

Name:

Total Marks:

Pure Mathematics 1



Advanced Subsidiary

Practice Paper M8

Time: 2 hours

Information for Candidates

- This practice paper is an adapted legacy old paper for the Edexcel GCE AS Level Specifications
- There are 12 questions in this question paper
- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets.
- Full marks may be obtained for answers to ALL questions

Advice to candidates:

- You must ensure that your answers to parts of questions are clearly labelled.
- You must show sufficient working to make your methods clear to the Examiner
- Answers without working may not gain full credit

Question 1

(a) Find the first 4 terms, in ascending powers of x , of the binomial expansion of $(1 + ax)^{10}$, where a is a non-zero constant. Give each term in its simplest form. (4)

Given that, in this expansion, the coefficient of x^3 is double the coefficient of x^2 ,

(b) find the value of a . (2)

(Total 6 marks)

Question 2

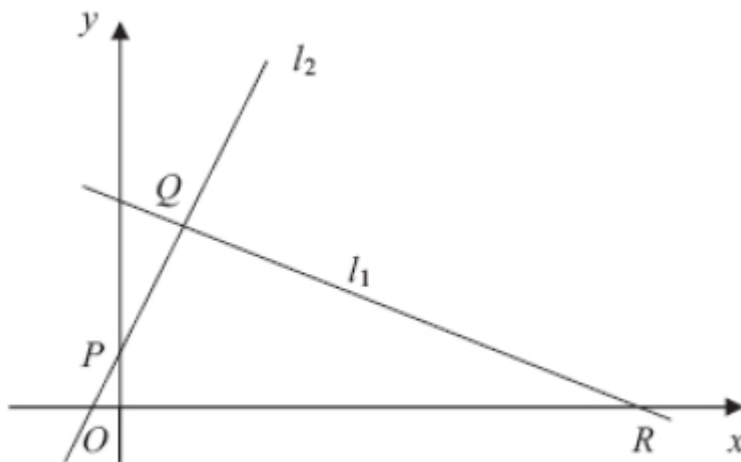


Figure 2

The points $Q(1, 3)$ and $R(7, 0)$ lie on the line l_1 , as shown in Figure 2.

The length of QR is $a\sqrt{5}$.

(a) Find the value of a . (3)

The line l_2 is perpendicular to l_1 , passes through Q and crosses the y -axis at the point P , as shown in Figure 2. Find

(b) an equation for l_2 , (5)

(c) the coordinates of P , (1)

(d) the area of ΔPQR . (4)

(Total 13 marks)



Question 3

The curve C has equation $y = \frac{3}{x}$ and the line l has equation $y = 2x + 5$.

- (a) Sketch the graphs of C and l , indicating clearly the coordinates of any intersections with the axes. (3)
- (b) Find the coordinates of the points of intersection of C and l . (6)

(Total 9 marks)

Question 4

The gradient of a curve C is given by

$$\frac{dy}{dx} = \frac{(x^2 + 3)^2}{x^2}, \quad x \neq 0.$$

- (a) Show that $\frac{dy}{dx} = x^2 + 6 + 9x^{-2}$. (2)

The point $(3, 20)$ lies on C .

- (b) Find an equation for the curve C in the form $y = f(x)$. (6)

(Total 8 marks)

Question 5

The circle C has centre $(3, 1)$ and passes through the point $P(8, 3)$.

- (a) Find an equation for C . (4)
- (b) Find an equation for the tangent to C at P , giving your answer in the form $ax + by + c = 0$, where a , b and c are integers. (5)

(Total 9 marks)

Question 6

The curve C has equation $y = kx^3 - x^2 + x - 5$, where k is a constant.

- (a) Find $\frac{dy}{dx}$. (2)

The point A with x -coordinate $-\frac{1}{2}$ lies on C . The tangent to C at A is parallel to the line with equation $2y - 7x + 1 = 0$.

