



Rewarding Learning

ADVANCED
General Certificate of Education
2023

Centre Number

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Candidate Number

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Mathematics

Assessment Unit A2 1

assessing

Pure Mathematics



[AMT11]

AMT11

TUESDAY 6 JUNE, AFTERNOON

TIME

2 hours 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 eleven** questions in the spaces provided.

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

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

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

Show clearly the full development of your answers. **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 150

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 $\ln z \equiv \log_e z$

13356

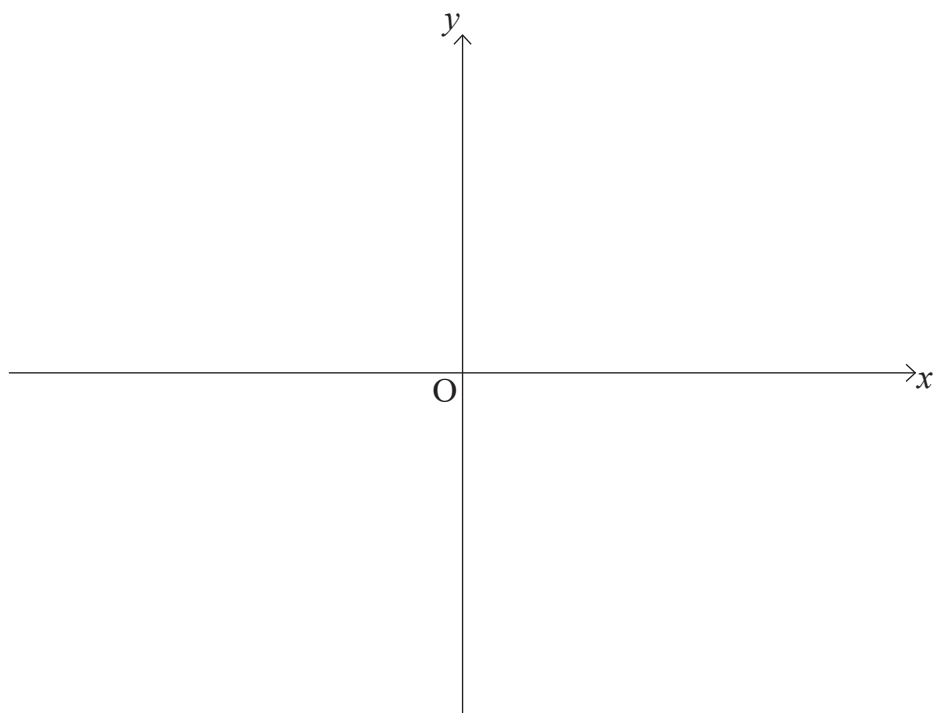


36AMT1101

4 The function $f(x) = \sin^{-1} x$

(i) Sketch the graph of $y = f(x)$

[3]



(ii) State clearly the domain and range for this function.

[2]

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36AMT1115



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36AMT1123



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36AMT1125



A large rectangular area containing 25 horizontal dotted lines for writing, enclosed in a black border.

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36AMT1127

10 A cylindrical water tank is leaking water. A student believes that the rate of change of depth, D metres, of water in the tank is proportional to the square of the depth at time t minutes.

(i) Using this model, form a differential equation. [2]

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The initial depth of water in the tank was 3 m and after 4 minutes the depth of water in the tank had reduced to 1.2 m.

(ii) By solving the differential equation, find the time it will take for the depth of water in the tank to drop to 0.5 m. [10]

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36AMT1131



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36AMT1133

(b) The graphs of the functions

$$f(x) = x \ln x$$

and

$$g(x) = x + 1$$

are shown in **Fig. 3** below.

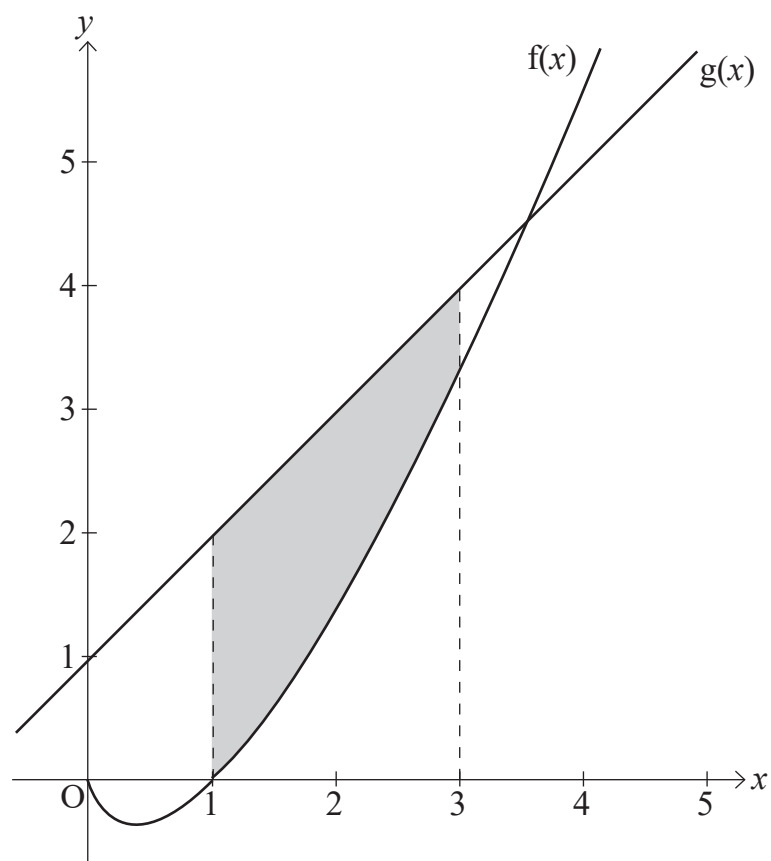


Fig. 3

Find the exact value of the shaded area.

[11]

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36AMT1135

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For Examiner's use only	
Question Number	Marks
1	
2	
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11	

Total Marks	
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Examiner Number

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