

New
Specification



Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education

Centre Number

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Candidate Number

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Mathematics

Assessment Unit AS 1

assessing

Pure Mathematics



[SMT11]

SMT11

Assessment

Assessment Level of Control:

Tick the relevant box (✓)

Controlled Conditions	
Other	

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

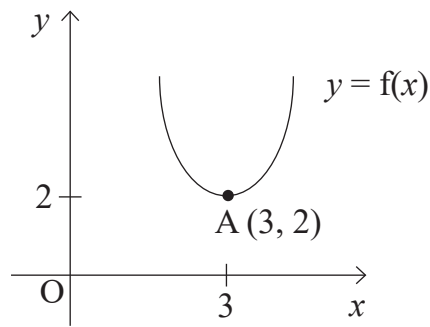


Fig. 1

Point A has coordinates (3, 2).

Sketch, on the axes opposite, the graphs of:

(i) $y = f(x) - 1$

[2]

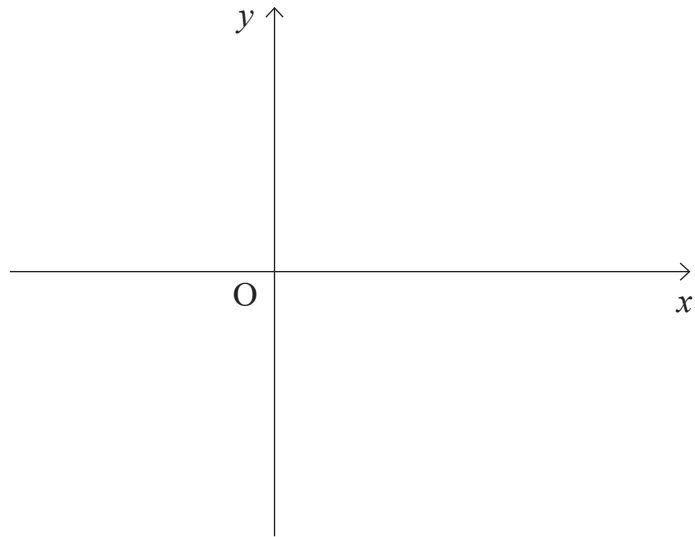
(ii) $y = f\left(\frac{x}{2}\right)$

[2]

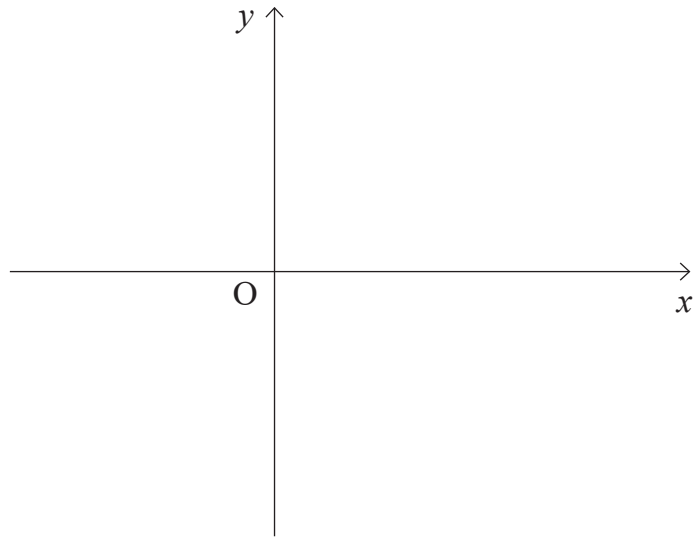
clearly labelling the image of the point A in each case.



(i)



(ii)



2 (a) The vectors \mathbf{a} , \mathbf{b} and \mathbf{c} are given by:

$$\mathbf{a} = 4\mathbf{i} + 3\mathbf{j}$$

$$\mathbf{b} = 6\mathbf{i} - \mathbf{j}$$

$$\mathbf{c} = x\mathbf{i} + 2\mathbf{j}$$

(i) Find $2\mathbf{a} - \mathbf{b}$ [2]

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(ii) If $|\mathbf{c}| = 6$, find the possible values of x . [4]

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4 Fig. 2 below shows a sketch of a curve.

