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

Paper Reference(s)

7362/02

Examiner's use only

Team Leader's use only

London Examinations GCE

Pure Mathematics

Alternative Ordinary Level

Paper 2

Tuesday 23 January 2007 – Afternoon

Time: 2 hours

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
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.

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 11 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. A triangle has sides of length 4.6 cm, 5.3 cm and 6.5 cm. Find, to the nearest degree, the size of the largest angle of the triangle.

Q1

(Total 3 marks)

Leave blank

2. The sum of the first 10 terms of an arithmetic series is 295, and the sum of the first 8 terms of the same series is 196. Find

(a) the common difference of the series,

(4)

(b) the first term of the series.

(1)

Q2

(Total 5 marks)

Leave blank

3. Solve the equation $\log_3(5x + 12) + \log_3 x = 2$.

Q3

(Total 5 marks)

Leave blank

4. The position vectors of the points R and S are $(2\mathbf{i} + 6\mathbf{j})$ and $(6\mathbf{i} + 14\mathbf{j})$ respectively, referred to a fixed origin O. The point T divides RS internally in the ratio 3:1. Find, in terms of $\mathbf{i}$ and $\mathbf{j}$,

(a) $\overrightarrow{OT}$,

(3)

(b) the unit vector in the direction of $\overrightarrow{OT}$.

(2)

Q4

(Total 5 marks)

Leave blank

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

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

(2)

The region enclosed by the curve with equation $y = 3 \cos 2x$, the y-axis, the x-axis and the line $x = \frac{\pi}{8}$ is rotated through 360° about the x-axis.

(b) Find, in terms of π, the volume of the solid formed.

(6)

Leave blank

Question 5 continued

Q5

(Total 8 marks)

Leave blank

6. The first three terms of a geometric series are non-identical and are given by $(x+2)$, $3x$ and $(7x-4)$ respectively. Find

(a) the first term of the series,

(5)

(b) the common ratio of the series,

(1)

(c) the sum of the first 17 terms of the series.

(2)

Leave blank

Question 6 continued

Q6

(Total 8 marks)

Leave blank

7. The points A and B have coordinates $(-2, 4)$ and $(5, 5)$ respectively.

(a) Show that an equation of the perpendicular bisector of AB is $y + 7x = 15$.

(5)

The point C has coordinates $(6, 4)$.

(b) Write down an equation for the perpendicular bisector of AC.

(1)

A circle passes through the points A, B and C.

(c) Find

(i) the coordinates of the centre of the circle,

(ii) the radius of the circle.

(4)

Leave blank

Question 7 continued

Leave blank

Question 7 continued

Leave blank

Question 7 continued

Q7

(Total 10 marks)

Leave blank

8. (a) Complete the table below of values for $y = e^{-\frac{1}{2}x} + 1$, giving your values of y to 2 decimal places.

x	–1	0	1	2	3	4	5
y		2	1.61		1.22	1.14	

(2)

(b) Using a scale of 2 cm to 1 unit on the x-axis and 4 cm to 1 unit on the y-axis, draw the graph of $y = e^{-\frac{1}{2}x} + 1$ for $-1 \leqslant x \leqslant 5$.

(2)

(c) Use your graph to estimate, to 2 significant figures, the solution of the equation

$$e^{-\frac{1}{2}x} = 0.8$$

showing your method clearly.

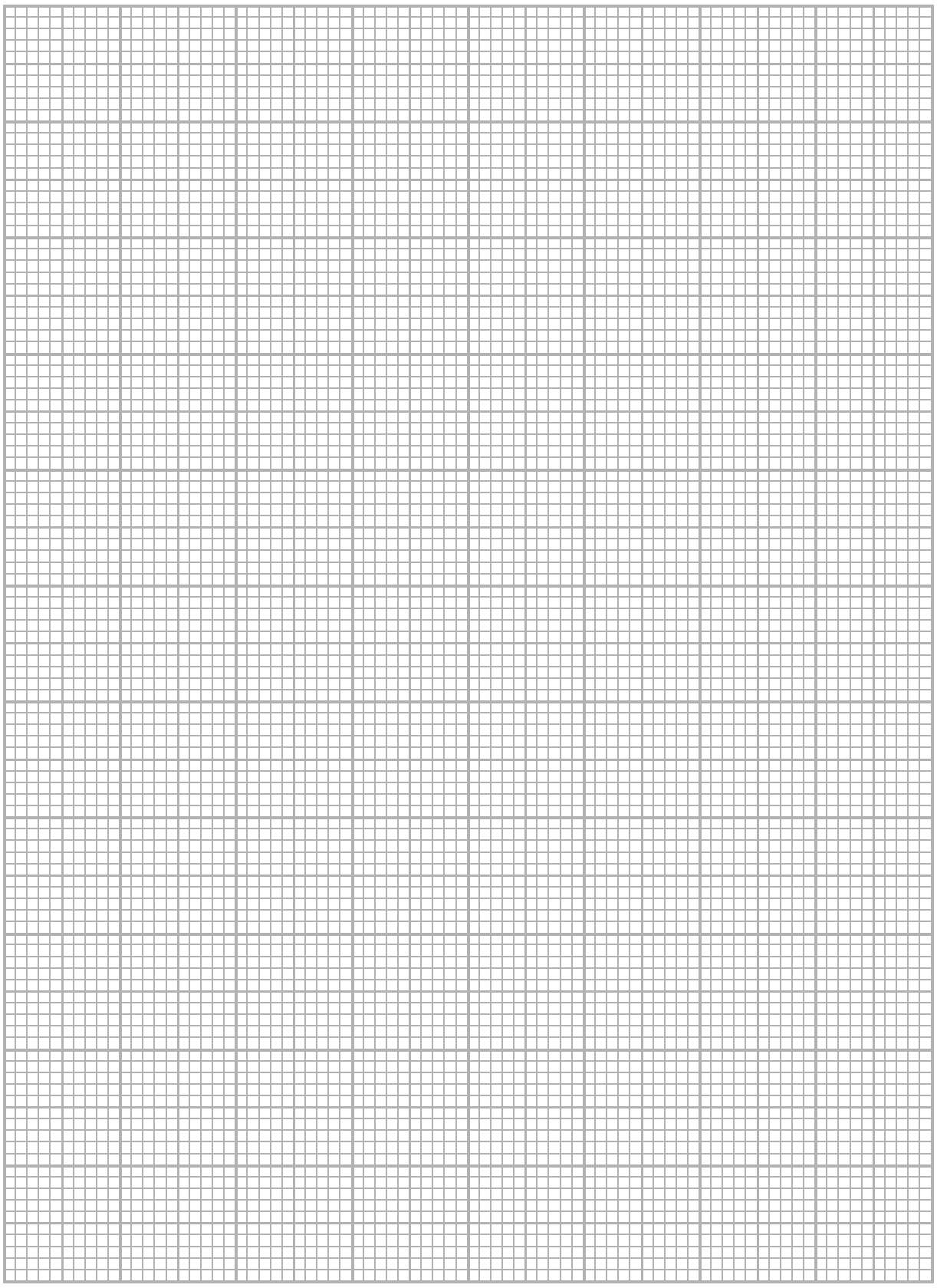
(2)

