



Rewarding Learning

ADVANCED
General Certificate of Education
2017

Centre Number

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Candidate Number

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Mathematics

Assessment Unit C3

assessing

Module C3:

Core Mathematics 3



[AMC31]

AMC31

THURSDAY 1 JUNE, AFTERNOON

TIME

1 hour 30 minutes.

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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- 1 The tray on a child's high chair can be modelled as the area between the curves

$$y = 20 \cos x$$

and $y = 4 \cos x$

from $x = \frac{-\pi}{2}$ to $x = \frac{\pi}{2}$

Find the area of the tray.

[5]

[illegible]

Handwriting practice lines consisting of a solid top line, a dashed middle line, and a solid bottom line. There are 20 rows of these lines for practice.

[Turn over]

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24AMC3103

- 2 The speed, $y \text{ ms}^{-1}$, of an accelerating car is recorded every second, x , for six seconds.

Time x	0	1	2	3	4	5	6
Speed y	0	5.3	8.1	10.3	11.9	13.0	14.1

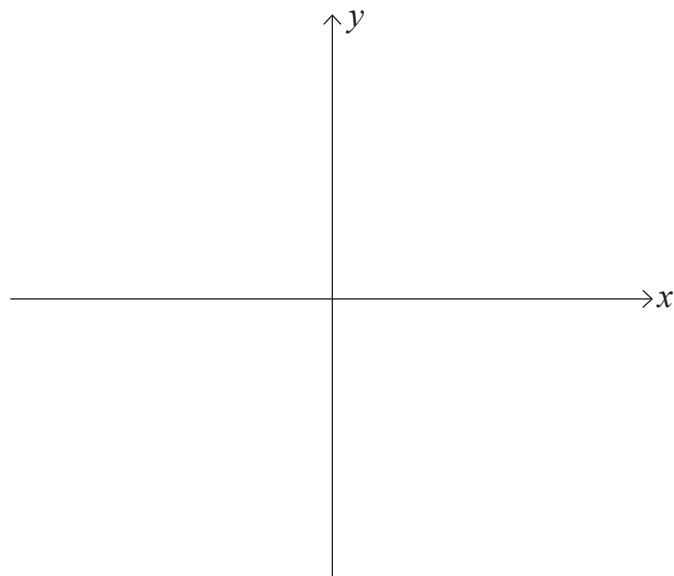
Use Simpson's rule to estimate the distance the car travels during the six seconds. [4]

[illegible]

3 The function $f(x)$ is defined as

$$f(x) = |2x - 1|$$

(i) On the axes below sketch the graph of $y = f(x)$. [2]



(ii) Describe fully the two successive transformations that will map $y = f(x)$ onto

$$y = 3 - f(x) \quad [4]$$

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[Turn over]



- 4 (a)** Eliminate θ from the following pair of equations

$$x = 3 \tan \theta \quad y = 2 \sec \theta \quad [4]$$

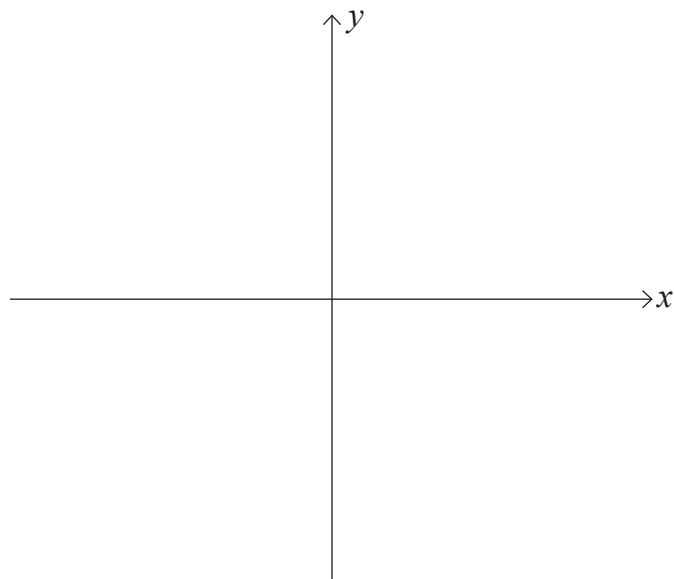
$$\frac{\operatorname{cosec} \theta}{\operatorname{cosec} \theta - \sin \theta} \equiv \sec^2 \theta \quad [5]$$

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- 5 (i) Sketch on the axes below the curve $y = \ln x$ and the straight line $y = 5 - x$ [2]



- (ii) State why the equation

$$5 - x = \ln x$$

has only 1 root.

[1]

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- (iii) Show that this root lies between 3.6 and 3.7

[3]

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[4]

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6 Find the turning point on the curve

$$y = e^{2x} - 5e^x$$

and state if it is a maximum or a minimum.

[9]

This image shows a full page of white paper with horizontal dotted lines, typical of notebook paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings present.

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Handwriting practice area with 20 sets of three horizontal lines (top, middle, bottom) for writing practice.

[Turn over]

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24AMC3111

7 (i) Write in partial fractions

$$\frac{6x^2}{(1-x)(1+2x)}$$

[8]

[illegible]

This image shows a full page of a document template designed for handwriting practice or general note-taking. It consists of approximately 28 evenly spaced horizontal dotted lines across the entire width of the page. There are no margins, headers, footers, or other markings present.

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24AMC3113

(ii) Hence find, in ascending powers of x , the binomial expansion of

$$\frac{6x^2}{(1-x)(1+2x)}$$

as far as the term in x^3

[8]

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

[illegible]

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24AMC3115

[5]

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24AMC3117

[5]



24AMC3118

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24AMC3119

(b) Find

$$\int \frac{2x^2}{x^3 - 1} + \operatorname{cosec}^2(3 - 7x) + \frac{x+1}{x^2} dx \quad [6]$$

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THIS IS THE END OF THE QUESTION PAPER

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

Total Marks	
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Examiner Number

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