

Quadratic Inequalities

GCSE Maths · Written to the shared content for AQA, Edexcel and OCR

Name _____ Class _____ Date _____

1. Worked example

Solve $x^2 - x - 6 < 0$.

Step 1 · Critical values

$$(x - 3)(x + 2) = 0 \rightarrow x = -2, x = 3$$

Step 2 · U-shaped curve; < 0 means below the axis
between the roots

Answer: $-2 < x < 3$

Check: $x = 0$: $-6 < 0$ ✓; $x = 4$: 6 , not < 0 ✓

2. Now try one with the steps

Solve $x^2 - 4x - 12 \geq 0$.

Step 1 · Critical values

Step 2 · ≥ 0 means on or above the axis

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Solve $x^2 - 16 < 0$. [2]

2. Solve $x^2 \geq 25$. [2]

3. Solve $(x - 2)(x + 5) > 0$. [2]

4. Solve $(x - 1)(x - 7) \leq 0$. [2]

5. Solve $x^2 + 2x - 8 < 0$. [3]

6. Solve $x^2 - 7x + 10 \geq 0$. [3]

7. Solve $x^2 - 5x > 0$. [3]

8. Solve $x^2 < 3x + 10$. [3]

9. Solve $2x^2 - 3x - 2 \leq 0$. [3]

10. Solve $3x^2 + 5x - 2 > 0$. [3]

11. List all the integers that satisfy $x^2 - 2x - 15 < 0$. [3]

12. Solve $x^2 - 3x - 4 < 0$, writing your answer in set notation. [3]

13. Solve $6 - x - x^2 > 0$. [3]

14. Solve $x^2 - 4x + 1 \leq 0$. Give the end values in surd form. [4]

15. A rectangle is x cm wide and $(x + 4)$ cm long. Its area must be more than 21 cm^2 . Find the possible values of x . [4]

4. Before you hand it in

$x^2 > 9 \rightarrow x > \pm 3$

' $x > -3$ ' would include 0, and $0^2 = 0$ is not > 9 . Use critical values ± 3 and a sketch: $x < -3$ or $x > 3$.

$x^2 - x - 6 < 0 \rightarrow x < -2$ or $x < 3$

Sketch the curve. Below the axis is BETWEEN the roots: $-2 < x < 3$, a single combined inequality.

$6 - x - x^2 > 0 \rightarrow$ roots -3 and 2 , ' > 0 means outside' $\rightarrow x < -3$ or $x > 2$

Multiply by -1 and REVERSE the inequality: $x^2 + x - 6 < 0$. Now the curve is a U-shape and the answer is $-3 < x < 2$.

$x^2 - 5x > 0 \rightarrow$ divide by $x \rightarrow x > 5$

Factorise instead: $x(x - 5) > 0$ gives $x < 0$ or $x > 5$. Dividing by x loses the negative solutions.