



Rewarding Learning

ADVANCED SUBSIDIARY (AS)  
General Certificate of Education  
2025

Centre Number

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Candidate Number

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# Mathematics

Assessment Unit AS 1

*assessing*

Pure Mathematics



[SMT11]

\*SMT11\*

THURSDAY 15 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  $\ln z \equiv \log_e z$

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\*24SMT1101\*

**1** Solve the simultaneous equations

$$4x + 3y - z = 18$$

$$5x - 2y + z = 3$$

$$7x - 4y - 3z = 5$$

[7]

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**\*24SMT1102\***

**[Turn over**

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\*24SMT1103\*

2 Fig. 1 below shows a sketch of the graph of the function  $y = f(x)$

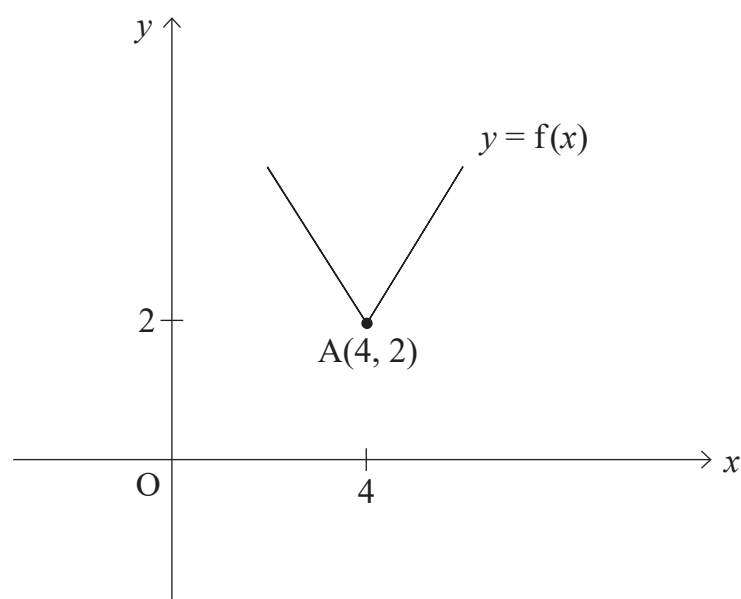


Fig. 1

Point A has coordinates (4, 2).

Sketch, on the axes opposite, the graphs of:

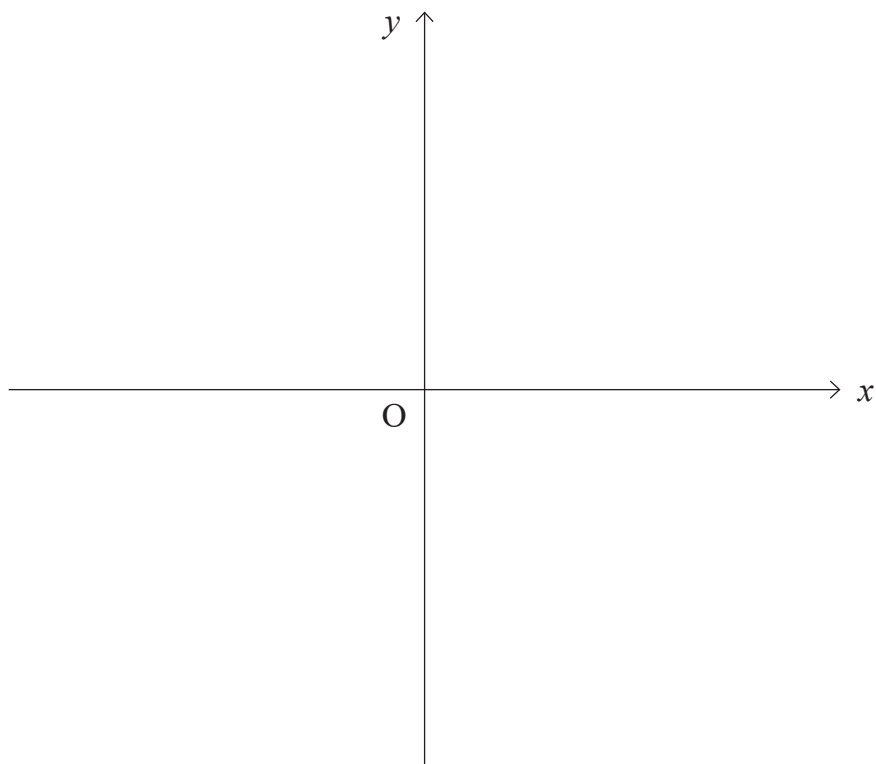
(i)  $y = f(x - 2)$  [2]

(ii)  $y = f(-x)$  [2]

