

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

(Pages 434–439)

Recall the FOIL method to help factor trinomials in which the coefficient of x^2 is 1.

EXAMPLES

A Factor $x^2 - 5x + 6$.

x^2 is the product of the **F**irst terms, and 6 is the product of the **L**ast terms.

$$x^2 - 5x + 6 = (x + \blacksquare)(x + \blacksquare)$$

The sum of the products of the **O**uter and **I**nner terms is $-5x$. You need to find two integers whose product is 6 and whose sum is -5 . Recall that the product of two negative integers is positive.

Product	Integers	Sum
6	-1, -6	$-1 + (-6) = -7$
6	-2, -3	$-2 + (-3) = -5 \checkmark$

Therefore, $x^2 - 5x + 6 = (x - 2)(x - 3)$.

B Factor $3x^2 + 9x - 12$.

First, check for a GCF.

$$3x^2 + 9x - 12 = 3(x^2 + 3x - 4) \quad \text{The GCF is 3.}$$

Now, factor $x^2 + 3x - 4$. Find two integers whose product is -4 and whose sum is 3.

Product	Integers	Sum
-4	-1, 4	$-1 + 4 = 3$

You can stop listing factors when you find a pair that works.

$$\text{So, } x^2 + 3x - 4 = (x - 1)(x + 4).$$

$$\text{Therefore, } 3x^2 + 9x - 12 = 3(x - 1)(x + 4).$$

PRACTICE

Factor each trinomial. If the trinomial cannot be factored, write prime.

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|----------------------|-----------------------|-----------------------|
| 1. $b^2 + b - 6$ | 2. $a^2 + 2a - 8$ | 3. $x^2 - 3x - 10$ |
| 4. $k^2 + 9k + 18$ | 5. $x^2 + 2x + 3$ | 6. $y^2 - 8y + 7$ |
| 7. $x^2 + x - 12$ | 8. $y^2 - 5y - 14$ | 9. $k^2 - 15k + 50$ |
| 10. $a^2 - 4a - 12$ | 11. $z^2 + 11z + 24$ | 12. $g^2 + 5g - 6$ |
| 13. $m^2 - 6m + 8$ | 14. $3s^2 + 9s - 30$ | 15. $4x^2 + 16x - 20$ |
| 16. $5b^2 - 10b + 5$ | 17. $3p^2 + 21p + 36$ | 18. $2n^2 - 4n - 16$ |



19. Standardized Test Practice Factor the trinomial $v^2 + 7v + 12$.

- A** $(v + 7)(v + 5)$ **B** $(v + 4)(v - 3)$ **C** $(v + 3)(v + 4)$ **D** $(v + 12)(v - 5)$

Answers: 1. $(b + 3)(b - 2)$ 2. $(a + 4)(a - 2)$ 3. $(x - 5)(x + 2)$ 4. $(k + 6)(k + 3)$ 5. prime 6. $(v - 1)(v - 7)$ 7. $(x + 4)(x - 3)$ 8. $(y - 7)(y + 2)$ 9. $(k - 5)(k + 2)$ 10. $(a - 6)(a + 2)$ 11. $(z + 8)(z + 3)$ 12. $(g - 1)(g + 6)$ 13. $(m - 2)(m - 4)$ 14. $3(s - 5)(s + 2)$ 15. $4(x + 5)(x - 1)$ 16. $5(b - 1)(b + 5)$ 17. $3(p + 3)(p + 4)$ 18. $2(n + 2)(n - 4)$ 19. C