Find

- (b) the value of k , (4)
 (c) the value of the y -coordinate of A . (2)

(Total 8 marks)

Question 7

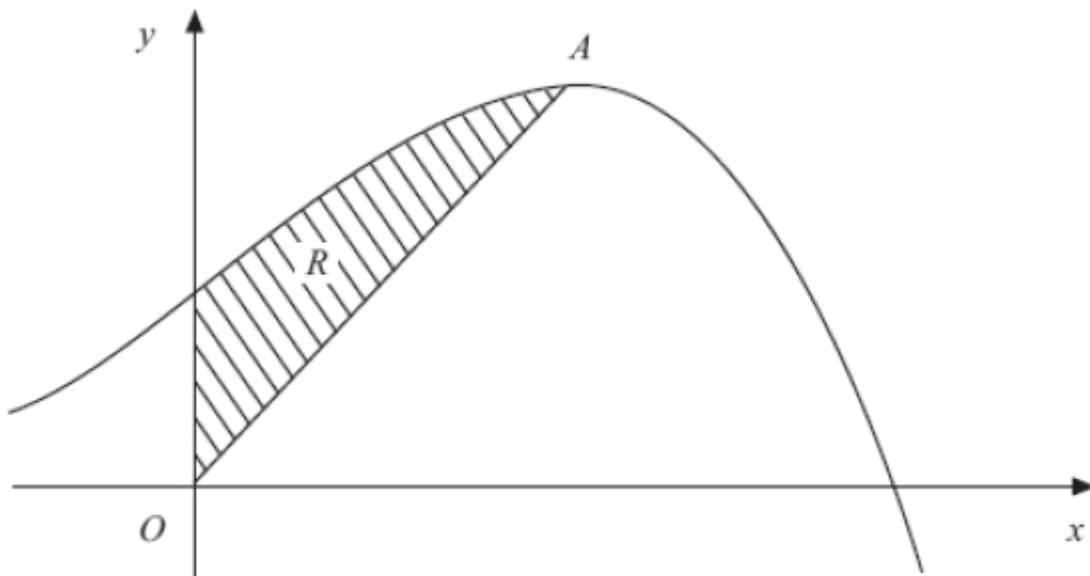


Figure 2

Figure 2 shows a sketch of part of the curve with equation $y = 10 + 8x + x^2 - x^3$.

The curve has a maximum turning point A .

- (a) Using calculus, show that the x -coordinate of A is 2. (3)

The region R , shown shaded in Figure 2, is bounded by the curve, the y -axis and the line from O to A , where O is the origin.

- (b) Using calculus, find the exact area of R . (8)

(Total 11 marks)

Question 8

(a) Find, to 3 significant figures, the value of x for which $5^x = 7$. (2)

(b) Solve the equation $5^{2x} - 12(5^x) + 35 = 0$. (4)

(Total 6 marks)

Question 9

Solve, for $0 \leq x < 360^\circ$,

(a) $\sin(x - 20^\circ) = \frac{1}{\sqrt{2}}$, (4)

(b) $\cos 3x = -\frac{1}{2}$. (6)

(Total 10 marks)

Question 10

Figure 1 below shows a triangle ABC, where $\overrightarrow{AB} = 4i + 6j$ and $\overrightarrow{AC} = 6i + 2j$

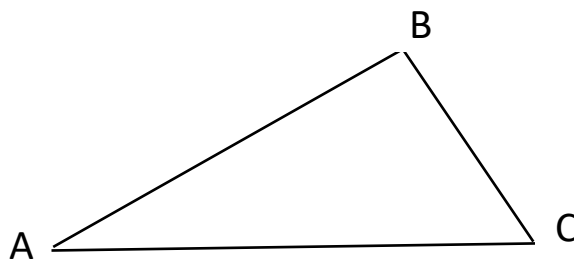


Figure 1

(a) Find \overrightarrow{BC} (2)

(b) Calculate the angle BAC (4)

(c) Find the area of the triangle ABC (2)

(Total 8 marks)



Question 11

(a) On a coordinate grid, shade the region that satisfies the inequalities

$$2y + x < 8, y < 3x + 6, y > 1 \text{ and } x > 2$$

(4)

(a) Work out the area of the shaded region

(2)

(Total 6 marks)

Question 12

The point P lies on the curve with equation

$$y = 4e^{2x}$$

The y -coordinate of P is 8.

(a) Find, in terms of $\ln 2$, the x -coordinate of P .

(2)

(b) Find the equation of the tangent to the curve at the point P in the form $y = ax + b$, where a and b are exact constants to be found

(4)

(Total 6 marks)

TOTAL FOR PAPER IS 100 MARKS
