



Rewarding Learning

ADVANCED  
General Certificate of Education

Centre Number

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Candidate Number

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# Mathematics

## Assessment Unit C3

*assessing*

Module C3:

Core Mathematics 3



[AMC31]

\*AMC31\*

## Assessment

### TIME

1 hour 30 minutes.

### Assessment Level of Control:

Tick the relevant box (✓)

Controlled Conditions	
Other	

### INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer **all eight** questions in the spaces provided.

**Do not write outside the boxed area on each page or on blank pages.**

Complete in black ink only. **Do not write with a gel pen.**

Questions which require drawing or sketching should be completed using an H.B. pencil.

All working should be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions. **Answers without working may not gain full credit.**

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  $\ln z \equiv \log_e z$

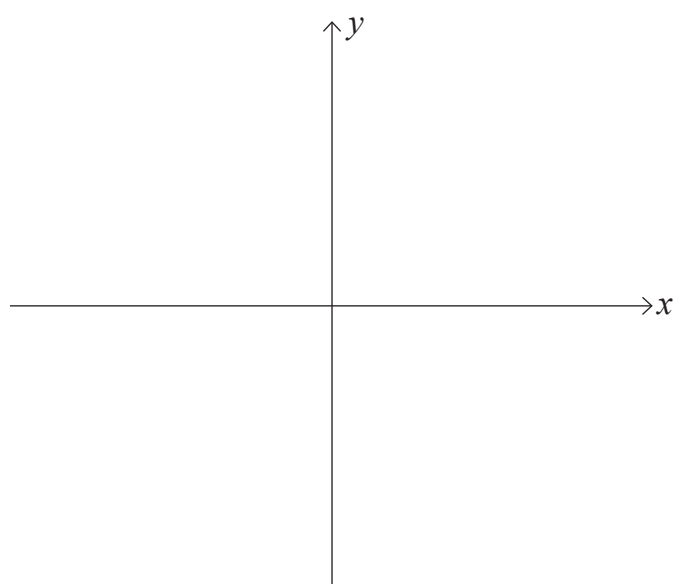
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\*24AMC3101\*

1 (i) On the axes below, sketch the graph of  $y = |6 - 2x|$

[2]



(ii) Hence, or otherwise, solve

$$|6 - 2x| \leq 5$$

[4]

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3 Write in partial fractions

$$\frac{2x^2 + 15x + 7}{(x + 2)(x - 3)(x + 5)}$$

[7]

A series of 25 horizontal dotted lines for writing the solution.





Handwriting practice area with 20 horizontal dotted lines.







(ii) Take the first approximation of this root to be  $x = 1.8$  and use the Newton-Raphson method once to find a better approximation.

[4]

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(b) In the binomial expansion below, find the values of  $a$  and  $n$ .

$$(1 + ax)^n = 1 - \frac{3x}{2} - \frac{9x^2}{8} + \dots$$

[8]

Dotted lines for student work.







Handwriting practice area with 20 horizontal dotted lines.

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[Turn over



\*24AMC3109\*





- (b) The temperature  $T^{\circ}\text{C}$  of a bowl of soup  $t$  minutes after it is taken from the heat can be modelled by the equation

$$T = 50 + Ae^{-kt}$$

where  $A$  and  $k$  are positive constants.  
The initial temperature of the soup was  $95^{\circ}\text{C}$ .

- (i) Find  $A$ . [2]

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It takes 5 minutes for the temperature of the soup to decrease from  $95^{\circ}\text{C}$  to  $60^{\circ}\text{C}$ .

- (ii) Find  $k$ . [3]

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6 The equation of a curve is  $y = x \ln x$  for  $x > 0$

Find the exact coordinates of the stationary point of this curve and determine its nature. [7]

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Handwriting practice area with 20 horizontal dotted lines.









8 (a) Fig. 1 below shows a logo for a flower shop.

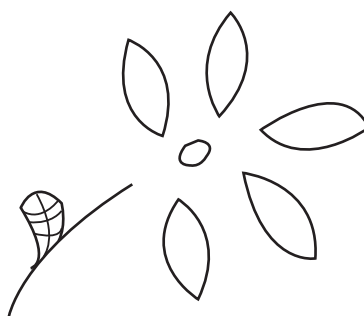


Fig. 1

The area of each petal can be modelled as the area bounded by the curves  $y = 2\sin x$  and  $y = \tan x$  as shown in Fig. 2 below.

Using calculus, find the exact area of each petal.

[7]

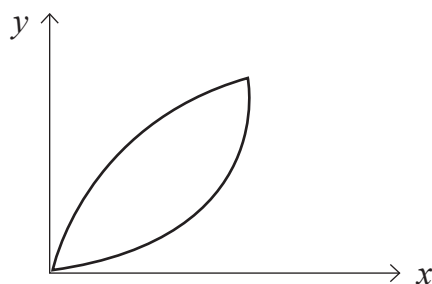


Fig. 2

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(b) Integrate

$$4\operatorname{cosec}^2 x + \frac{2x}{x^2 - 3} - e^x$$

[3]

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For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	

<b>Total Marks</b>	
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Examiner Number

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