

Factorising Quadratics (CTS)

Factorisation: Complete the Square (CTS)

Quadratic equations can be factorised and solved using CTS.
Recall the general quadratic equation: $ax^2 + bx + c = 0$

STEP ONE: Subtract c . Move c across the equals sign.

STEP TWO: Simplify. Factor out a on the LHS to make sure $a = 1$.

STEP THREE: Factorise into vertex form using CTS.

Complete the square by adding $(b/2)^2$ to both sides. Then, factorise the LHS into a perfect square. Write your answer in vertex form.

If coefficients have been factored out in Step 2, $(b/2)^2 \times \text{coefficient}$ is added to the RHS of the equation. This value will differ from what is added to the LHS of the equation (these terms are within the brackets).

STEP FOUR: Factorise into intercept form by solving for x .

Transpose equation to find the two solutions for x (x -intercept points)
Once you have your solutions, write your answer in intercept form.

If coefficients have been factored out in Step 2/3, they must be included in this equation outside of the brackets.

STEP FIVE: Graph. Plot your equation, if required.

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

EXAMPLE 1: $3x^2 + 12x + 9 = 0$

1) Move c $3x^2 + 12x = -9$

2) Factor out a $3(x^2 + 4x) = -9$

3) Find the value of $(b/2)^2$
 $(b/2)^2 = (4/2)^2 = 4$

Add $(b/2)^2$ to the LHS
 $3(x^2 + 4x + 4) = -9$

Add $(b/2)^2 \times \text{coefficient}$ to RHS
 $3(x^2 + 4x + 4) = -9 + 12$
 $3(x^2 + 4x + 4) = 3$

Factorise LHS into perfect square

$$3(x + 2)^2 = 3$$

Write in VERTEX FORM

$$3(x + 2)^2 - 3 = 0 \quad \text{Vertex is } (-2, -3)$$

4) Solve for x (x -intercepts)

$$3(x + 2)^2 = 3$$

$$(x + 2)^2 = 3/3$$

$$\sqrt{(x + 2)^2} = \sqrt{1}$$

$$x = \pm 1 - 2 \quad \text{ x -intercepts} = \{-1, -3\}$$

Write in INTERCEPT form

$$3(x + 1)(x + 3) = 0$$

Instructions: Complete steps 1 to 5 for the quadratic equations below.

1

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


2

$$x^2 + 8x + 7 = 0$$



3

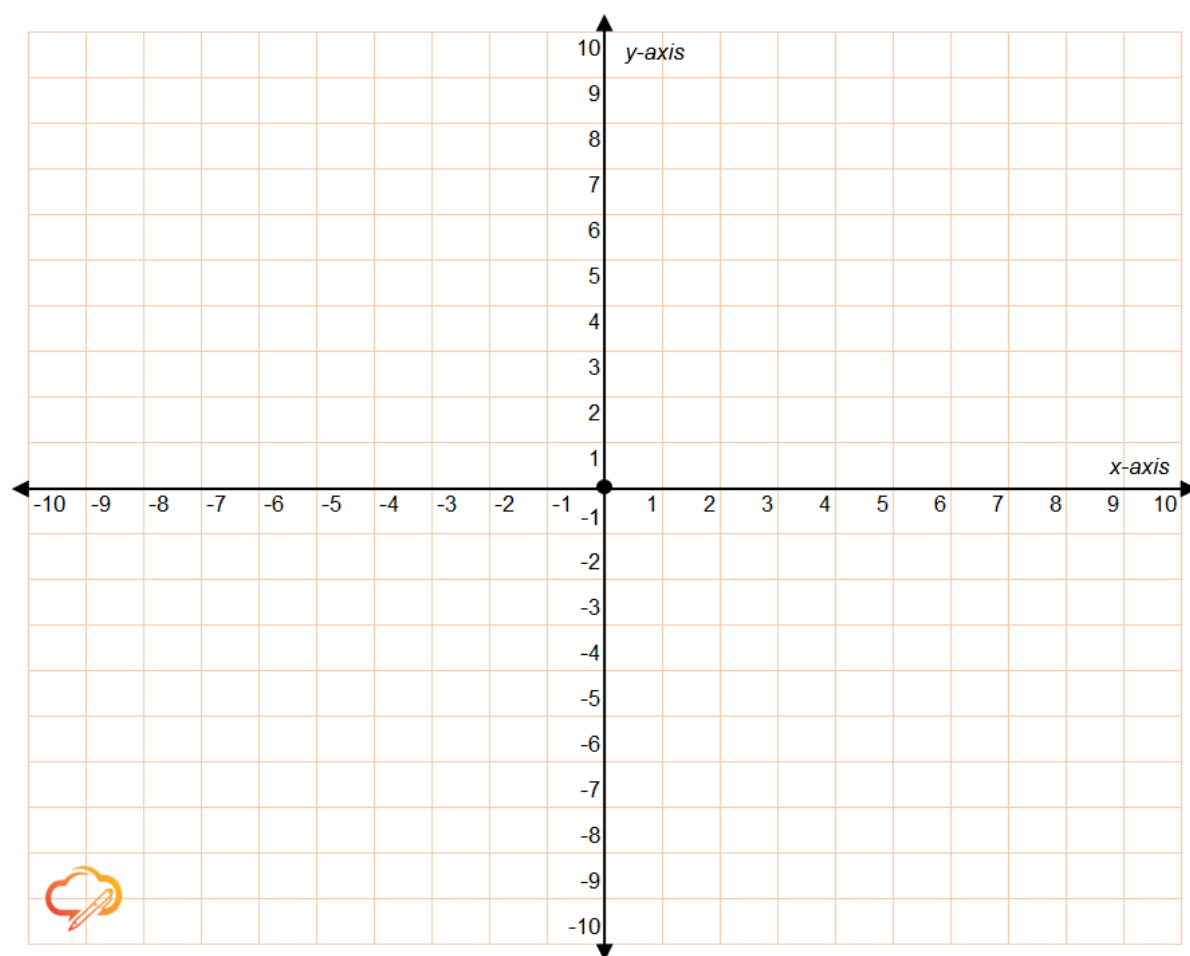
$$x^2 - 10x + 16 = 0$$



4

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







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Write in INTERCEPT form

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Instructions: Complete steps 1 to 5 for the quadratic equations below.

1

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



2

$$x^2 + 10x + 24 = 0$$



3

$$2x^2 + 4x - 6 = 0$$



4

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



