

Section 9.5 Factoring $x^2 + bx + c$

Goal • Factor trinomials of the form $x^2 + bx + c$.

Factoring $ax^2 + bx + c$

Example 1: Factor each trinomial

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

$a = 1$ $b = 11$ $c = 18$

$a \cdot c = 18$	Sum: 11
1, 18	$1 + 18 = 19$
2, 9	$2 + 9 = 11 \checkmark$
3, 6	$3 + 6 = 9$

Factored Form: $(x + 2)(x + 9)$

b. $x^2 - 7x + 10$

$a = 1$ $b = -7$ $c = 10$

$a \cdot c = 10$	Sum: -7
1, 10	$1 + 10 = 11$
2, 5	$2 + 5 = 7$
-2, -5	$-2 + -5 = -7 \checkmark$

Factored Form: $(x - 2)(x - 5)$

c. $y^2 + 2y - 15$

$a = 1$ $b = 2$ $c = -15$

$a \cdot c = -15$	Sum: 2
-15, 1	$-15 + 1 = -14$
-5, 3	$-5 + 3 = -2$
5, -3	$5 + -3 = 2 \checkmark$

Factored Form: $(y + 5)(y - 3)$

d. $n^2 - 6n - 7$

$a = 1$ $b = -6$ $c = -7$

$a \cdot c = -7$	Sum: -6
-7, 1	$-7 + 1 = -6 \checkmark$

Factored Form: $(n - 7)(n + 1)$

Checkpoint: Factor each trinomial.

1. $x^2 + 12x + 27$

$a = 1$ $b = 12$ $c = 27$

$a \cdot c = 27$	Sum: 12
9, 3	$9 + 3 = 12$

Factored Form: $(x + 9)(x + 3)$

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

$a = 1$ $b = -9$ $c = 20$

$a \cdot c = 20$	Sum: -9
-4, -5	$-4 + -5 = -9$

Factored Form: $(x - 4)(x - 5)$

Section 9.5 Factoring $x^2 + bx + c$

Steps to Solving Polynomial Equations

Step 1: Set the equation equal to zero

Step 2: Factor the polynomial

Step 3: Solve

Example 2: Solve the equation.

a. $x^2 - 4x = 21$

① $x^2 - 4x - 21 = 0$

$a = 1$ $b = -4$ $c = -21$

$a \cdot c = -21$	Sum: -4
$-7, 3$	$-7 + 3 = -4$

$(x-7)(x+3) = 0$

$\swarrow$ $\searrow$
 $x-7=0$ $x+3=0$
 $\boxed{x=7}$ $\boxed{x=-3}$

Finding Zeros of Functions

Step 1: Set the function equal to zero

Step 2: Factor the polynomial

Step 3: Solve

Example 3: Find the zeros of the function.

a. $f(x) = x^2 + 3x - 18 = 0$

$a = 1$ $b = 3$ $c = -18$

$a \cdot c = -18$	Sum: 3
$6, -3$	$6 + (-3) = 3$

$(x+6)(x-3) = 0$

$\swarrow$ $\searrow$
 $x+6=0$ $x-3=0$
 $\boxed{x=-6}$ $\boxed{x=3}$

b. $r^2 - 2r = 24$

① $r^2 - 2r - 24 = 0$

$a = 1$ $b = -2$ $c = -24$

$a \cdot c = -24$	Sum: -2
$-6, 4$	$-6 + 4 = -2$

$(r-6)(r+4) = 0$

$\swarrow$ $\searrow$
 $r-6=0$ $r+4=0$
 $\boxed{r=6}$ $\boxed{r=-4}$

b. $f(x) = x^2 - 5x - 24 = 0$

$a = 1$ $b = -5$ $c = -24$

$a \cdot c = -24$	Sum: -5
$-8, 3$	$-8 + 3 = -5$

$(x-8)(x+3) = 0$

$\swarrow$ $\searrow$
 $\boxed{x=8}$ $\boxed{x=-3}$