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

Paper Reference(s)

7362/01

London Examinations GCE

Pure Mathematics

Alternative Ordinary Level

Paper 1

Thursday 13 May 2010 – Afternoon

Time: 2 hours

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
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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, initials and signature.
Check that you have the correct question paper.
You must write your answer to 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. The grid opposite shows the graph of $y = 3x - 4 + \frac{6}{x^2}$ for $0.74 \leqslant x \leqslant 4$

The line with equation $y = 5x - 4$ intersects the curve with equation $y = 3x - 4 + \frac{6}{x^2}$ at the point P.

(a) Using algebra, show that the x-coordinate of P satisfies $x^3 = 3$

(3)

(b) By drawing a suitable straight line on the grid, obtain an estimate, to 1 decimal place, for the value of $\sqrt[3]{3}$

(2)

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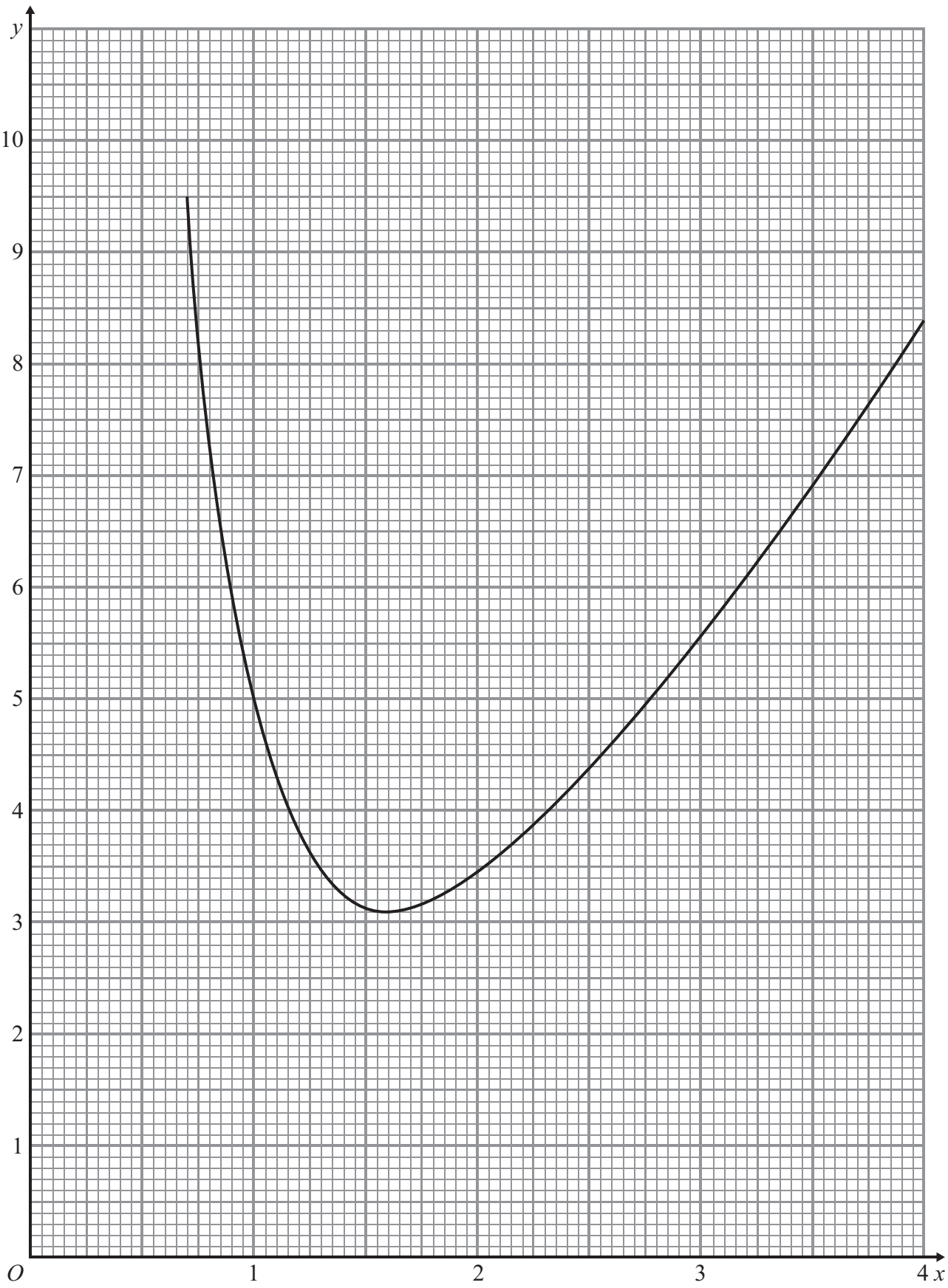

