

Surname	Centre Number	Candidate Number
First name(s)		2



GCE AS/A LEVEL

2300U10-1



WEDNESDAY, 14 MAY 2025 – MORNING

**MATHEMATICS – AS unit 1
PURE MATHEMATICS A**

2 hours 30 minutes

ADDITIONAL MATERIALS

In addition to this examination paper, you will need:

- a Formula Booklet;
- a calculator.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet. If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

The maximum mark for this paper is 120.

The number of marks is given in brackets at the end of each question or part-question.

Sufficient working must be shown to demonstrate the **mathematical** method employed.

Answers without working may not gain full credit.

Unless the degree of accuracy is stated in the question, answers should be rounded appropriately.

You are reminded of the necessity for good English and orderly presentation in your answers.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	5	
2	11	
3	6	
4	10	
5	6	
6	16	
7	6	
8	10	
9	5	
10	6	
11	9	
12	4	
13	4	
14	4	
15	11	
16	7	
Total	120	



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03

1. Solve the inequality $(x-1)(x+6) < 9-2x-x^2$. [5]



2. The line L_1 passes through the points $A(-2, 0)$ and $B(3, 5)$.

(a) Find the equation of L_1 .

[3]

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The line L_2 is perpendicular to L_1 , passes through B and intersects the x -axis at the point C .

(b) Find the coordinates of C .

[3]

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[5]



[3]

(a)
$$\frac{(a^2)^4 (\sqrt{a})^{-\frac{8}{3}}}{a^{-\frac{1}{3}}}$$



(b) $\frac{3 - a\sqrt{3}}{2 + 3\sqrt{3}}$

[3]

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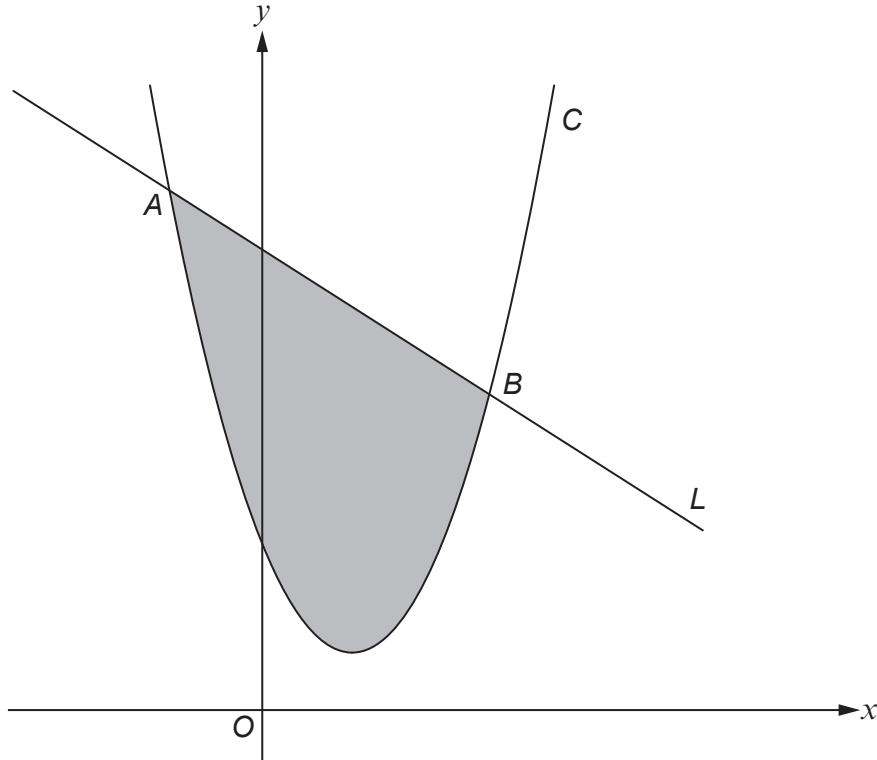
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4. The diagram below shows a sketch of the curve C with equation $y = x^2 - 4x + 6$ and the line L with equation $y = -x + 16$. The curve and the line intersect at the points A and B .



- (a) Find the coordinates of A and B .

