Solving $x^2 + bx + c = 0$ quadratic equations by factors - All Four cases

1. **Both factors positive** $x^2 + bx + c \implies (x + p)(x + q)$

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

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

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

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

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

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

2. **Both factors negative** $x^2 - bx + c \implies (x - p)(x - q)$

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

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

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

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

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

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

3. **Mixed signs (positive dominants)** $x^2 + bx - c \implies (x + \text{big})(x - \text{small})$

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

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

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

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

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

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

4. **Mixed signs (negative dominants)** $x^2 - bx - c \implies (x - \text{big})(x + \text{small})$

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

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

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

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

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

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

5. **Classify what case is involved and solve**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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