

GCE Examinations
Advanced / Advanced Subsidiary

Core Mathematics C1

Paper L

Time: 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

- Answer **all** the questions.
- Give non-exact numerical answers correct to 3 significant figures, unless a different degree of accuracy is specified in the question or is clearly appropriate.
- **You are not permitted to use a calculator in this paper.**

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is 72.
- **You are reminded of the need for clear presentation in your answers.**



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1. Solve the inequality

$$4(x - 2) < 2x + 5. \quad [3]$$

2. $f(x) = 2 - x - x^3$.

Show that $f(x)$ is decreasing for all values of x . [4]

3. (i) Solve the equation

$$y^2 + 8 = 9y. \quad [2]$$

(ii) Hence solve the equation

$$x^3 + 8 = 9x^{\frac{3}{2}}. \quad [3]$$

4. Given that

$$y = \frac{x^4 - 3}{2x^2},$$

(i) find $\frac{dy}{dx}$, [4]

(ii) show that $\frac{d^2y}{dx^2} = \frac{x^4 - 9}{x^4}$. [2]

5. Find the pairs of values (x, y) which satisfy the simultaneous equations

$$3x^2 + y^2 = 21$$

$$5x + y = 7 \quad [7]$$

6. (i) Evaluate $(5\frac{4}{9})^{-\frac{1}{2}}$. [2]

(ii) Find the value of x such that

$$\frac{1+x}{x} = \sqrt{3},$$

giving your answer in the form $a + b\sqrt{3}$ where a and b are rational. [5]

7. The straight line l passes through the point $P(-3, 6)$ and the point $Q(1, -4)$.

(i) Find an equation for l in the form $ax + by + c = 0$, where a , b and c are integers. [4]

The straight line m has the equation $2x + ky + 7 = 0$, where k is a constant.

Given that l and m are perpendicular,

(ii) find the value of k . [4]

8. (i) Describe fully a single transformation that maps the graph of $y = \frac{1}{x}$ onto the graph of $y = \frac{3}{x}$. [2]

(ii) Sketch the graph of $y = \frac{3}{x}$ and write down the equations of any asymptotes. [3]

(iii) Find the values of the constant c for which the straight line $y = c - 3x$ is a tangent to the curve $y = \frac{3}{x}$. [4]

Turn over

9. The circle C has the equation

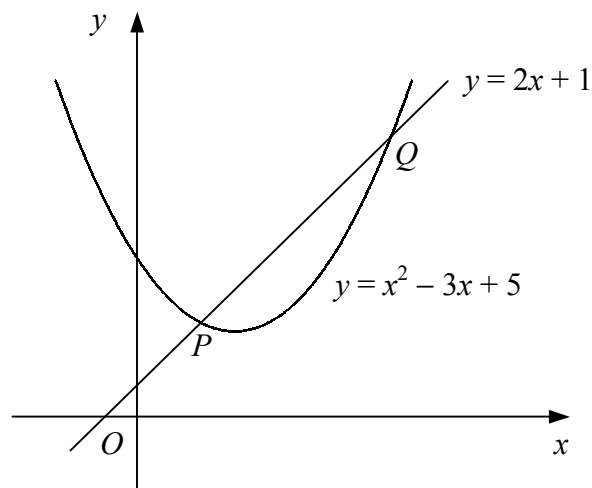
$$x^2 + y^2 - 12x + 8y + 16 = 0.$$

- (i) Find the coordinates of the centre of C . [2]
- (ii) Find the radius of C . [2]
- (iii) Sketch C . [2]

Given that C crosses the x -axis at the points A and B ,

- (iv) find the length AB , giving your answer in the form $k\sqrt{5}$. [4]

10.



The diagram shows the curve $y = x^2 - 3x + 5$ and the straight line $y = 2x + 1$. The curve and line intersect at the points P and Q .

- (i) Using algebra, show that P has coordinates $(1, 3)$ and find the coordinates of Q . [4]
- (ii) Find an equation for the tangent to the curve at P . [4]
- (iii) Show that the tangent to the curve at Q has the equation $y = 5x - 11$. [2]
- (iv) Find the coordinates of the point where the tangent to the curve at P intersects the tangent to the curve at Q . [3]