[4]

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09

[6]

[illegible]

- [6]

[illegible]

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- (a) Use an algebraic method to solve the equation $f(x) = 0$. Show all your working. [6]

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- (c) Sketch the curve C , clearly labelling the points where the curve crosses the x and y axes. [3]

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8. A circle C has centre A and equation $x^2 + y^2 + 2x - 4y = 4$.

(a) Find the coordinates of A and the radius of C .

[3]

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(b) (i) A straight line L , with equation $y = 2x + 1$, intersects the circle C at the points P and Q . Determine the coordinates of P and Q .

[4]

(ii) Find the gradient of the tangent at each of the points P and Q .

[3]

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[5]

[illegible]

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- 10.** Solve the following equation for values of θ between 0° and 360° .

[6]

$$15\sin^2\theta + 2\cos\theta = 14$$

[illegible]

11. The function f is defined by $f(x) = x^3 - 9x^2 + 28x + 4$.

(a) Show that $f(x)$ is an increasing function.

[4]

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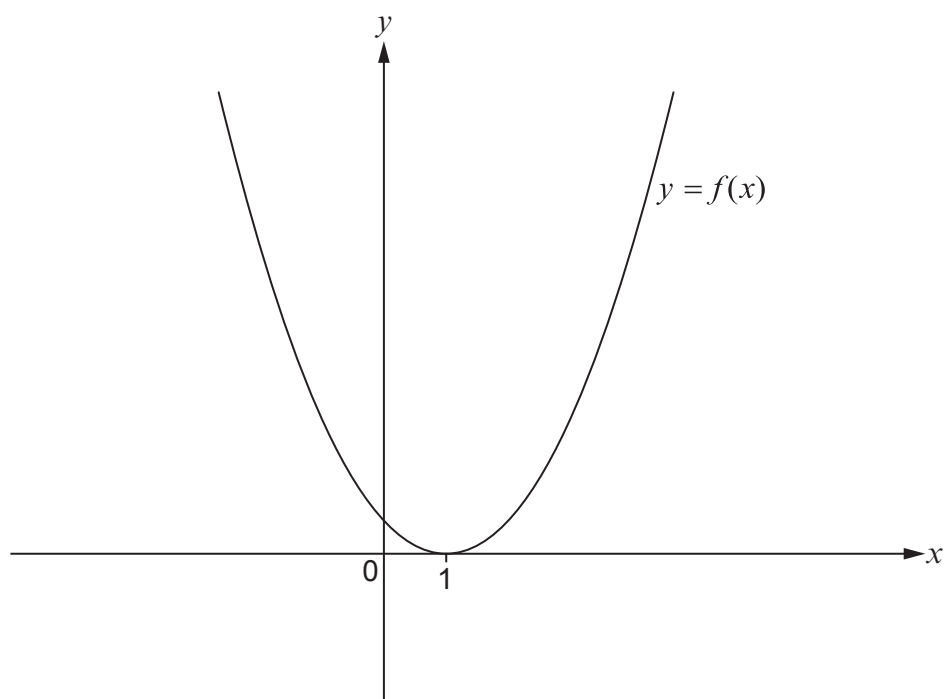
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- [5]

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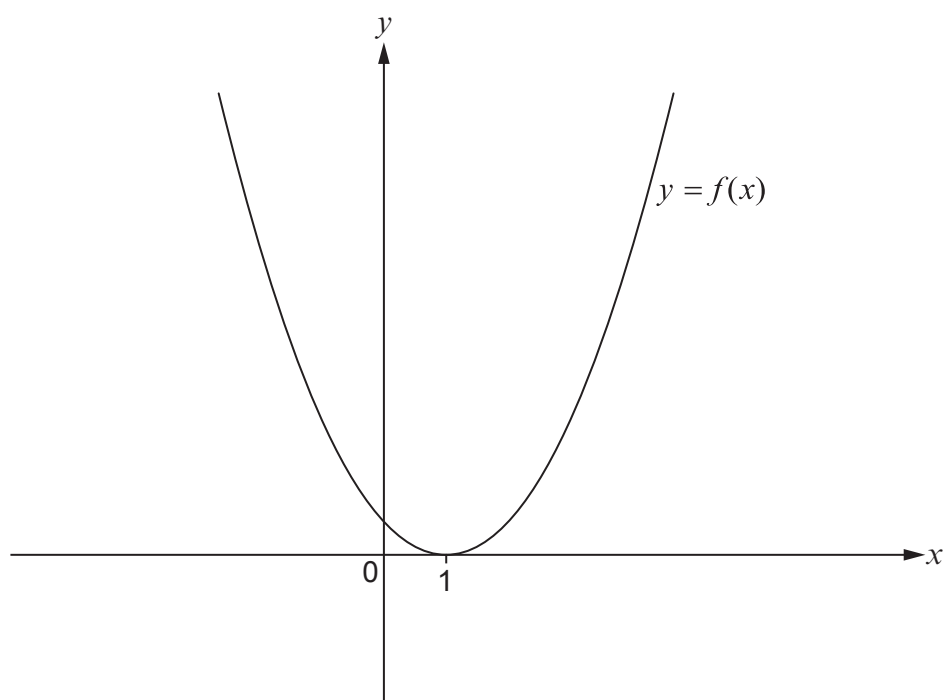
12. The diagram below shows the graph of $y = f(x)$.



