



Rewarding Learning

ADVANCED
General Certificate of Education
2019

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 30 MAY, 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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20AMC3101

- 1 An engineer wishes to know roughly how much water is in a drainage channel. **Fig. 1** below shows the cross section of the channel.

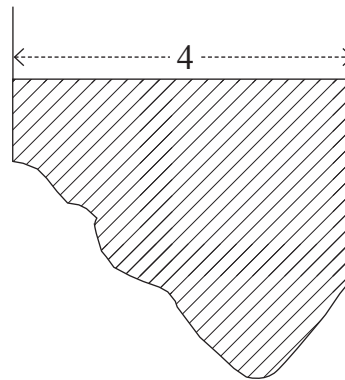


Fig. 1

The drainage channel is straight.

It is 4 m wide and 500 m long.

The depth d metres at a distance s metres from one bank is shown in the table below.

s	0	1	2	3	4
d	1.6	2.4	3.8	5.0	3.7

Use Simpson's Rule to find an approximate area of the cross section and hence the approximate volume of water in the drainage channel.

[You may assume that the cross section's area is constant.]

[5]

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Handwriting practice area with 20 horizontal dotted lines.

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[Turn over



20AMC3103

(b) Simplify

$$\frac{x^2 - 9}{4x^2 - 16x - 20} \div \frac{2x^2 + 7x + 3}{4x - 20} \quad [5]$$

Dotted lines for working out the solution.

[Turn over



4 (a) The graph of the function $y = f(x)$ is sketched in **Fig. 2** below.

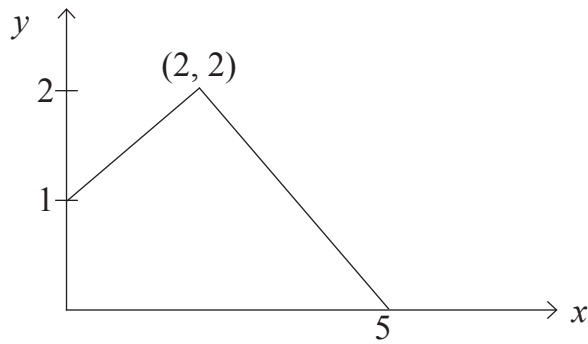
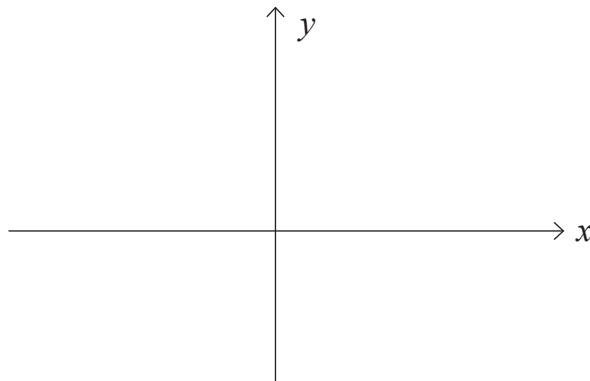


Fig. 2

On the axes below, sketch the graphs of

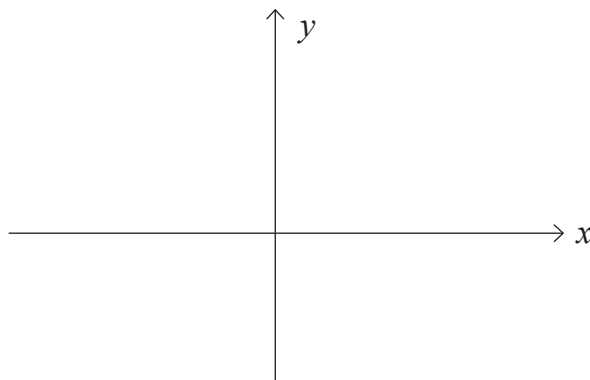
(i) $y = 4 + f(-x)$

[2]



(ii) $y = 3f(x - 1)$

[2]



[Turn over





Handwriting practice area with 20 sets of horizontal dotted lines for writing.



(b) Solve

$$2\sec^2 \theta - 5\tan \theta = 0$$

for $0 \leq \theta \leq \pi$

[4]

Area with horizontal dotted lines for writing the solution.

