

9-3 Study Guide and Intervention

Factoring Trinomials: $x^2 + bx + c$

Factor $x^2 + bx + c$ To factor a trinomial of the form $x^2 + bx + c$, find two integers, m and n , whose sum is equal to b and whose product is equal to c .

Factoring $x^2 + bx + c$	$x^2 + bx + c = (x + m)(x + n)$, where $m + n = b$ and $mn = c$.
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Example 1 Factor each trinomial.

a. $x^2 + 7x + 10$

In this trinomial, $b = 7$ and $c = 10$.

Factors of 10	Sum of Factors
1, 10	11
2, 5	7

Since $2 + 5 = 7$ and $2 \cdot 5 = 10$, let $m = 2$ and $n = 5$.

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

b. $x^2 - 8x + 7$

In this trinomial, $b = -8$ and $c = 7$.

Notice that $m + n$ is negative and mn is positive, so m and n are both negative.

Since $-7 + (-1) = -8$ and $(-7)(-1) = 7$, $m = -7$ and $n = -1$.

$$x^2 - 8x + 7 = (x - 7)(x - 1)$$

Example 2 Factor $x^2 + 6x - 16$.

In this trinomial, $b = 6$ and $c = -16$. This means $m + n$ is positive and mn is negative. Make a list of the factors of -16 , where one factor of each pair is positive.

Factors of -16	Sum of Factors
1, -16	-15
-1, 16	15
2, -8	-6
-2, 8	6

Therefore, $m = -2$ and $n = 8$.

$$x^2 + 6x - 16 = (x - 2)(x + 8)$$

Exercises

Factor each trinomial.

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|-----------------------|------------------------|------------------------|
| 1. $x^2 + 4x + 3$ | 2. $m^2 + 12m + 32$ | 3. $r^2 - 3r + 2$ |
| 4. $x^2 - x - 6$ | 5. $x^2 - 4x - 21$ | 6. $x^2 - 22x + 121$ |
| 7. $c^2 - 4c - 12$ | 8. $p^2 - 16p + 64$ | 9. $9 - 10x + x^2$ |
| 10. $x^2 + 6x + 5$ | 11. $a^2 + 8a - 9$ | 12. $y^2 - 7y - 8$ |
| 13. $x^2 - 2x - 3$ | 14. $y^2 + 14y + 13$ | 15. $m^2 + 9m + 20$ |
| 16. $x^2 + 12x + 20$ | 17. $a^2 - 14a + 24$ | 18. $18 + 11y + y^2$ |
| 19. $x^2 + 2xy + y^2$ | 20. $a^2 - 4ab + 4b^2$ | 21. $x^2 + 6xy - 7y^2$ |