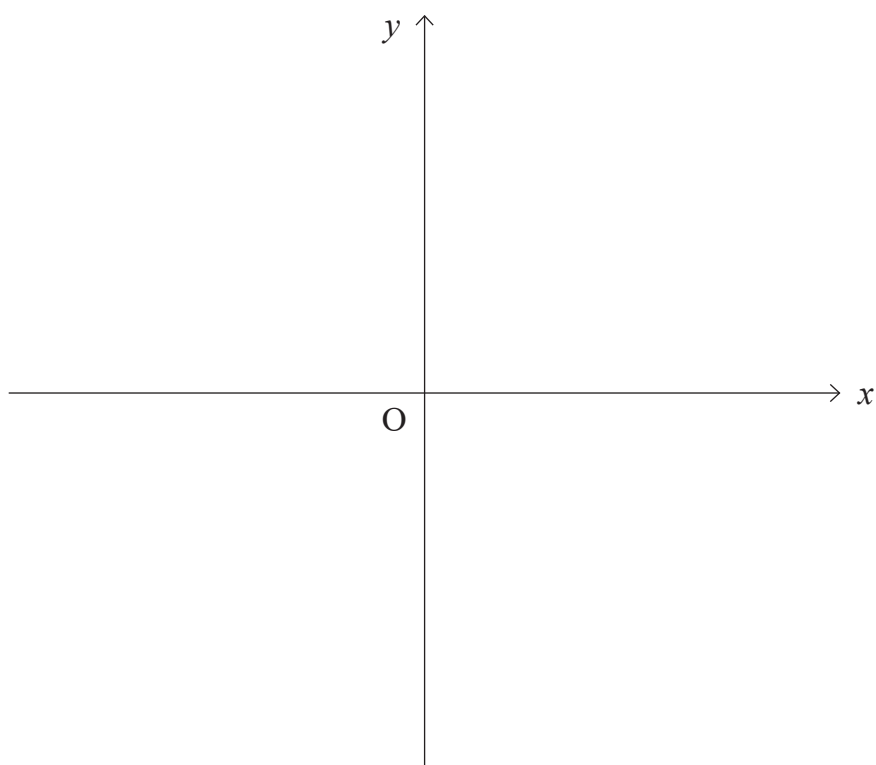
clearly labelling the image of the point A in each case.



(i)



(ii)



- 3 (a)** Find the equation of the normal to the curve given by the equation

$$y = 2x^3 + 6x^2 - 5x - 12$$

at the point where  $x = -2$

Leave your answer in the form  $ax + by + c = 0$  where  $a$ ,  $b$  and  $c$  are integers to be found.

[7]

[illegible]

[illegible]

[6]

[illegible]

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**\*24SMT1109\***

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\*24SMT1110\*

[illegible]

[illegible]

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\*24SMT1111\*

**5 (i)** Prove that

$$\log_a x + \log_a y = \log_a xy$$

[6]

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\*24SMT1112\*

[illegible]

[6]

**[Turn over**

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\*24SMT1113\*

**6 (a) Expand**

$$(1 - 2x) (2 + x)^8$$

in ascending powers of  $x$  up to and including the term in  $x^3$

[7]

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**\*24SMT1114\***

**(b)** Show that

$$\tan x \equiv \frac{\sin x}{1 - \frac{\sin^2 x}{1 + \cos x}} \quad [7]$$

**[Turn over**



7 **Fig. 3** below shows a solid prism.

Its cross-section is formed by joining an isosceles triangle to a rectangle.

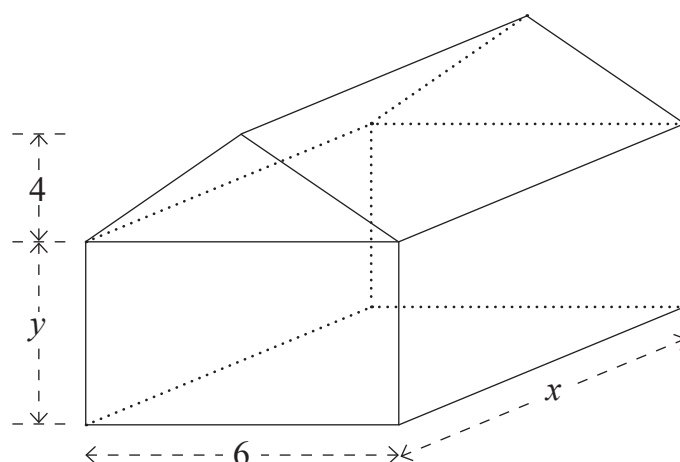


**Fig. 3**

The rectangle has width 6 metres and height  $y$  metres.  
The isosceles triangle has perpendicular height 4 metres.

The prism has length  $x$  metres and volume  $120\text{ m}^3$

(i) Show that

$$y = \frac{20}{x} - 2 \quad [4]$$

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**(iii)** Hence find the value of  $x$  for which  $S$  is a minimum.

[7]

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**[Turn over**

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**\*24SMT1119\***

8 Fig. 4 below shows a sketch of the graphs of a curve and a straight line.

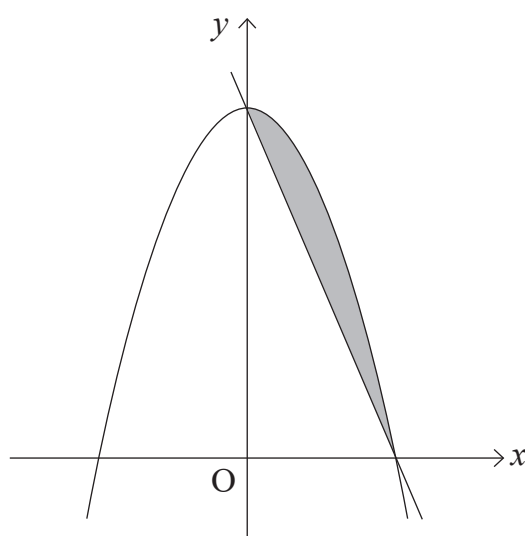


Fig. 4

The curve is given by the equation  $y = a^2 - x^2$  where  $a$  is a positive constant.

The curve and the straight line meet at the  $x$  and  $y$  axes.

Find, in terms of  $a$ , the area of the shaded region which is enclosed between the curve and the line.

[10]

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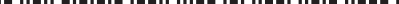
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\*24SMT1121\*



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



\*24SMT1123\*

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| For Examiner's use only |       |
|-------------------------|-------|
| Question Number         | Marks |
| 1                       |       |
| 2                       |       |
| 3                       |       |
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| Total Marks |  |
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Examiner Number

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