



Rewarding Learning

ADVANCED
General Certificate of Education
2017

Centre Number

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Candidate Number

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Mathematics

Assessment Unit C4

assessing

Module C4:

Core Mathematics 4



[AMC41]

AMC41

WEDNESDAY 7 JUNE, MORNING

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 $\ln z \equiv \log_e z$

10346



1 (i) Write

$$12 \cos \theta + 5 \sin \theta$$

in the form $R \cos(\theta - \alpha)$, where R is a positive integer and $0 < \alpha < \frac{\pi}{2}$ [3]

[illegible]

$$d = 12 \cos t + 5 \sin t + 20$$

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

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2 The functions f and g are defined as:

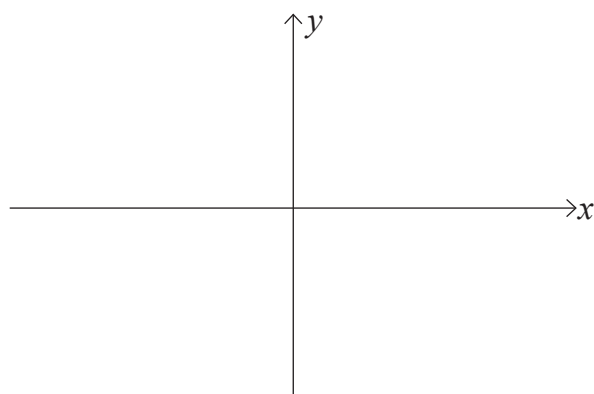
$$f(x) = 2x^2 - 4 \quad x > 0$$

$$g(x) = \sec x \qquad -\frac{\pi}{2} < x < \frac{\pi}{2}$$

(i) Find the inverse function $f^{-1}(x)$ and state its domain. [4]

[illegible]

[2]



[1]

.....

.....

[2]

[illegible]

[Turn over

3 The points A, B and C have position vectors

$$\overrightarrow{OA} = \begin{pmatrix} 2 \\ 1 \\ 3 \end{pmatrix} \quad \overrightarrow{OB} = \begin{pmatrix} 4 \\ -2 \\ 5 \end{pmatrix} \quad \overrightarrow{OC} = \begin{pmatrix} -3 \\ 2 \\ 7 \end{pmatrix}$$

(i) Find \vec{BA}

[2]

[illegible]

[5]

[Turn over

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20AMC4107

- (i) Model this by a differential equation.

[2]

[illegible]

(ii) Find the value of the car after 5 years.

[9]

[illegible]

Handwriting practice lines consisting of 20 sets of three horizontal dotted lines for writing practice.

[Turn over

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5 Fig. 1 below shows a sketch of part of the curve $y = x^2 \ln 3x$

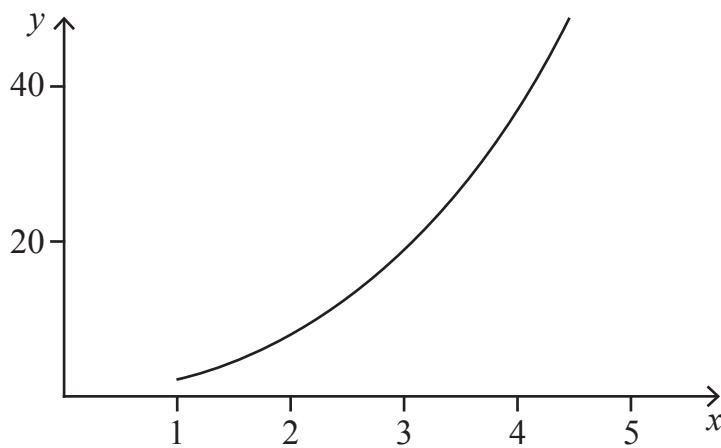


Fig. 1

A sail for a boat can be modelled by the area between the curve $y = x^2 \ln 3x$, the x -axis and the lines $x = 1$ and $x = 4$

Find the area of the sail.

[8]

[illegible]

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20AMC4111

6 A curve is defined by the parametric equations

$$x = 2 + 3 \sin \theta \quad \text{and} \quad y = \sin \theta - \cos \theta$$

(i) Find $\frac{dy}{dx}$ in terms of θ .

[4]

This image shows a full page of a document template designed for handwritten notes or answers. It consists of approximately 28 horizontal rows, each defined by two parallel dotted lines. The margins are consistent throughout, providing ample space for writing. There is no pre-printed text or other graphical elements on the page.

[4]

This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the page.

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[4]

Handwriting practice lines consisting of 20 sets of three horizontal dotted lines.

[Turn over]

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20AMC4115

7 (a) Solve

$$\sin \left(x - \frac{\pi}{3} \right) = \sqrt{3} \sin x$$

for $-\pi \leq x \leq \pi$

[5]

This image shows a single sheet of white paper with horizontal 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.

[6]

[illegible]

10346



8 Use the substitution $u = \sin x$ to find

$$\int \frac{3 \cos x \sin^2 x}{4 - \sin^2 x} dx \quad [12]$$

THIS IS THE END OF THE QUESTION PAPER



20AMC4119

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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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