



# KATALA

## Inequalities (3) - Quadratic inequalities

### Learning objectives

- Learn to solve quadratic inequalities ✓

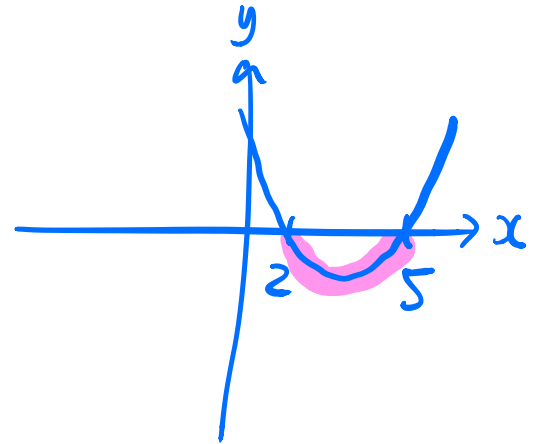
1) Solve the inequality  $x^2 - 7x + 10 < 0$

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

$$(x - 2)(x - 5) = 0$$

$$x = 2 \text{ or } x = 5$$

$$2 < x < 5$$



**Key point:** To solve a quadratic inequality we solve it as if it was an equation. We then draw a simple sketch to figure out the inequality part.

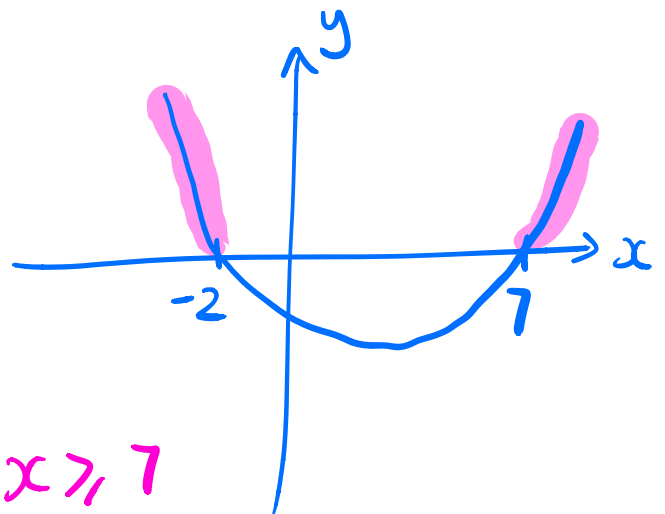
2) Solve  $x^2 - 5x - 14 \geq 0$

$$x^2 - 5x - 14 = 0$$

$$(x - 7)(x + 2) = 0$$

$$x = 7 \text{ or } x = -2$$

$$x \leq -2 \text{ or } x \geq 7$$



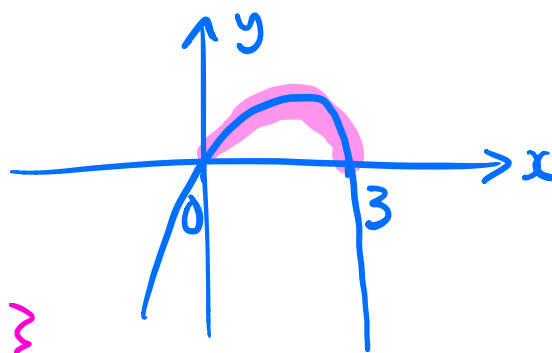
3) Solve  $3x - x^2 > 0$  giving your answer in set notation

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

$$x(3-x) = 0$$

$$x=0 \text{ or } x=3$$

$$\{x : 0 < x < 3\}$$



**Key point:** To write your answer in set notation we must lay our answer out as follows...

$$\{x : \text{Your solution}\}$$

This translates as **the set of x such that ...**

4) a) Solve the equation  $x^2 - 2x - 4 = 0$  giving your answer in surd form

$$a=1 \quad b=-2 \quad c=-4$$

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-4)}}{2(1)}$$

$$x = 1 \pm \sqrt{5}$$

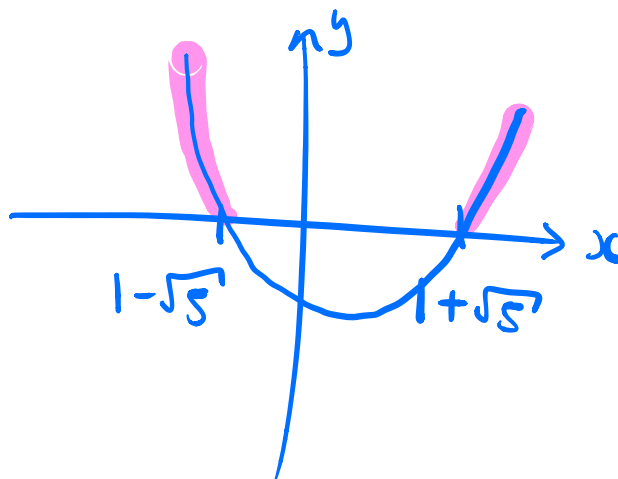
**Note:** We cannot factorise here so we have used the quadratic formula. We can also use completing the square.

b) Hence find the solution of the inequality  $x^2 - 2x - 4 > 0$

$$x < 1 - \sqrt{5}$$

or

$$x > 1 + \sqrt{5}$$



5) Given that  $x$  is an integer, write down the values of  $x$  that satisfy both:

$$x7 \quad \frac{2x^2 - 13x}{7} \leq 1 \quad \text{and} \quad x7$$

$$2x^2 - 13x \leq 7$$

$-7 \qquad -7$

$$2x^2 - 13x - 7 \leq 0$$

$$2x^2 - 13x - 7 = 0$$

$$\frac{(2x - 14)(2x + 1)}{2} = 0$$

$$(x - 7)(2x + 1) = 0$$

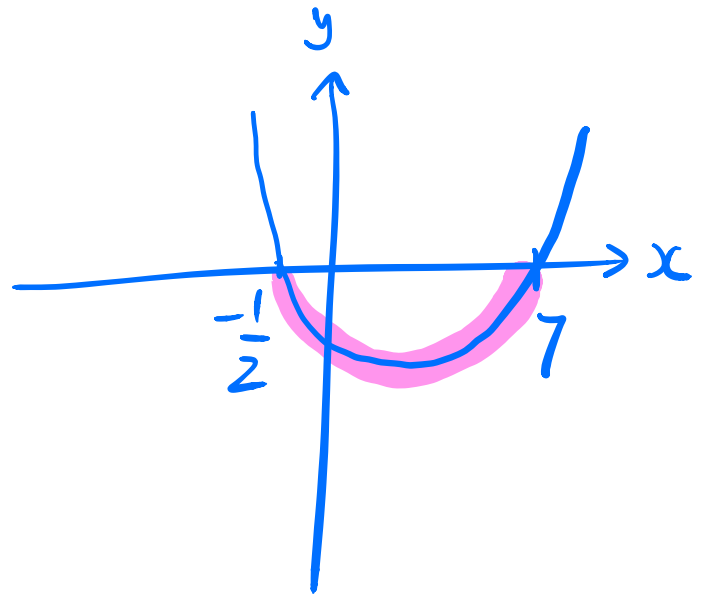
$$x = 7 \quad \text{or} \quad x = -\frac{1}{2}$$

$$-\frac{1}{2} \leq x \leq 7$$

$$2x + 1 < 9$$

$$2x < 8$$

$$x < 4$$



$$x = 0, 1, 2, 3$$