



Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2022

Centre Number

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Candidate Number

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Mathematics

Assessment Unit AS 1

assessing

Pure Mathematics



SMT11

[SMT11]

THURSDAY 19 MAY, AFTERNOON

TIME

1 hour 45 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 nine** 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 HB 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 100.

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 $\ln z \equiv \log_e z$

12955.05 R



28SMT1101

1 Solve the simultaneous equations

$$x + 3y = 10$$

$$2x - y + 4z = 2$$

$$3x + 2y - 3z = 19$$

[6]

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.



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

12955.05 R

[Turn over



28SMT1103

2 (a) (i) Write $2x^2 + 4x - 5$ in the form $2[(x + p)^2 - q]$ [2]

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(ii) Hence state the minimum value of $2x^2 + 4x - 5$ and the value of x at which it occurs. [2]

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[illegible]

$$N = 500e^{2t}$$

- (i) Find the initial value of N . [1]

[illegible]

- (ii) Find, in whole minutes, the time for N to increase by 48% [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.

[Turn over

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28SMT1105

(b) Show that

$$\frac{\tan x \cos x}{(1 - \cos^2 x)^{\frac{1}{2}}} \equiv 1$$

[4]

[Turn over

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28SMT1107

[7]

[Turn over



28SMT1109

5 (a) Integrate $5x^4 + \frac{1}{2x^3} - \frac{4}{\sqrt{x}}$

$$5x^4 + \frac{1}{2x^3} - \frac{4}{\sqrt{x}}$$

[4]

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28SMT1110

(b) Given that

$$\int_{-1}^2 (x^2 - px + 3) dx = 8$$

find the value of p .

[6]

[Turn over

12955.05 R



28SMT1111

6 $f(x) = qx^3 - 7x^2 + r$ where q and r are constants.

$f(x)$ has a factor $(x + 1)$

When $f(x)$ is divided by $(2x + 1)$ the remainder is 7

(i) Find the values of q and r .

[7]

[illegible]

[3]

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28SMT1115

[illegible]

[5]

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28SMT1117

12955.05 R



28SMT1119



[8]

[illegible]

12955.05 R

[Turn over



28SMT1121



[7]

This image shows a full page of white paper with horizontal dashed lines, typical of primary school writing paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



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

[Turn over]

12955.05 R



28SMT1123

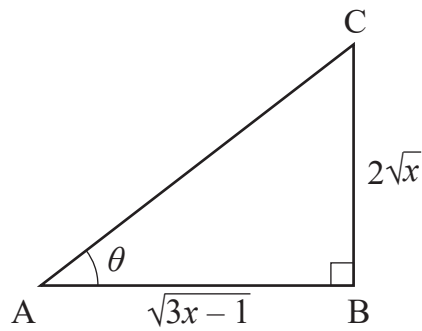


Fig. 3

AB has length $\sqrt{3x-1}$

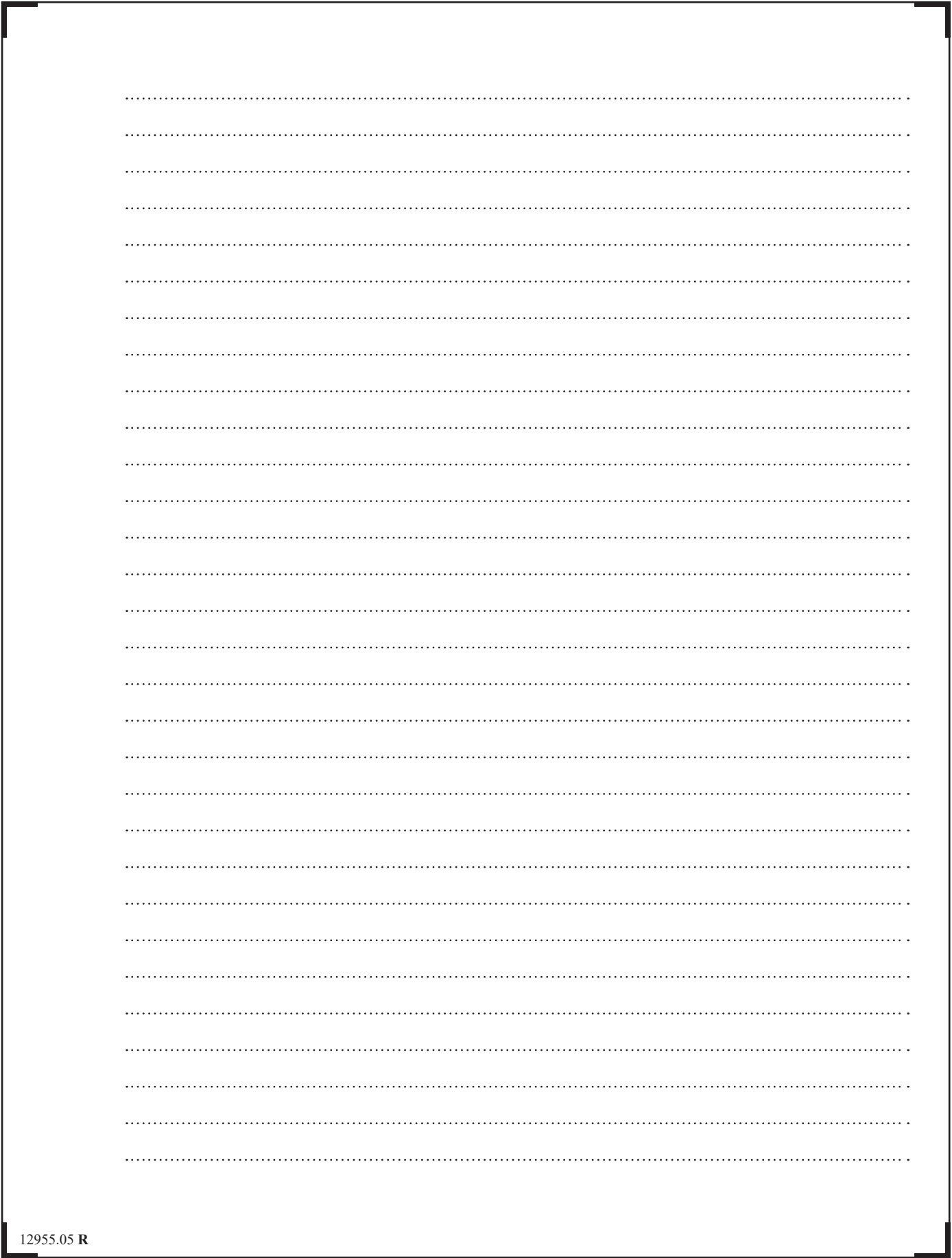
BC has length $2\sqrt{x}$

$$\mathbf{B}^{\mathbf{A}}\mathbf{C} = \theta$$

Given that $\cos^2 \theta = \frac{1}{x}$, find the value of x .

[8]

[illegible]



28SMT1125

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28SMT1126



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28SMT1127

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For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	

Total Marks	
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Examiner Number

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