Q1

(Total 5 marks)

Leave blank

2. A particle P is moving in a straight line.

At time t seconds, $t \geqslant 0$, the velocity of P is v m/s, where $v = 4 + 6t - t^2$.

(a) Find an expression, in terms of t, for the acceleration of P at time t.

(2)

(b) Find the maximum velocity of P.

(2)

Q2

(Total 4 marks)

Leave blank

3. Solve the equations

$$x - 2y = 3$$
$$2y^2 + 2xy + x^2 = 1$$

(6)

Q3

(Total 6 marks)

Leave blank

4. The lengths of the sides of a triangle are 5 cm, 6 cm and 8 cm.

(a) Find, in degrees to one decimal place, the size of the smallest angle of the triangle.

(4)

(b) Find, to the nearest cm^2, the area of the triangle.

(3)

Leave blank

Question 4 continued

(Total 7 marks)

Q4

Leave blank

5. The sum, S_n, of the first n terms of an arithmetic series is given by $S_n = n(2n+1)$.

For this series,

(a) prove that the first term is 3,

(2)

(b) find the common difference,

(3)

(c) find the value of the 25th term.

(2)

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Question 5 continued

(Total 7 marks)

Q5

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6.

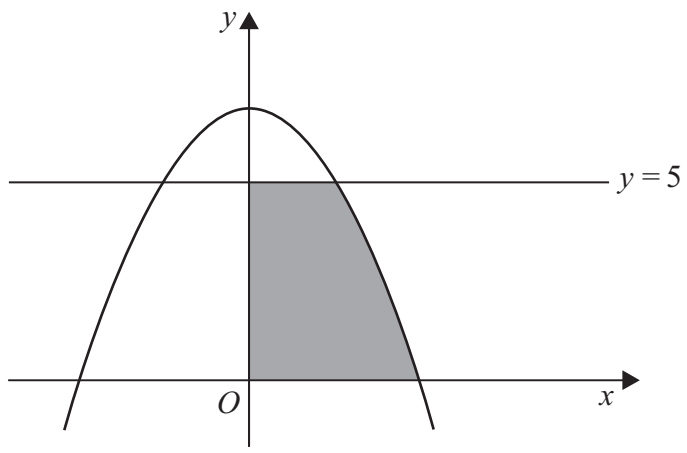

Figure 1

Figure 1 shows the curve with equation $y = 9 - x^2$ and the line $y = 5$

The shaded region is rotated through 360° about the x-axis.

Find, to 3 significant figures, the volume of the solid generated.

(11)

Question 6 continued

Leave blank

(Total 11 marks)

Q6

Leave blank

7. (a) Expand $\left(1+3x^2\right)^{-\frac{1}{2}}$ in ascending powers of x up to and including the term in x^6, simplifying each term as far as possible.

(3)

(b) State the range of values of x for which your expansion is valid.

(1)

$$f(x)=\frac{2+kx^2}{(1+3x^2)^{\frac{1}{2}}},\ k\neq 0$$

(c) Obtain a series expansion for $f(x)$ in ascending powers of x up to and including the term in x^6.

