



Rewarding Learning

ADVANCED  
General Certificate of Education  
2019

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 5 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  $\ln z \equiv \log_e z$

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\*24AMC4101\*

1 The functions  $f$  and  $g$  are defined by:

$$f(x) = x^2$$
$$g(x) = x + 2$$

(i) Find the composite function  $fg(x)$ . [2]

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(ii) Find the composite function  $gf(x)$ . [1]

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(iii) Hence find the value of  $x$  for which  $fg(x) = gf(x)$ .

[2]

A series of 22 horizontal dotted lines provided for the student to write their answer to the question.



2 Fig. 1 below shows part of the curve

$$y = 6 - 2\sqrt{x}$$

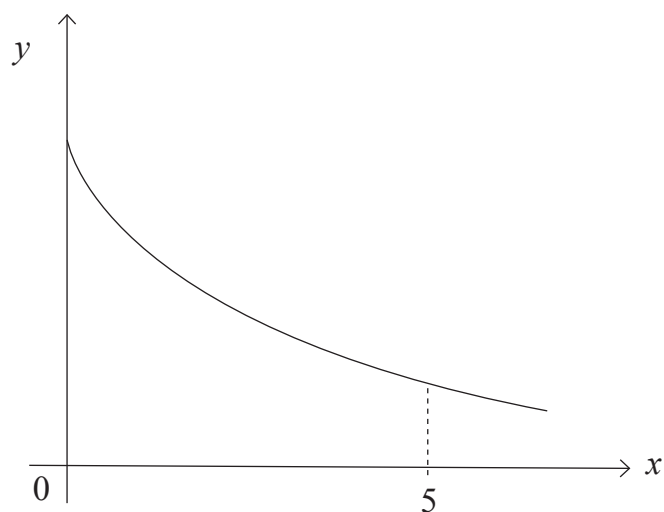


Fig. 1

A plastic funnel can be modelled by rotating this curve between  $x = 0$  and  $x = 5$  through  $360^\circ$  about the  $x$ -axis.

Find the volume that the funnel can hold.

[6]

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Handwriting practice area with 20 horizontal dotted lines.





(ii) Find a vector equation of the line AB.

[4]

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[Turn over













5 (i) Using partial fractions, show that

$$\frac{1}{(2x+1)(x+1)} = \frac{2}{2x+1} - \frac{1}{x+1} \quad [4]$$

A series of horizontal dotted lines provided for the student to write their solution.









Handwriting practice area with 20 horizontal dotted lines.









7 Solve the equation

$$7\sin \theta + 24\cos \theta = 8 \quad \text{where } 0^\circ \leq \theta \leq 360^\circ \quad [7]$$

A series of horizontal dotted lines provided for writing the solution to the equation.





Handwriting practice area with 20 horizontal dotted lines.



8 The metal blade of a scalpel can be modelled as the area enclosed by the curve

$$y = (\sin x - 2\cos x)^2$$

the  $x$  and  $y$ -axes and the line  $x = \frac{\pi}{4}$ , as shown in **Fig. 2** below.

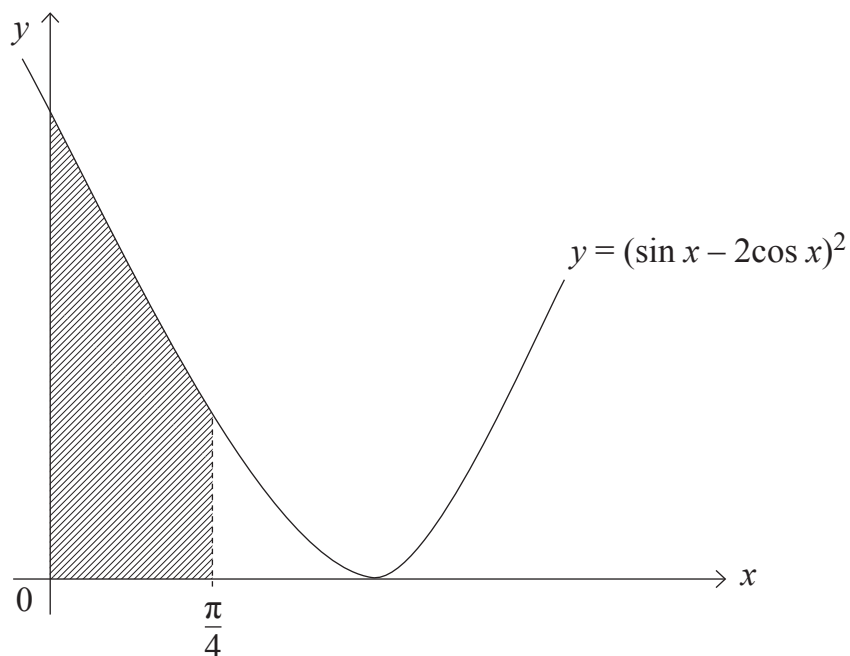


Fig. 2

Find the **exact** area of one face of the blade.

[10]

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Handwriting practice area with 20 horizontal dotted lines.







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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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