



Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2013

Mathematics

Assessment Unit C2

assessing

Module C2: AS Core Mathematics 2

[AMC21]



MONDAY 10 JUNE, MORNING

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number on the Answer Booklet provided.

Answer **all eight** questions.

Show clearly the full development of your answers.

Answers should be given to three significant figures unless otherwise stated.

You are permitted to use a graphic or scientific calculator in this paper.

INFORMATION FOR CANDIDATES

The total mark for this paper is 75

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

A copy of the **Mathematical Formulae and Tables booklet** is provided.

Throughout the paper the logarithmic notation used is $\ln z$ where it is noted that $\ln z \equiv \log_e z$

Answer all eight questions.

Show clearly the full development of your answers.

Answers should be given to three significant figures unless otherwise stated.

- 1 Use the trapezium rule with 5 ordinates to find an approximation for

$$\int_1^{1.4} \log_{10} x \, dx \quad [7]$$

- 2 Use the binomial theorem to find the first four terms in the expansion, in ascending powers of x , of

$$\left(1 - \frac{x}{2}\right)^8 \quad [4]$$

- 3 A and B are the points (5, 1) and (2, -3) respectively.
AD is the diameter of a circle with centre B as shown in Fig. 1 below.

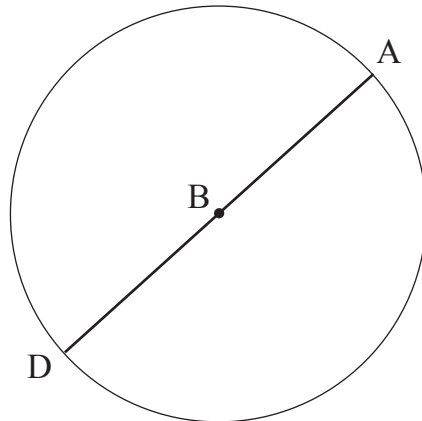


Fig. 1

- (i) Find the equation of the circle. [4]
(ii) Verify that D is the point (-1, -7). [2]

The point C has coordinates (3, -10).

- (iii) Prove that CD is a tangent to the circle. [4]

4 A triangle ABC has a perimeter of 19 cm.
AB is the shortest side and has length 4 cm.
The lengths of the sides of the triangle form an arithmetic progression.

(i) Using the sum of an arithmetic progression show that the lengths of the other two sides are $6\frac{1}{3}$ cm and $8\frac{2}{3}$ cm. [4]

(ii) Find the angle BCA. [3]

(iii) Find the area of the triangle. [2]

5 A particle moves along a straight line through a fixed point O.
At time t seconds its displacement, x cm, from O can be modelled by

$$x = 7 \sin t - 4 \cos^2 t + 2$$

for $0 \leq t \leq 2\pi$

(i) Find x when $t = \pi$ [2]

(ii) Find the times when the particle is at O. [8]

6 (a) Find

$$\int 3x^{\frac{1}{2}} + x^{-2} dx \quad [2]$$

(b) The gradient of a curve at any point on the curve is given by

$$\frac{dy}{dx} = 2x - 9x^2$$

The area between the curve, the x -axis and the lines $x = 0$ and $x = 1$ is $\frac{19}{12}$

This area lies above the x -axis.

Find the equation of the curve. [10]

- 7 Petals for paper flowers are to be made in the shape of a sector of a circle of radius r and angle θ .

The petals are to have a **perimeter** of 24 cm and a surface **area** of 18 cm^2

Find r and θ .

[12]

- 8 (i) Prove that

$$\log_a x + \log_a y \equiv \log_a (xy) \quad [6]$$

- (ii) Find a given that

$$2 \log_a 3 + 3 \log_a 4 = 5 \quad [5]$$

THIS IS THE END OF THE QUESTION PAPER
