integers are -2 and 9: $-2(9) = -18$, $-2 + 9 = 7$.

$$x^2 + 7x - 18 = (x - 2)(x + 9)$$

b. Find two integers whose product is 10 and whose sum is 7. The integers are 2 and 5: $2(5) = 10$, $2 + 5 = 7$.

$$x^2 + 7xy + 10y^2 = (x + 2y)(x + 5y)$$

■ **Try Exercise 12, page 48**

Exercises P.48

In Exercises 9 to 22, factor each trinomial over the integers.

9. $x^2 + 7x + 12$

10. $x^2 + 9x + 20$

11. $a^2 - 10a - 24$

12. $b^2 + 12b - 28$

13. $x^2 + 6x + 5$

14. $x^2 + 11x + 18$

15. $6x^2 + 25x + 4$

16. $8a^2 - 26a + 15$

17. $51x^2 - 5x - 4$

18. $57y^2 + y - 6$

19. $6x^2 + xy - 40y^2$

20. $8x^2 + 10xy - 25y^2$

21. $6x^2 + 23x + 15$

22. $9x^2 + 10x + 1$

Questions