Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						7	3	6	2	/	0	1	Signature	

Paper Reference(s)

7362/01

Examiner's use only

Team Leader's use only

London Examinations GCE

Pure Mathematics

Alternative Ordinary Level

Paper 1

Monday 21 January 2008 – Afternoon

Time: 2 hours

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total	

Materials required for examination
Nil

Items included with question papers
Nil

Candidates are expected to have an electronic calculator when answering this paper.

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
Check that you have the correct question paper.
You must write your answer for each question in the space following the question.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

Full marks may be obtained for answers to ALL questions.
The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 10 questions in this question paper. The total mark for this paper is 100.
There are 28 pages in this question paper. Any blank pages are indicated.

Advice to Candidates

Write your answers neatly and legibly.

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1. Triangle LMN has $LM = 5$ cm, $LN = 8.2$ cm and $MN = 6.4$ cm. Calculate, in degrees to the nearest 0.1°, the size of $\angle LMN$.

(3)

(Total 3 marks)

Q1

Leave blank

2. Evaluate $\sum_{r=7}^{50}(3r-5)$.

(4)

(Total 4 marks)

Q2

Leave blank

3. A particle P moves in a straight line. At time t seconds, the velocity, v m/s, of P is given by $v = 5 - 2t + t^2$. Find

(a) the acceleration, in m/s^2, of P when $t = 3$,

(3)

(b) the distance, in metres, travelled by P in the interval $0 \leqslant t \leqslant 4$.

(3)

Leave blank

Question 3 continued

(Total 6 marks)

Q3

Leave blank

4. Given that $y = (3x - 2)e^{2x}$,

(a) find $\frac{dy}{dx}$,

(3)

(b) show that $(3x - 2)\frac{dy}{dx} = (6x - 1)y$.

(3)

Question 4 continued

Leave blank

Q4

(Total 6 marks)

Leave blank

5. A water tank is in the shape of a right circular cylinder with no lid. The base of the cylinder is a circle of radius r cm and the height is h cm. The total external surface area of the tank is A cm^2. The capacity of the tank is $50\,000\pi$ cm^3.

(a) Show that $A = \left(\frac{100\,000}{r} + r^2\right)\pi$.

(4)

(b) Find, to the nearest whole number, the minimum value of A. Verify that the value you have found is a minimum.

(6)

Question 5 continued

Leave blank

(Total 10 marks)

Q5

Leave blank

6. $f(x) = 3x^2 - 6x + p.$

The equation $f(x) = 0$ has roots α and β. Without solving the equation $f(x) = 0$,

(a) form a quadratic equation, with integer coefficients, which has roots $(\alpha + \beta)$ and $\frac{1}{\alpha + \beta}$,

(4)

(b) form a quadratic equation which has roots $\frac{\alpha + \beta}{\alpha}$ and $\frac{\alpha + \beta}{\beta}$.

(4)

Given that 3 is a root of the equation found in part (b), find

(c) the value of p,

(2)

(d) the other root of the equation.

(2)

Question 6 continued

Leave blank

Question 6 continued

Leave blank

Leave blank

Question 6 continued

(Total 12 marks)

Q6

Leave blank

7. The third, fourth and fifth terms of a geometric series are $(5x-9)$, $(7x-3)$ and $(12x+4)$ respectively.

(a) Determine the two possible values of x.

(5)

Given that all the terms of the series are positive, find, for the series,

(b) the common ratio,

(2)

(c) the first term,

(2)

(d) the sum of the first 12 terms.

(2)

Question 7 continued

Leave blank

Question 7 continued

Leave blank

Question 7 continued

Leave blank

(Total 11 marks)