Draw a sketch of each of the following transformations on the diagrams provided. Clearly label the coordinates of the stationary point in each case.

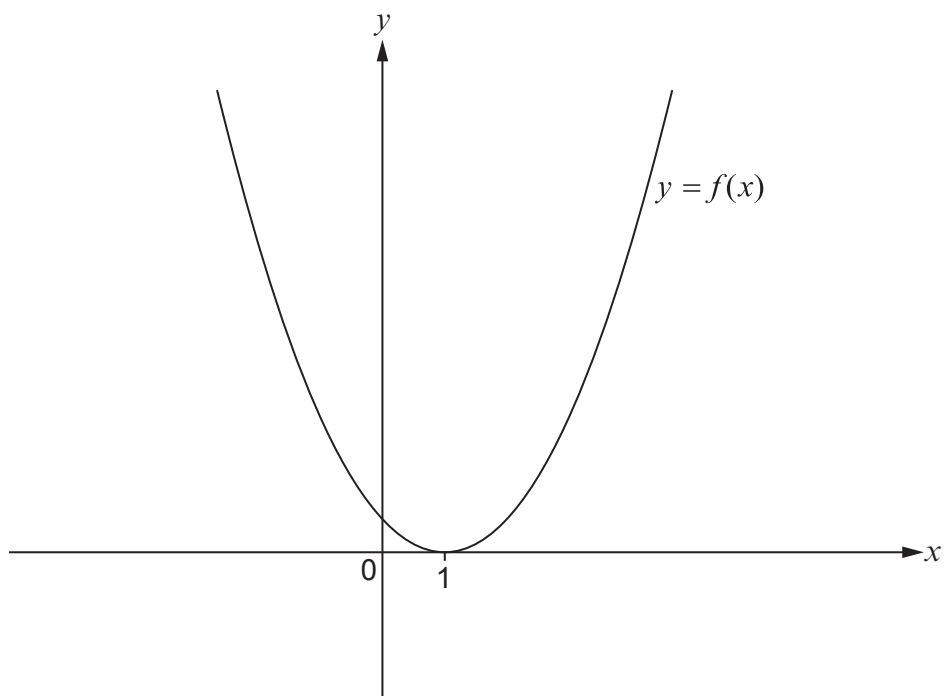
(a) $y = f(x + 4)$

[2]



(b) $y = f\left(\frac{1}{2}x\right)$

[2]



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- Hence, or otherwise, find the possible values of $\tan x$.

[4]



- [4]



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- [5]

$$\log_3 36 - 2\log_3 18 + \log_3 180 + \log_3 x = 2$$

[illegible]

[6]

$$2 \times 4^x + 5 \times 2^x - 3 = 0$$



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16. The binomial expansion of $(2 - x^2)^7$ is given by

$$(2-x^2)^7 = a_0 + a_1x^2 + a_2x^4 + a_3x^6 + a_4x^8 + a_5x^{10} + a_6x^{12} + a_7x^{14}.$$

(a) Find the numerical values of a_0 , a_2 and a_7 .

[4]



[3]

$$a_1 + a_2 + a_3 + a_4 + a_5 + a_6 = -126.$$

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[illegible]

[illegible]

[illegible]

[illegible]

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