

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

## 1. Both factors positive

a)  $x^2 + 3x + 2 = 0$

$$x^2 + bx + c \implies (x + p)(x + q)$$

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

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)  $x^2 + 14x + 45 = 0$

$$(x + 5)(x + 9); x = -5 \text{ or } -9$$

g)  $x^2 + 20x + 91 = 0$

$$(x + 7)(x + 13); x = -7 \text{ or } -13$$

## 2. Both factors negative

a)  $x^2 - 3x + 2 = 0$

$$x^2 - bx + c \implies (x - p)(x - q)$$

$$(x - 1)(x - 2); x = 1 \text{ or } 2$$

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)  $x^2 - 11x + 30 = 0$

$$(x - 5)(x - 6); x = 5 \text{ or } 6$$

g)  $x^2 - 20x + 51 = 0$

$$(x - 17)(x - 3); x = 17 \text{ or } 3$$

## 3. Mixed sign factors-bigger positive

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)  $x^2 + 8x - 65 = 0$

$$(x + 13)(x - 5); x = -13 \text{ or } 5$$

g)  $x^2 + 5x - 50 = 0$

$$(x + 10)(x - 5); x = -10 \text{ or } 5$$

h)  $x^2 + 1x - 42 = 0$

$$(x + 7)(x - 6); x = -7 \text{ or } 6$$

i)  $x^2 + 11x - 42 = 0$

$$(x + 14)(x - 3); x = -14 \text{ or } 3$$

#### 4. Mixed sign factors-bigger negative $x^2 - bx - c \implies (x - \text{big})(x + \text{small})$

- |                        |  |
|------------------------|--|
| 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) $x^2 - 6x - 91 = 0$ | $(x + 7)(x - 13); x = -7 \text{ or } 13$ |
| g) $x^2 - 4x - 77 = 0$ | $(x + 7)(x - 11); x = -7 \text{ or } 11$ |

#### 5. Classify the sign pattern 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) $x^2 + 6x - 55 = 0$  | $(x + 11)(x - 5); x = -11 \text{ or } 5$ |