



## Factorising Quadratics (Grouping)

### Factorisation: Grouping

Quadratic equations can be factorised and solved using grouping which relies on your knowledge of factors and a simple rule of thumb.

Recall the general quadratic equation:  $ax^2 + bx + c = 0$

**EXAMPLE:** Factorise and solve  $x^2 - 2x - 35 = 0$

**STEP ONE:** Identify your terms.  $a = 1$ ,  $b = -2$  and  $c = -35$

**STEP TWO:** Apply the rule of thumb.

“Find two factors that multiply to get  $a \times c$  and add to get  $b$ .”

$$(a \times c) = -35 \quad b = -2$$

List the factors for  $-35$ .  $\rightarrow (-1 \times 35)(1 \times -35)$  &  $(-7 \times 5)(7 \times -5)$

Identify factors that add to  $-2$ .  $\rightarrow -7$  and  $5$  add to  $-2$ .

**STEP THREE:** Factorise into intercept form.

Re-write the quadratic equation with the new factors.

$$\rightarrow x^2 - 7x + 5x - 35 = 0$$

Identify terms with common factors, then factorise individually.

$$\rightarrow x^2 - 7x = x(x - 7) \quad 5x - 35 = 5(x - 7)$$

Notice how  $(x - 7)$  is a common binomial between the factored pair.

Write the equation using the factored pair.

$$\rightarrow x(x - 7) + 5(x - 7) = 0$$

Factorise out the common binomial  $(x - 7)$ .

$$\rightarrow (x - 7)(x + 5) = 0$$

**INTERCEPT FORM**

$$\rightarrow x\text{-intercepts at } (7, 0) \text{ and } (-5, 0)$$

**STEP FOUR:** Graph. Plot your equation, if required.

Note: You can find the  $y$ -intercept by letting  $x = 0$  in the standard form.



**Instructions:** Factorise the quadratics and find their intercept points.

1

$$x^2 + x - 6 = 0$$

2

$$x^2 - 7x + 10 = 0$$

3

$$x^2 + 5x + 6 = 0$$

4

$$x^2 - 15x + 56 = 0$$



5

$$x^2 + 4x - 21 = 0$$

6

$$x^2 - 12x - 28 = 0$$

7

$$2x^2 + x - 6 = 0$$

8

$$2x^2 + 11x + 12 = 0$$



9

$$3x^2 + 17x + 10 = 0$$

10

$$6x^2 + 5x - 6 = 0$$

11

$$3x^2 - 13x - 10 = 0$$

12

$$8x^2 - 2x - 3 = 0$$



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1

$$x^2 - x - 30 = 0$$

2

$$x^2 - 3x - 108 = 0$$

3

$$x^2 + 13x + 42 = 0$$

4

$$x^2 - 20x + 96 = 0$$



5

$$2x^2 - 7x - 15 = 0$$

6

$$3x^2 - 11x - 20 = 0$$

7

$$5x^2 - 12x + 4 = 0$$

8

$$7x^2 + 20x - 3 = 0$$



9

$$8x^2 + 14x + 5 = 0$$

10

$$9x^2 + 18x - 16 = 0$$

11

$$15x^2 + 23x - 28 = 0$$

12

$$12x^2 - 17x + 6 = 0$$