

Mathematics

Assessment Unit AS 1 assessing **Pure Mathematics**

SMT11

Centre Number

[SMT11]

Assessment

Assessment Level of Control:

TIME 1 hour 45 minutes.

Other

Tick the relevant box (✓) **Controlled Conditions**

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 $\ln z \equiv \log_{e} z$ 12365

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

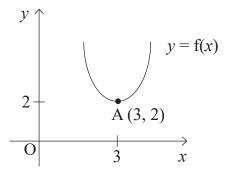


Fig. 1

Point A has coordinates (3, 2).

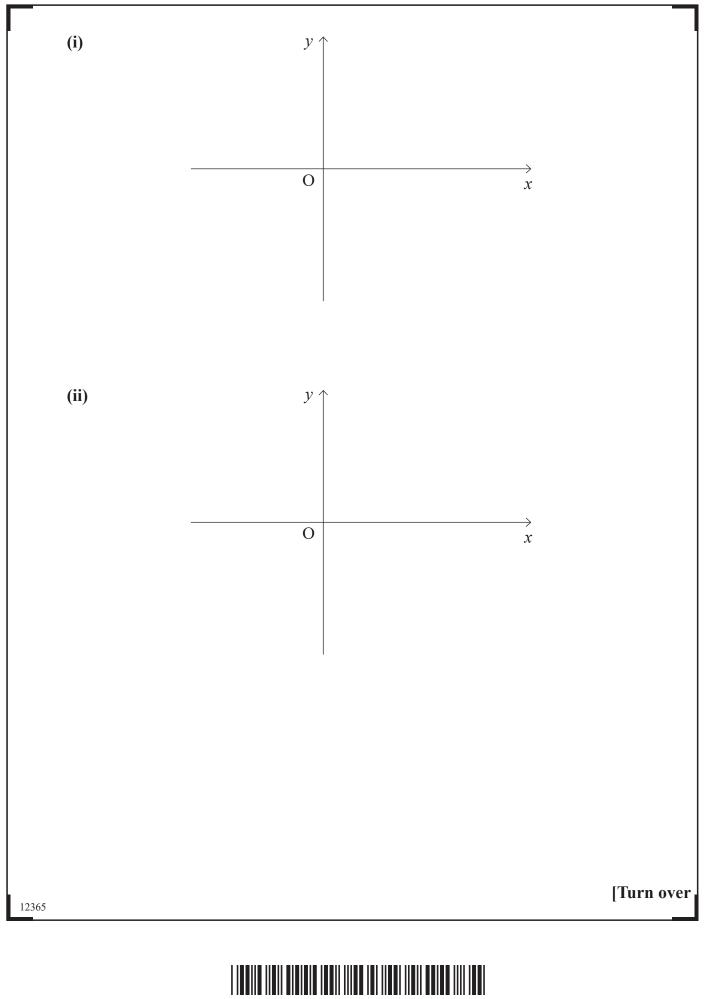
Sketch, on the axes opposite, the graphs of:

(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.



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2 (a) Th	ne vectors a , b and c are given by:
	a = 4i + 3j b = 6i - j c = xi + 2j
(i)	Find 2 a – b [2]
(ii) If $ \mathbf{c} = 6$, find the possible values of <i>x</i> . [4]
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f(x) has a factor $(x-k)$			
Find the possible values of <i>k</i> . [6]			
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	y - 3x - 2 = 0	
	$y - 3x - 2 = 0$ $x^2 + 2y = 20$	[7
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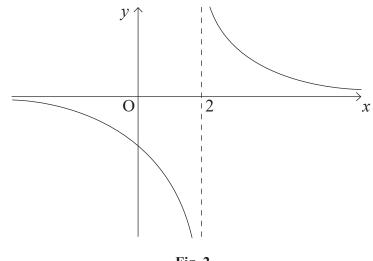
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[1]

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





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*.

