

Question	Scheme	Marks	AOs
7	$4x^2 > 20x - 27$		
	$4x^2 - 20x + 27 > 0$		
	$4x^2 - 20x + 27 = 4\left(x - \frac{5}{2}\right)^2 - 25 + 27$ or $(2x - 5)^2 + 2$	M1	3.1a
	$= 4\left(x - \frac{5}{2}\right)^2 + 2$ with comment (see notes)	A1	1.1b
	As $4\left(x - \frac{5}{2}\right)^2 \geq 0$, $4\left(x - \frac{5}{2}\right)^2 + 2 \geq 2 > 0$ hence $4x^2 > 20x - 27$ for all x	A1	2.4
		(3)	

(3 marks)

Notes:

Method One: Completing the square

M1: For an attempt to rearrange and complete the square. Accept $4(x - 2.5)^2 \dots$ or $(2x - 5)^2 \dots$

A1: For either $4(x - 2.5)^2 + 2$ or $(2x - 5)^2 + 2$ with either e.g., $4(x - 2.5)^2 \geq 0$ or $(2x - 5)^2 + 2 \geq 2$ or minimum at $(2.5, 2)$. Accept the inequality statement in words.

Condone e.g., $4(x - 2.5)^2 > 0$ or $(x - 2.5)^2$ is always positive for this mark.

A1: A fully written out solution, with correct statements and no incorrect statements. There must be a valid reason and conclusion.

Method Two: Discriminant

M1: For an attempt to rearrange and find the discriminant $b^2 - 4ac$ with a correct a , b and c which may be within a quadratic formula. You may condone missing brackets.

A1: Correct value of $b^2 - 4ac = -32$ **and** states that the curve is U shaped (or intercept is $(0, 27)$) or equivalent such as positive x^2 etc.

A1: Explains that as $b^2 - 4ac$ is negative there are no roots, **and** since the curve is U shaped then $4x^2 - 20x + 27 > 0$ hence $4x^2 > 20x - 27$

Method Three: Differentiation

M1: For an attempt to rearrange, differentiate and find the turning point. This would require an attempt to find $\frac{dy}{dx}$, setting it equal to 0 and solving to find the x value and y value.

A1: For differentiating $\frac{dy}{dx} = 8x - 20 = 0 \Rightarrow (2.5, 2)$ is the turning point.

A1: Shows that $(2.5, 2)$ is the **minimum** using either the second derivative or stating that the curve is U shaped etc. and $4x^2 - 20x + 27 \geq 2 > 0$ hence $4x^2 > 20x - 27$