



Rewarding Learning

ADVANCED SUBSIDIARY (AS)  
General Certificate of Education  
2025

Centre Number

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Candidate Number

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# Further Mathematics

Assessment Unit AS 1

*assessing*

Pure Mathematics



[SFM11]

\*SFM11\*

**MONDAY 12 MAY, AFTERNOON**

## 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 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 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  $\ln z \equiv \log_e z$

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\*24SFM1101\*

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\*24SFM1102\*





- 2 A metal ingot has three parallel edges, AC, BE and DF, joining two parallel congruent triangular faces, ABD and CEF, as shown in Fig. 1 below.

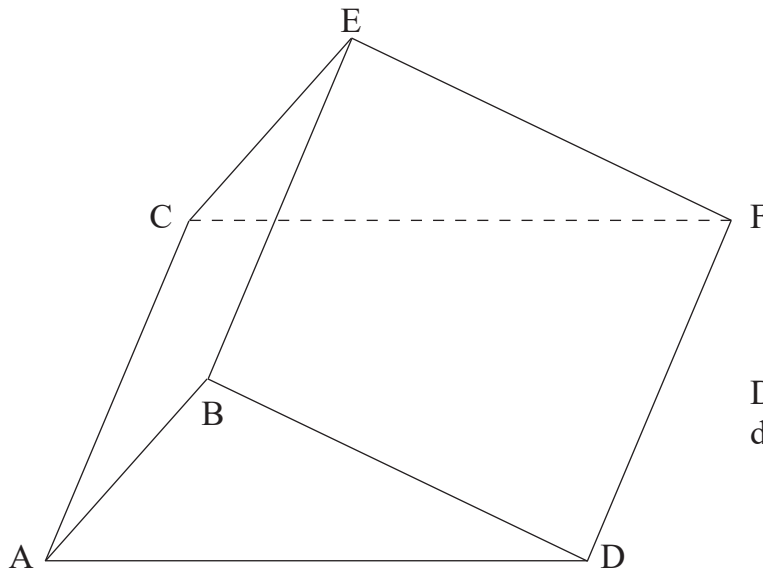


Diagram not drawn to scale

Fig. 1

A, B, C and D are points with coordinates  $(-1, 2, 3)$ ,  $(3, 5, 6)$ ,  $(2, 7, 10)$  and  $(13, 12, 2)$  respectively.

Using a scalar triple product, find the volume of the ingot.

[7]

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Handwriting practice area with 24 sets of horizontal lines. Each set consists of a solid top line, a dashed middle line, and a solid bottom line.

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[Turn over



\*24SFM1105\*





4 (a) The complex numbers  $z$  and  $w$  are given by

$$z = 3 + 3\sqrt{3}i \quad \text{and} \quad w = 1 - \sqrt{3}i$$

(i) Find  $|zw|$  [3]

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(ii) Write  $z^*$  in modulus-argument form. [4]

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**(Questions continue overleaf)**

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**\*24SFM1109\***

(b) In the space below, sketch on the same clearly labelled Argand diagram the following loci:

(i) the locus of the points representing complex numbers  $z$  which satisfy

$$|z - 1 + i| = |z - 5 - 3i| \quad [3]$$

(ii) the locus of the points representing complex numbers  $z$  which satisfy

$$\arg(z + 1 - i) = \frac{\pi}{4} \quad [3]$$

















7 The lines  $L_1$  and  $L_2$  are defined by

$$L_1: \frac{x-3}{-2} = \frac{y-2}{-3} = \frac{z-1}{1} \quad \text{and} \quad L_2: \frac{x-2}{3} = \frac{y+2}{2} = \frac{z+2}{-5}$$

(i) Write the equations of the lines  $L_1$  and  $L_2$  in vector form. [2]

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(ii) Show that  $L_1$  and  $L_2$  intersect and find their point of intersection. [7]

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











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A large rectangular area with a black border, containing 24 horizontal dotted lines for writing.



\*24SFM1123\*

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**THIS IS THE END OF THE QUESTION PAPER**

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**DO NOT WRITE ON THIS PAGE**

<b>For Examiner's use only</b>	
<b>Question Number</b>	<b>Marks</b>
1	
2	
3	
4	
5	
6	
7	
8	

<b>Total Marks</b>	
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Examiner Number

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