Q7

Leave blank

8. **Figure 1**

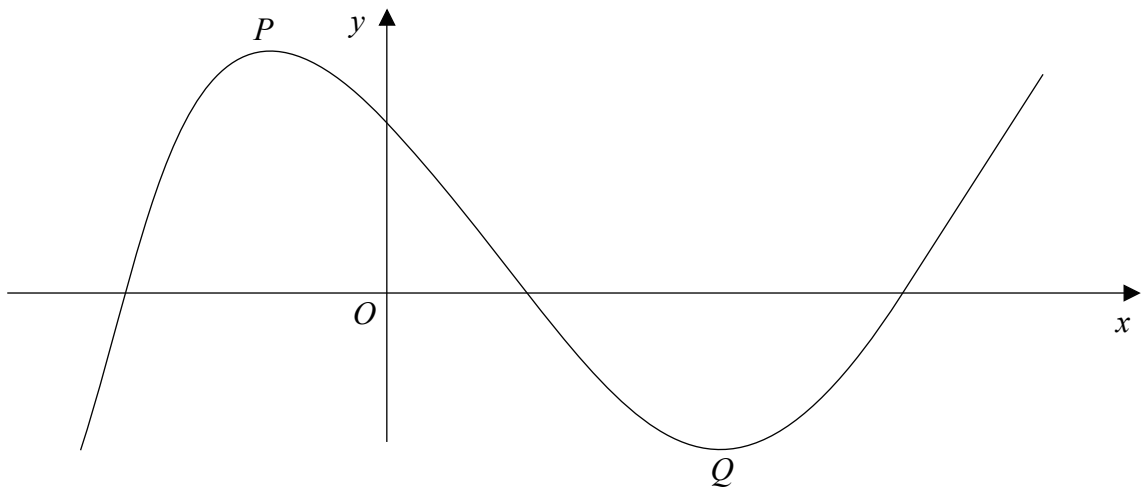

Figure 1 shows the curve with equation $y = f(x)$ where $f'(x) = 3x^2 - 4x - 4$. Given that the curve passes through the point with coordinates (1, 0),

(a) find $f(x)$.

(3)

The curve has a maximum point at P and a minimum point at Q.

(b) Find the exact values of the coordinates of

(i) P, (ii) Q.

(3)

(c) Write down an equation for

(i) the tangent at P,

(ii) the normal at Q.

(2)

(d) Find the exact value of the finite area enclosed by the curve between the points P and Q, the tangent at P and the normal at Q.

(7)

Question 8 continued

Leave blank

Question 8 continued

Leave blank

Leave blank

Question 8 continued

(Total 15 marks)

Q8

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9.

$$\sin(A+B) \equiv \sin A \cos B + \cos A \sin B$$
$$\cos(A+B) \equiv \cos A \cos B - \sin A \sin B.$$

(a) Obtain an expression for $\cos 2\theta$ in terms of $\cos^2\theta$.

(2)

(b) Write down an expression for $\sin 2\theta$ in terms of $\sin\theta$ and $\cos\theta$.

(1)

(c) Show that $\cos 3\theta \equiv 4\cos^3\theta - 3\cos\theta$.

(4)

(d) Solve, for $0 < \theta < \pi$, the equation $9\cos\theta - 12\cos^3\theta = 2$, giving your answers to 3 significant figures.

(4)

(e) Find $\int_0^{\frac{\pi}{2}} (3\cos^3\theta + 2\sin\theta)\,\mathrm{d}\theta$.

(5)

Question 9 continued

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Question 9 continued

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Question 9 continued

Leave blank

(Total 16 marks)

Q9

Leave blank

10.

Figure 2

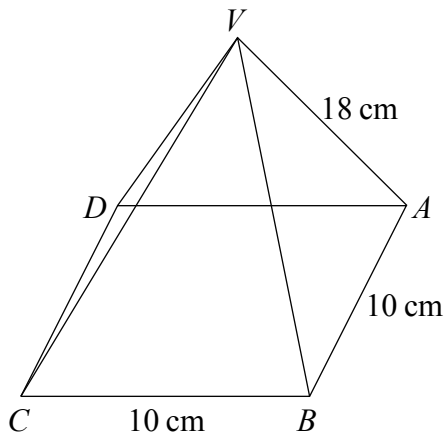

Figure 2 shows a right pyramid $VABCD$. The base $ABCD$ of the pyramid is a square of side 10 cm and $VA = VB = VC = VD = 18$ cm.

(a) Find, in cm to 3 significant figures, the height of the pyramid.

(3)

(b) Find, to the nearest 0.1°, the size of the angle between VA and the plane $ABCD$.

(3)

(c) Find, to the nearest 0.1°, the size of the angle between the plane VAB and the plane $ABCD$.

(3)

(d) Find, in cm to 3 significant figures, the length of the perpendicular from B to VA.

(4)

(e) Find, in cm to the nearest 0.1°, the size of the angle between the plane VAB and the plane VAD.

(4)

Question 10 continued

Leave blank

Question 10 continued

Leave blank

Q10

(Total 17 marks)

TOTAL FOR PAPER: 100 MARKS

END