Factoring Monic Quadratics

Today we focus only on the factors.

1. Both Factors Positive

Positive constant → same-sign factors. Linear term positive → both factors positive.

a)

$x^2 + 3x + 2 = 0$ $(x+1)(x+2) = 0 \Rightarrow x = -1 \text{ or } -2$

b)

$x^2 + 5x + 6 = 0$ $(x+2)(x+3) = 0 \Rightarrow x = -2 \text{ or } -3$

c)

$x^2 + 6x + 5 = 0$ $(x+1)(x+5) = 0 \Rightarrow x = -1 \text{ or } -5$

d)

$x^2 + 7x + 12 = 0$ $(x+3)(x+4) = 0 \Rightarrow x = -3 \text{ or } -4$

e)

$x^2 + 11x + 28 = 0$ $(x+4)(x+7) = 0 \Rightarrow x = -4 \text{ or } -7$

f)

$x^2 + 14x + 45 = 0$ $(x+5)(x+9) = 0 \Rightarrow x = -5 \text{ or } -9$

2. Both Factors Negative

Positive constant → same-sign factors. Linear term negative → both factors negative.

a)

$x^2 - 3x + 2 = 0$ $(x-1)(x-2) = 0 \Rightarrow x = 1 \text{ or } 2$

b)

$x^2 - 6x + 5 = 0$ $(x-1)(x-5) = 0 \Rightarrow x = 1 \text{ or } 5$

c)

$x^2 - 9x + 14 = 0$ $(x-2)(x-7) = 0 \Rightarrow x = 2 \text{ or } 7$

d)

$x^2 - 7x + 12 = 0$ $(x-3)(x-4) = 0 \Rightarrow x = 3 \text{ or } 4$

e)

$x^2 - 11x + 24 = 0$ $(x-3)(x-8) = 0 \Rightarrow x = 3 \text{ or } 8$

f)

$x^2 - 11x + 30 = 0$ $(x-5)(x-6) = 0 \Rightarrow x = 5 \text{ or } 6$

3. **Mixed Signs (Positive Dominant)**

Negative constant → mixed signs. Linear term positive → the positive factor dominates.

a)

$x^2 - 4x - 5 = 0$ $(x+1)(x-5) = 0 \Rightarrow x = -1 \text{ or } 5$

b)

$x^2 - 5x - 14 = 0$ $(x+2)(x-7) = 0 \Rightarrow x = -2 \text{ or } 7$

c)

$x^2 - 5x - 24 = 0$ $(x+3)(x-8) = 0 \Rightarrow x = -3 \text{ or } 8$

d)

$x^2 - 5x - 36 = 0$ $(x+4)(x-9) = 0 \Rightarrow x = -4 \text{ or } 9$

e)

$x^2 - 6x - 55 = 0$ $(x+5)(x-11) = 0 \Rightarrow x = -5 \text{ or } 11$

f)

$x^2 - 6x - 91 = 0$ $(x+7)(x-13) = 0 \Rightarrow x = -7 \text{ or } 13$

4. **Mixed Signs (Negative Dominant)**

Negative constant → mixed signs. Linear term negative → the negative factor dominates.

a)

$x^2 + 4x - 5 = 0$ $(x+5)(x-1) = 0 \Rightarrow x = -5 \text{ or } 1$

b)

$x^2 + 6x - 7 = 0$ $(x+7)(x-1) = 0 \Rightarrow x = -7 \text{ or } 1$

c)

$x^2 + 6x - 16 = 0$ $(x+8)(x-2) = 0 \Rightarrow x = -8 \text{ or } 2$

d)

$x^2 + 6x - 27 = 0$ $(x+9)(x-3) = 0 \Rightarrow x = -9 \text{ or } 3$

e)

$x^2 + 7x - 44 = 0$ $(x+11)(x-4) = 0 \Rightarrow x = -11 \text{ or } 4$

f)

$x^2 + 8x - 65 = 0$ $(x+13)(x-5) = 0 \Rightarrow x = -13 \text{ or } 5$

5. **24 Mixed Jumbled Questions**

A full mix of all four sign-patterns.

1)

$x^2 - 1x - 2 = 0$ $(x+1)(x-2) = 0 \Rightarrow x = -1 \text{ or } 2$

2)

$x^2 + 2x - 3 = 0$ $(x+3)(x-1) = 0 \Rightarrow x = -3 \text{ or } 1$

3)

$x^2 - 12x + 35 = 0$ $(x-5)(x-7) = 0 \Rightarrow x = 5 \text{ or } 7$

4)

$x^2 - 6x - 55 = 0$ $(x+5)(x-11) = 0 \Rightarrow x = -5 \text{ or } 11$

5)

$x^2 - 14x + 13 = 0$ $(x-1)(x-13) = 0 \Rightarrow x = 1 \text{ or } 13$

6)

$x^2 + 6x - 7 = 0$ $(x+7)(x-1) = 0 \Rightarrow x = -7 \text{ or } 1$

7)

$x^2 - 14x + 33 = 0$ $(x-3)(x-11) = 0 \Rightarrow x = 3 \text{ or } 11$

8)

$x^2 + 9x - 22 = 0$ $(x + 11)(x - 2) = 0 \Rightarrow x = -11 \text{ or } 2$

9)

$x^2 - 12x - 13 = 0$ $(x + 1)(x - 13) = 0 \Rightarrow x = -1 \text{ or } 13$

10)

$x^2 - 7x + 10 = 0$ $(x - 2)(x - 5) = 0 \Rightarrow x = 2 \text{ or } 5$

11)

$x^2 - 4x - 21 = 0$ $(x + 3)(x - 7) = 0 \Rightarrow x = -3 \text{ or } 7$

12)

$x^2 + 3x - 10 = 0$ $(x + 5)(x - 2) = 0 \Rightarrow x = -5 \text{ or } 2$

13)

$x^2 - 16x + 55 = 0$ $(x - 5)(x - 11) = 0 \Rightarrow x = 5 \text{ or } 11$

14)

$x^2 + 4x - 21 = 0$ $(x + 7)(x - 3) = 0 \Rightarrow x = -7 \text{ or } 3$

15)

$x^2 - 8x + 7 = 0$ $(x - 1)(x - 7) = 0 \Rightarrow x = 1 \text{ or } 7$

16)

$x^2 + 6x - 55 = 0$ $(x + 11)(x - 5) = 0 \Rightarrow x = -11 \text{ or } 5$

17)

$x^2 + 12x - 13 = 0$ $(x + 13)(x - 1) = 0 \Rightarrow x = -13 \text{ or } 1$

18)

$x^2 - 16x + 39 = 0$ $(x - 3)(x - 13) = 0 \Rightarrow x = 3 \text{ or } 13$

19)

$x^2 - 9x - 22 = 0$ $(x + 2)(x - 11) = 0 \Rightarrow x = -2 \text{ or } 11$

20)

$x^2 - 18x + 77 = 0$ $(x - 7)(x - 11) = 0 \Rightarrow x = 7 \text{ or } 11$

21)

$x^2 + 4x - 5 = 0$ $(x+5)(x-1) = 0 \Rightarrow x = -5 \text{ or } 1$

22)

$x^2 - 2x - 15 = 0$ $(x+3)(x-5) = 0 \Rightarrow x = -3 \text{ or } 5$

23)

$x^2 - 15x + 26 = 0$ $(x-2)(x-13) = 0 \Rightarrow x = 2 \text{ or } 13$

24)

$x^2 + 5x - 14 = 0$ $(x+7)(x-2) = 0 \Rightarrow x = -7 \text{ or } 2$