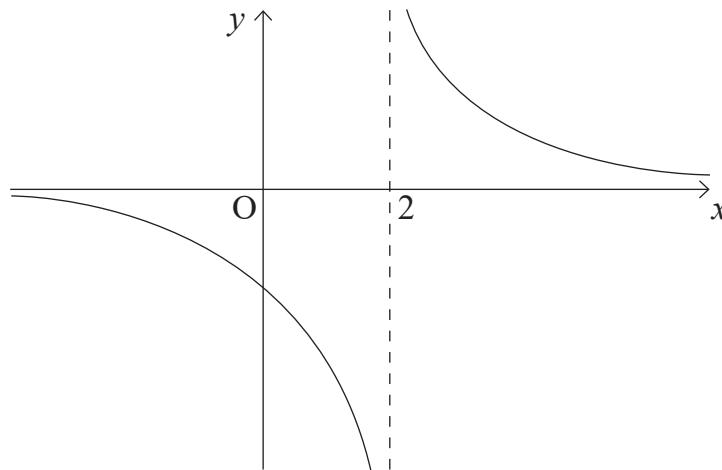


Fig. 2

The curve has equation $y = \frac{q}{x-p}$ where p and q are integers.

The curve has a horizontal asymptote with equation $y = 0$

The curve has a vertical asymptote with equation $x = 2$

(i) State the value of p .

[1]

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The curve passes through the point $(-1, -2)$.

(ii) Find the value of q . [3]

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(iii) Hence find the coordinates of the point where the curve cuts the y -axis. [2]

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5 Fig. 3 below shows a sketch of a curve and a straight line.

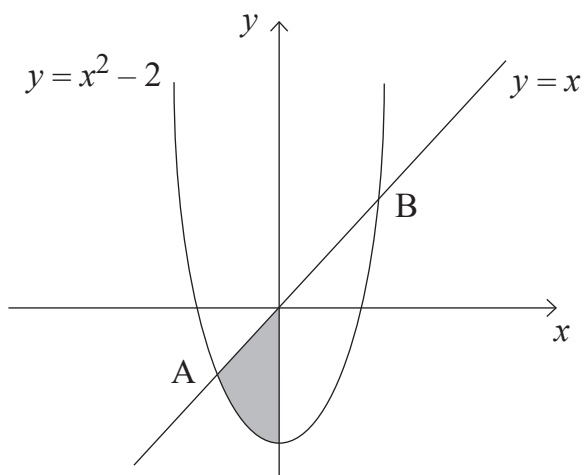


Fig. 3

The curve has equation $y = x^2 - 2$

The line has equation $y = x$

The curve and line intersect at the points A and B.

(i) Find the coordinates of A and B.

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(b) Fig. 4 below shows a triangle ABC.

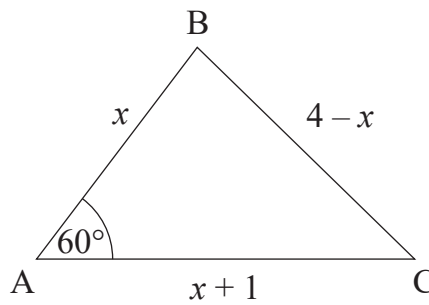


Fig. 4

$$AB = x$$

$$BC = 4 - x$$

$$AC = x + 1$$

$$\hat{BAC} = 60^\circ$$

(i) Show that $x = \frac{5}{3}$ [3]

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(ii) Hence find the area of triangle ABC. [3]

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(b) Fig. 5 below shows a sketch of plans for a display area in a garden centre.

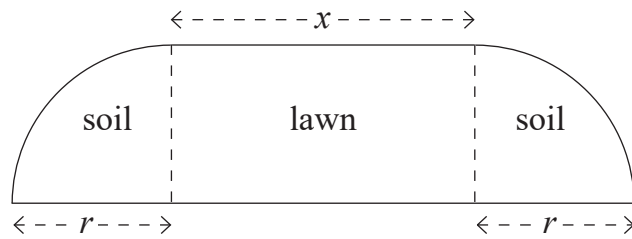


Fig. 5

The display area has a rectangular lawn with two quarter circles of soil, one on either side.

The lawn has a length of x metres.
Each patch of soil has a radius of r metres.

The perimeter of the display is 32 m.

(i) Express x in terms of r . [4]

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Handwriting practice area with 24 horizontal dotted lines.

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[Turn over



24SMT1119



Handwriting practice area with 20 horizontal dotted lines.

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[Turn over



24SMT1121

10 Solve $(2 - e^x)(4 - e^x) < 1$

[8]

A series of horizontal dotted lines for writing the solution.

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DO NOT WRITE ON THIS PAGE

For Examiner's use only	
Question Number	Marks
1	
2	
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9	
10	

Total Marks	
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Examiner Number

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