Quadratic Inequalities Worksheet

Solving Factorised Quadratics & Critical Values

Reference: Edexcel GCSE 1MA1 / Higher Tier / Paper 2H / Q21

I Do

Solve $(3x - 1)(5x + 2) < 0$.

(Total for Question 1 is 3 marks)

We Do
Solve $(2x - 3)(4x + 1) \leq 0$.

(Total for Question 2 is 3 marks)

You Do
Solve $(4x - 1)(3x + 5) > 0$.

(Total for Question 3 is 3 marks)

Challenge
Solve $6x^2 - 7x - 3 \leq 0$.

(Total for Question 4 is 4 marks)

Answers & Worked Solutions

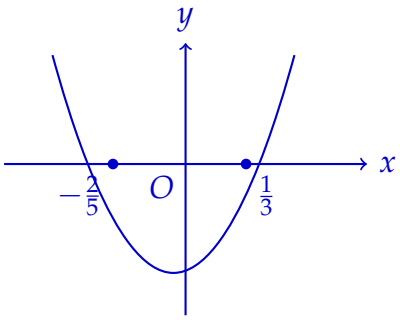
• **I Do:**

1. Find the critical values (roots where expression equals 0):

$3x - 1 = 0 \implies x = \frac{1}{3}$

$5x + 2 = 0 \implies x = -\frac{2}{5}$

2. Sketch the parabola crossing the x-axis at $-\frac{2}{5}$ and $\frac{1}{3}$:



3. Since we want < 0, identify the region below the x-axis:

$-\frac{2}{5} < x < \frac{1}{3}$

Answer: $-\frac{2}{5} < x < \frac{1}{3}$

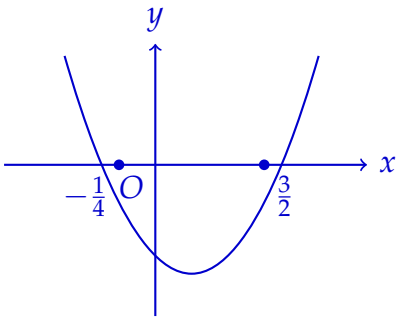
• **We Do:**

1. Find the critical values:

$2x - 3 = 0 \implies x = \frac{3}{2}$

$4x + 1 = 0 \implies x = -\frac{1}{4}$

2. Sketch the quadratic curve:



3. Since we want ≤ 0, select the region below or on the x-axis:

$-\frac{1}{4} \leq x \leq \frac{3}{2}$

Answer: $-\frac{1}{4} \leq x \leq \frac{3}{2}$

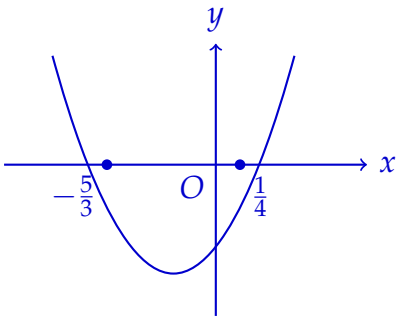
• **You Do:**

1. Find the critical values:

$4x - 1 = 0 \implies x = \frac{1}{4}$

$3x + 5 = 0 \implies x = -\frac{5}{3}$

2. Sketch the quadratic curve:



3. Since we want > 0, select the regions above the x-axis:

$x < -\frac{5}{3}$ ***or*** $x > \frac{1}{4}$

Answer: $x < -\frac{5}{3}$ ***or*** $x > \frac{1}{4}$

• **Challenge:**

1. Factorise $6x^2 - 7x - 3$***:***
Find factors of $6 \times (-3) = -18$ ***that sum to*** -7***:*** -9 ***and*** $+2$***.***
$6x^2 - 9x + 2x - 3 = 3x(2x - 3) + 1(2x - 3) = (2x - 3)(3x + 1)$

2. Set up inequality: $(2x - 3)(3x + 1) \leq 0$
Critical values: $x = \frac{3}{2}$ ***and*** $x = -\frac{1}{3}$

3. Since we want ≤ 0***, region below or on*** x***-axis:***
$-\frac{1}{3} \leq x \leq \frac{3}{2}$

Answer: $-\frac{1}{3} \leq x \leq \frac{3}{2}$