(d) By drawing a straight line on your graph, estimate, to 2 significant figures, the solution of the equation $x = -2\ln(2x - 7)$.

(4)

Leave blank

Question 8 continued



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Question 8 continued

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Question 8 continued

Q8

(Total 10 marks)

Leave blank

9. $f(x) = 2x^2 + px + 3$, where p is a constant.

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

(a) form a quadratic equation, with integer coefficients, which has roots $\alpha^2\beta^2$ and $\frac{1}{\alpha^2\beta^2}$,

(3)

(b) form, in terms of p, a quadratic equation which has roots α^2 and β^2.

(5)

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

(c) the value of the other root of the equation,

(2)

(d) the possible values of p.

(3)

Leave blank

Question 9 continued

Leave blank

Question 9 continued

Leave blank

Question 9 continued

Q9

(Total 13 marks)

Leave blank

10. $f(x) = x^3 + px^2 - 11x + q, \quad p, q \in \mathbb{R}$

Given that $(x + 5)$ and $(x - 3)$ are factors of $f(x)$,

(a) form a pair of simultaneous equations in p and q,

(3)

(b) find the value of p and the value of q,

(3)

(c) factorise $f(x)$ completely,

(1)

(d) sketch the curve with equation $y = f(x)$, showing on the diagram the coordinates of the points of intersection with the axes.

(3)

The minimum point on the curve is A.

(e) Find the coordinates of the point where the tangent at A meets the curve again.

(6)

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Question 10 continued

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Question 10 continued

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Question 10 continued

(Total 16 marks)

Q10

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11. **Figure 1**

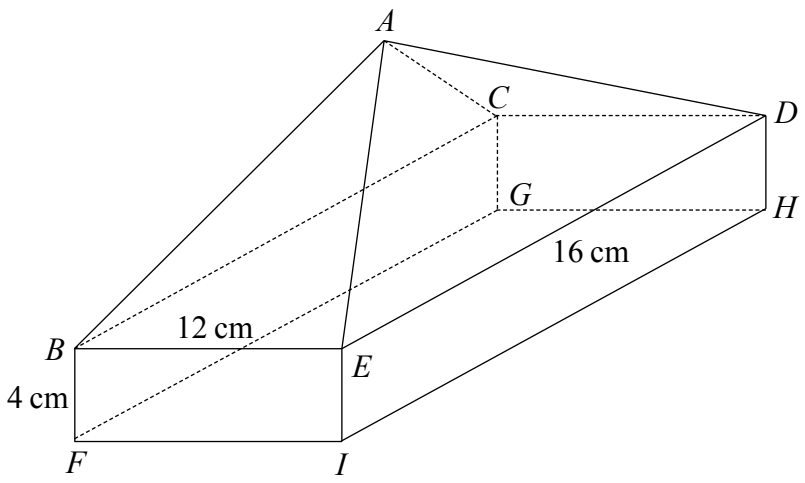

Figure 1 shows a paperweight which consists of a cuboid *BCDEFGHI* and a right pyramid *ABCDE*. The height of the pyramid is 8 cm, $BF = 4$ cm, $BE = 12$ cm and $DE = 16$ cm.

(a) Find, to 3 significant figures, the length of

(i) *GE*,

(ii) *AB*.

(6)

Calculate, in degrees to the nearest 0.1°, the size of the angle

(b) between *GE* and the plane *FGHI*,

(3)

(c) between *AB* and the plane *BCDE*,

(3)

(d) between the plane *ABC* and the plane *BCHI*.

(5)

Leave blank

Question 11 continued

Leave blank

Question 11 continued

Q11

(Total 17 marks)

TOTAL FOR PAPER: 100 MARKS

END