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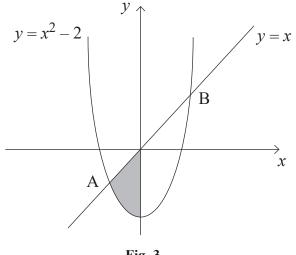
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)	Find the value of q . [3]
)	Hence find the coordinates of the point where the curve cuts the <i>y</i> -axis.
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Fig. 3 below shows a sketch of a curve and a straight line. 5





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.

[4]

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	traight line, the curve and the y-axis.	[6]
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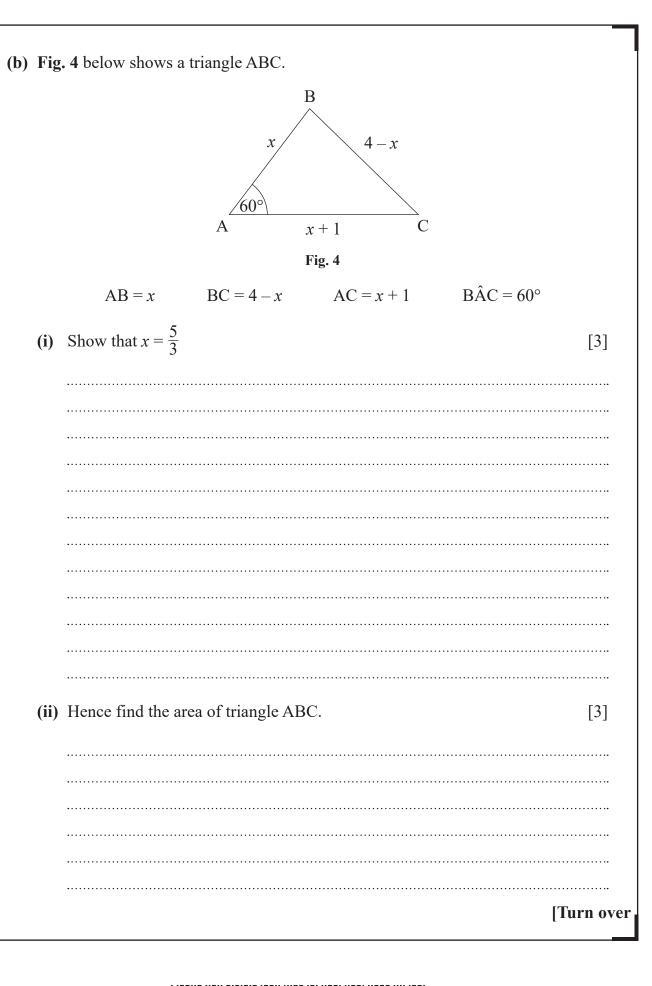
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6 (a)	Solve	$\sqrt{3}\sin 2x = \cos 2x$	$0^\circ \le x \le 360^\circ$	[6]
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7 (a)	Differentiate $\frac{x}{5} + \frac{3}{x^2} - \frac{1}{4\sqrt{x}}$	[3]
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(b) Fig. 5 below shows a sketch of plans for a display area in a garden centre.

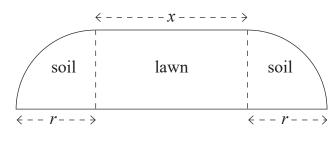


Fig. 5

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.

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$A = 16r - r^2 - \frac{1}{2}\pi r^2$	

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	$x^2 + y^2 - 2x - 6y - 3 = 0$ at the point (4, 5).		
	Leave your answer in the form $ax + by + c = 0$, where a, b and c are integers. [9]		
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9 Given that

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 $(1-x)(1+ax)^n \equiv 1+23x+228\ x^2+\dots$

find the values of <i>a</i> and <i>n</i> .	[10]

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Solve	$(2-e^x)(4-e^x) < 1$	[{
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For Examiner's use only	
Question Number	Marks
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