FORM TP 23271



TEST CODE **000576** MAY/JUNE 2003

CARIBBEAN EXAMINATIONS COUNCIL ADVANCED PROFICIENCY EXAMINATION

MATHEMATICS

UNIT 1 - PAPER 03B

1½ hours

23 MAY 2003 (p.m.)

This examination paper consists of THREE questions. One question from each of Modules 1.1, 1.2 and 1.3.

The maximum mark for each question is 20. The maximum mark for this examination is 60. This examination consists of 4 printed pages.

INSTRUCTIONS TO CANDIDATES

1. **DO NOT** open this examination paper until instructed to do so.

2. Answer ALL THREE questions.

3. Unless otherwise stated in the question, all numerical answers **MUST** be given exactly **OR** to three significant figures as appropriate.

Examination material:

Mathematical formulae and tables Electronic calculator Ruler and graph paper

Section A (Module 1.1)

- 2 -

Answer this question.

Find the values of $x \in \mathbf{R}$ which satisfy the inequality (a)

> [5 marks] $|5x-3| \le |x-4|.$

Find the values of the constants p and q such that x - 1 and x + 1 are factors of (b)

$$4x^3 - px^2 - qx + 3.$$
 [5 marks]

Find the values of x which satisfy the equation (c)

$$2^{2x} - 3(2^{x+2}) + 32 = 0.$$
 [6 marks]

Find the radius of the circle whose area is equal to the area of the sector in the diagram shown [4 marks] below (not drawn to scale).



Total 20 marks

GO ON TO THE NEXT PAGE

000576/CAPE 2003

1.

(d)

Section B (Module 1.2)

- 3 -

Answer this question.

(a) The diagram below, not drawn to scale, shows the circle, C, in the Cartesian plane.



C has centre (3, 4) and passes through the point (8, 16). Find the equation of C. [4 marks] Let α and β be the roots of the equation $2x^2 + 4x + 1 = 0$.

(i) Without solving the equation, write down the value of

a) $\alpha + \beta$ b) $\alpha \beta$. [2 marks]

(ii) Hence, find the value of $\alpha^2 + \beta^2$. [2 marks]

(iii) Find also the equation whose roots are $\frac{1}{\alpha^2}, \frac{\pi}{\beta^2}$. [3 marks]

(c) Solve, for $0 \le \theta \le \pi$, the equation

 $\sin\theta + \sin 2\theta + \sin 3\theta = 0.$ [6 marks]

(d) Find the values of $t \in \mathbf{R}$ such that the vectors

$$\mathbf{u} = 3\mathbf{i} + 2t\mathbf{j}$$
$$\mathbf{v} = -2\mathbf{i} + 3t\mathbf{j}$$

are perpendicular.

[3 marks]

Total 20 marks

000576/CAPE 2003

(b)

2.

GO ON TO THE NEXT PAGE

Section C (Module 1.3)

Answer this question.

3.

(a)

 $\frac{\lim_{x \to 2} \frac{x^3 - 4x}{x - 2}}{x - 2}.$

(ii) Determine the real values of x for which the function

$$\frac{4x}{(|2x-7|-5)}$$
 is continuous. [4 marks]

(b) Differentiate with respect to x the function

$$\frac{x}{3x+4}$$
 [4 marks

Hence, or otherwise, find

$$\frac{16}{(3x+4)^2} dx$$
. [2 marks]

(c) The graph of the curve $y = x^2$ between x = 0 and x = 2 is rotated through 2π radians about the x-axis.

Find the volume of the solid generated.

[6 marks]

[4 marks]

Total 20 marks

-

END OF TEST