FOR EDEXCEL

## GCE Examinations Advanced Subsidiary

## **Core Mathematics C4**

Paper B

Time: 1 hour 30 minutes

## Instructions and Information

Candidates may use any calculator EXCEPT those with the facility for symbolic algebra, differentiation and/or integration.

Full marks may be obtained for answers to ALL questions.

Mathematical formulae and statistical tables are available.

This paper has eight questions.

## Advice to Candidates

You must show sufficient working to make your methods clear to an examiner. Answers without working may gain no credit.



Written by Shaun Armstrong

© Solomon Press

These sheets may be copied for use solely by the purchaser's institute.

6	by parts to find	
	$\int x^2 \sin x  dx.$	(6)

2. Given that $y = -2$ when $x = 1$ , solve the differential equation	
$\frac{\mathrm{d}y}{\mathrm{d}x} = y^2 \sqrt{x} \;,$	
giving your answer in the form $y = f(x)$ .	(7)

•	A curve has the equation	
	$4x^2 - 2xy - y^2 + 11 = 0.$	
	Find an equation for the normal to the curve at the point with coordinates $(-1, -3)$ . (8)	)

contin	ued		

4	()	Expand $(1 + x)^{-3}$   $x = 1$ in according near of $x = 1$ to and including		blank
4.	(a)	Expand $(1 + ax)^{-3}$ , $ ax  < 1$ , in ascending powers of $x$ up to and including the term in $x^3$ . Give each coefficient as simply as possible in terms of the constant $a$ .	(3)	
	Give	en that the coefficient of $x^2$ in the expansion of $\frac{6-x}{(1+ax)^3}$ , $ ax  < 1$ , is 3,		
	(b)	find the two possible values of $a$ .	(4)	
	Give	en also that $a < 0$ ,		
	<i>(c)</i>	show that the coefficient of $x^3$ in the expansion of $\frac{6-x}{(1+ax)^3}$ is $\frac{14}{9}$ .	(2)	

4.	continued	Leave blank

Leave blank

**5.** 

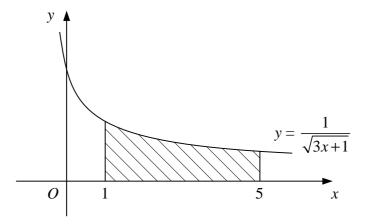


Figure 1

Figure 1 shows the curve with equation  $y = \frac{1}{\sqrt{3x+1}}$ .

The shaded region is bounded by the curve, the x-axis and the lines x = 1 and x = 5.

(a) Find the area of the shaded region.

**(4)** 

The shaded region is rotated completely about the *x*-axis.

(b) Find the volume of the solid formed, giving your answer in the form  $k\pi \ln 2$ , where k is a simplified fraction. (5)

•	continued	

Leave blank

**(7)** 

$(x \neq -2, x \neq \frac{1}{3})^2$

Find the values of the constants A, B and C such that *(a)* 

$$f(x) = \frac{A}{2+x} + \frac{B}{1-3x} + \frac{C}{(1-3x)^2}.$$
 (4)

Find the value of *(b)* 

$$\int_{-1}^{0} f(x) dx,$$

giving your answer in the form $p + \ln q$ , where $p$ and $q$ are integers.	(7)

		Lea bla
6.	continued	

Leave blank

7.

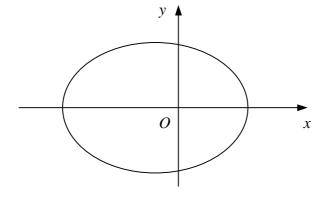


Figure 2

Figure 2 shows the curve with parametric equations

$$x = -1 + 4\cos\theta$$
,  $y = 2\sqrt{2}\sin\theta$ ,  $0 \le \theta < 2\pi$ .

The point *P* on the curve has coordinates  $(1, \sqrt{6})$ .

- (a) Find the value of  $\theta$  at P. (2)
- (b) Show that the normal to the curve at P passes through the origin. (7)
- (c) Find a cartesian equation for the curve. (3)

7.	continued	Leave blank

Leave
hlank

8.	The line $l_1$ passes through the points $A$ and $B$ with position vectors $(-3\mathbf{i} + 3\mathbf{j} + 2\mathbf{k})$ and $(7\mathbf{i} - \mathbf{j} + 12\mathbf{k})$ respectively, relative to a fixed origin.	Diane
	(a) Find a vector equation for $l_1$ .	(2)
	The line $l_2$ has the equation	
	$\mathbf{r} = (5\mathbf{j} - 7\mathbf{k}) + \mu(\mathbf{i} - 2\mathbf{j} + 7\mathbf{k}).$	
	The point C lies on $l_2$ and is such that AC is perpendicular to BC.	
	(b) Show that one possible position vector for $C$ is $(\mathbf{i} + 3\mathbf{j})$ and find the other.	(8)
	Assuming that $C$ has position vector $(\mathbf{i} + 3\mathbf{j})$ ,	
	(c) find the area of triangle ABC, giving your answer in the form $k\sqrt{5}$ .	(3)

continued		

3. continued		bl
• Continued		
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
		_
	END	