Guide to:
Quadratic inequalities

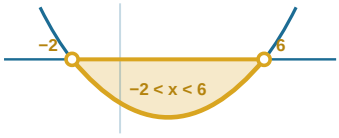
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Explanation:

Never solve a quadratic inequality like a linear equation: always rearrange so one side is **0** (with a positive x^2 term), factorise to find the **critical values (roots)**, and sketch a quick U-shaped parabola crossing the x-axis at those roots.

• If the quadratic is **< 0** (below the x-axis), the solution is a **single connected region** between the roots: **a < x < b**.
• If the quadratic is **> 0** (above the x-axis), the solution is **two separate regions** outside the roots: **x < a or x > b**.

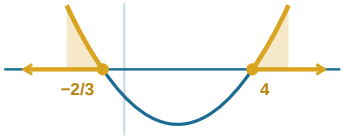
Example 1: Solve $x^2 - 4x - 12 < 0$



Solution:

Factorise: $(x - 6)(x + 2) < 0$
Critical values (roots): **x = −2** and **x = 6**
U-shaped curve is below the x-axis (< 0) between the roots:
Answer: −2 < x < 6

Example 2: Solve $3x^2 \geq 10x + 8$



Solution:

Rearrange & factorise: $3x^2 - 10x - 8 = (3x + 2)(x - 4) \geq 0$
Critical values: **x = $-\frac{2}{3}$** and **x = 4**
Curve is on or above x-axis (≥ 0) outside the roots:
Answer: x ≤ $-\frac{2}{3}$ or x ≥ 4

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