Centre No.					Pape	r Refer	ence			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

Monday 12 May 2008 – Afternoon

Time: 2 hours

Materials required for examination Items included with question papers

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 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.

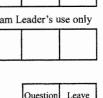
#### Advice to Candidates

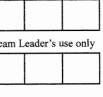
Write your answers neatly and legibly.

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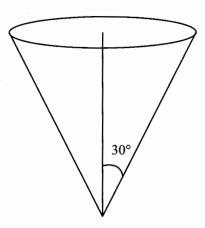


Figure 1

Figure 1 shows a right circular cone which is fixed with its vertex at its lowest point and its axis vertical. The semi-vertical angle of the cone is  $30^{\circ}$ . The cone is filled with sand. Sand then leaks from the cone through a small hole at the vertex at a constant rate of  $5 \, \text{cm}^3/\text{s}$ . Find, in cm/s to 2 significant figures, the rate of decrease of the radius of the circular surface of the sand when the depth of the sand is 10 cm.

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(Total 7 marks)

4. Differentiate, with respect to x,	
(a) $y = (5x^2 - 2)e^{2x}$ ,	
	(3)
(b) $y = \frac{x^3 + 2}{x - x^2}$ , simplifying your answer.	
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5.	Referred to a fixed origin $O$ , the position vectors of the points $A$ and $B$ are $4\mathbf{i} + 5\mathbf{j}$ and $9$ respectively. The point $C$ divides $AB$ internally in the ratio $2:3$ . Find, in terms of $\mathbf{i}$ a	i +15j nd j,
	(a) (i) $\overrightarrow{AB}$ (ii) $\overrightarrow{OC}$	(3)
	(b) the unit vector in the direction of $\overrightarrow{AB}$ .	(2)
	The point $D$ lies on $BA$ produced and $\overrightarrow{OD} = \lambda \mathbf{i}$ .	
	(c) Find the value of $\lambda$ .	(3)
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(Total 8 marks)	Q5



- 6. Solve the equation
  - (a)  $\log_p 243 = 5$ ,

**(2)** 

(b)  $\log_4(3q+4)=3$ .

**(2)** 

$$f(x) = 2x \log_x 3 - 5 \log_x 9 - x + 5$$

(c) Find the value of a and the value of b so that  $f(x) = (x-5)(a \log_x 3 - b)$ .

(3)

(d) Hence solve the equation f(x) = 0.

(3)

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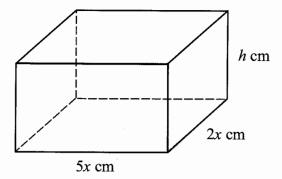


Figure 2

Figure 2 shows a solid cuboid of height h cm. The width of the cuboid is 2x cm and the length of the cuboid is 5x cm. The total surface area of the cuboid is A cm<sup>2</sup>.

(a) Write down an expression, in terms of x and h, for A.

**(1)** 

The volume of the cuboid is 500 cm<sup>3</sup>.

(b) Show that  $A = 20x^2 + \frac{700}{x}$ .

(3)

(c) Find, to 3 significant figures, the minimum value of A.

**(5)** 

(d) Verify that your answer for part (c) is the minimum value of A.

(2)

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8.	The first three	terms of	a geometric	series	are $(15x+6)$ , $(6x-3)$	and $(x+4)$
	respectively.					
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(a)	i) This the possible values of x.	
		(4)

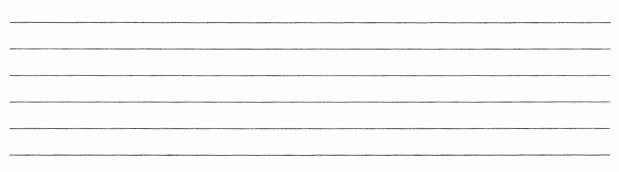
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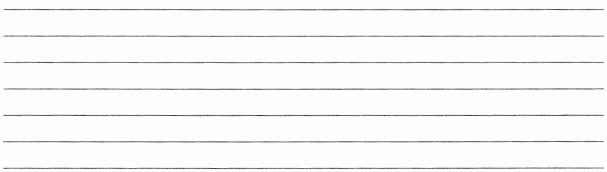
Given that the series is	s convergent, find

(c) the sum to infinity of the series,
(3)

(d)	the percentage error when	the sum	of the	first n	terms	is taken	as an	approximation
	for the sum to infinity.							
								(3)

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

express

(a)  $\cos 2A$  in terms of  $\cos A$ ,

**(2)** 

(b)  $\sin 2A$  in terms of  $\sin A$  and  $\cos A$ , simplifying your answer.

**(1)** 

(c) Hence show that  $\cos 3A = 4\cos^3 A - 3\cos A$ .

**(4)** 

(d) Solve, for  $0 \le x \le 180^{\circ}$ , the equation  $4\cos^3 x - 3\cos x = 0.6$ , giving your solutions to one decimal place.

**(5)** 

(e) Evaluate  $\int_0^{\pi} \cos^3 \theta \, d\theta$ , giving your answer in the form  $\frac{a}{b} \sqrt{c}$ , where a, b and c are integers.

**(5)** 

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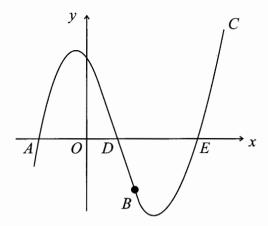


Figure 3

$$f(x) = x^3 + px^2 + qx + 6$$

Figure 3 shows the curve C with equation y=f(x). The point A with coordinates (-2,0) and the point B with coordinates (2,-4) both lie on C.

(a) Find the value of p and the value of q.

**(5)** 

The curve also intersects the x-axis at the points D and E.

(b) Find the x-coordinate of D and the x-coordinate of E.

**(3)** 

The normal at B intersects the x-axis at the point F.

(c) Find an equation for the normal to the curve C at the point B.

**(4)** 

(d) Find the value of the area enclosed by the curve C, the line BF and the x-axis between the point D and the point F.

**(6)** 

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