(3)

Given that the coefficient of x^6 in the series expansion of $f(x)$ is zero,

(d) show that $k=5$

(2)

(e) Hence use your series expansion from part (c) to obtain an estimate, to 4 decimal places, of

$$\int_0^{0.3} f(x)\mathrm{d}x$$

(4)

Question 7 continued

Leave blank

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Question 7 continued

Leave blank

Question 7 continued

(Total 13 marks)

Q7

Leave blank

8. (a) Solve the equation $\log_5 625 = x$

(2)

(b) Solve the equation $\log_3 (5y+3) = 5$

(2)

(c) (i) Factorise $5x\ln x + 3\ln x - 10x - 6$

(ii) Hence find the exact solution of the equation

$$5x\ln x + 3\ln x - 10x - 6 = 0$$

(5)

Given that $p \neq q$, solve the simultaneous equations

(d) $\log_p q + 3\log_q p = 4$

$$pq = 81$$

(5)

Question 8 continued

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Question 8 continued

Question 8 continued

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(Total 14 marks)

Q8

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9.

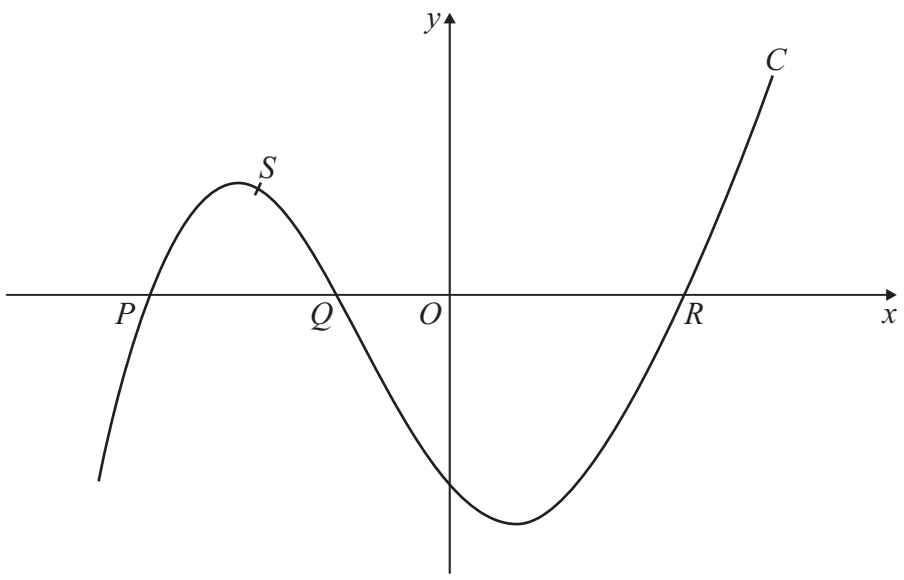

Figure 2

$$f(x) = x^3 + ax^2 + bx + d, \quad a, b, d \in \mathbb{Z}$$

Figure 2 shows the curve C with equation $y = f(x)$.

The curve C crosses the x-axis at the points P, Q and R.

The x-coordinates of P, Q and R are $-3, -1$ and 2 respectively.

The point S on C has x-coordinate -2

(a) Find the value of a, the value of b and the value of d.

(4)

The line l is the tangent to C at S.

(b) Find an equation for l giving your answer in the form $y = px + q$.

(5)

(c) Hence show that l passes through R.

(1)

(d) Find the area of the region enclosed by C and l.

(5)

Question 9 continued

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Question 9 continued

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Question 9 continued

(Total 15 marks)

Q9

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10. The points P, Q and R have coordinates (1, 3), (4, 5) and (6, 2) respectively.

(a) Find the gradient of (i) PQ, (ii) QR.

(3)

(b) Show, by calculation, that PQ is perpendicular to QR.

(2)

(c) Find the exact length of PQ.

(2)

The line l is the perpendicular bisector of PR.

(d) Find an equation for l.

(4)

(e) Show that Q lies on l.

(1)

The line l meets the x-axis at the point S.

(f) Show that $PQRS$ is a square.

(4)

(g) Find the area of ΔPQR.

(2)

Question 10 continued

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Question 10 continued

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Question 10 continued

Q10

(Total 18 marks)

TOTAL FOR PAPER: 100 MARKS

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