



Equations and Inequalities

Questions

Suitable for:
Pearson Edexcel International A-Level (iAL) — Pure Mathematics 1



Question 1

*In this question, you must show all stages of your working.
Solutions relying on calculator technology are not acceptable.*

Sketch the line l with equation $y = x + 2$ and the curve C with equation $y = 2x^2 - 7x + 2$.

The line l intersects the curve C at the points P and Q .

(a) Find, using algebra, the coordinates of P and the coordinates of Q .

(4 marks)

The region R , shown shaded, is bounded by C , l , and the x -axis.

(b) Use inequalities to define the region R .

(3 marks)

Total for question = 7 marks



Question 2

The curve C has the equation:

$$y = 2x^2 - 8x + 5$$

(a) Write C in the form:

$$y = a(x + b)^2 + c$$

where a , b , and c are constants to be found.

(3 marks)

The point M is the minimum turning point of C .

(b) Deduce the coordinates of M .

(2 marks)

The line l is the normal to C at the point P , where $x = 3$.

Given that l has the equation $y = kx + c$, where k is a constant:

(c) (i) Find the coordinates of P .

(3 marks)

(ii) Find the value of k .

(3 marks)

The finite region R is bounded by l , C , and the line through M parallel to the y -axis.

(d) Identify the inequalities that define R .

(3 marks)

Total for question = 14 marks



Question 3

*In this question, you must show all stages of your working.
Solutions relying on calculator technology are not acceptable.*

Solve the inequality:

$$5x^2 - 9x - 2 \geq 3x^2 - 3x + 6$$

Total for question = 4 marks



Question 4

(a) On the same axes, sketch the graphs of $y = x + 3$ and $y = x^2 - 3x - 10$, showing the coordinates of all points at which each graph crosses the coordinate axes.

(4 marks)

(b) On your sketch, show, by shading, the region R defined by the inequalities:

$$y < x + 3 \quad \text{and} \quad y > x^2 - 3x - 10$$

(1 marks)

(c) Hence, or otherwise, find the set of values of x for which:

$$x^2 - 4x - 12 < 0$$

(3 marks)

Total for question = 8 marks



Question 5

Solve the simultaneous equations:

$$3x - y = 5$$

$$x^2 + y^2 = 25$$

Total for question = 6 marks