[Turn over



6 (a) A curve is defined by the parametric equations

$$x = \cot \theta - 2 \qquad y = 6 \sin \theta + 1$$

(i) Find the Cartesian equation of this curve. [5]

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(ii) State the equation of the asymptote to this curve. [1]

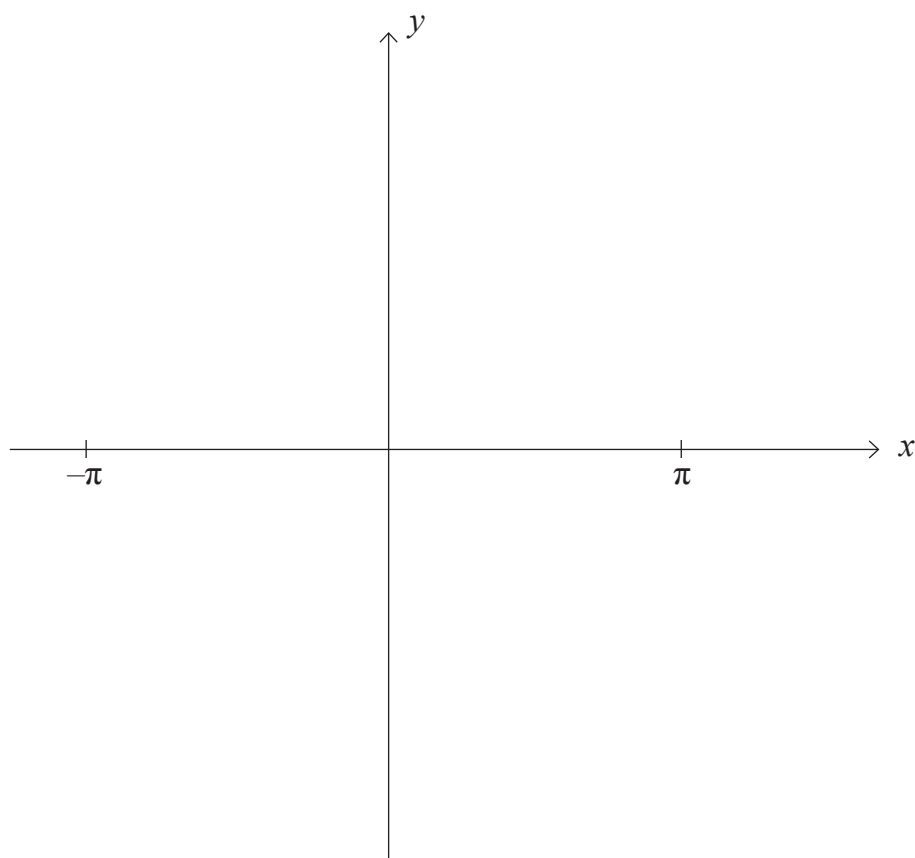
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(b) On the axes below, sketch the graph of $y = \operatorname{cosec} x$ for $-\pi \leq x \leq \pi$ [2]



[Turn over



7 (a) (i) Differentiate $5x \sec x$

[3]

A series of horizontal dotted lines provided for writing the answer.



- (b) The entrance to a ghost train ride at an amusement park can be modelled as part of the area bounded by the curve

$$y = 2\sin 6x$$

and the x -axis, as shown in **Fig. 3** below.

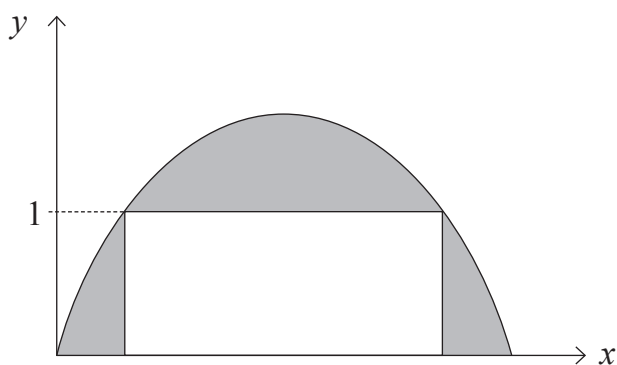


Fig. 3

The shaded area is to be painted.

Find this area.

[9]

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Lined writing area with 26 horizontal dotted lines for student answers.

THIS IS THE END OF THE QUESTION PAPER



DO NOT WRITE ON THIS PAGE

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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