

Please write clearly in block capitals.

Centre number

Candidate number

Surname

Forename(s)

Candidate signature

I declare this is my own work.

INTERNATIONAL AS

MATHEMATICS

(9660/MA01) Unit P1 Pure Mathematics

Wednesday 14 May 2025

07:00 GMT

Time allowed: 1 hour 30 minutes

- Materials
- For this paper you must have the OxfordAQA Booklet of Formulae and Statistical Tables (enclosed).
 - You may use a graphical calculator.
- Instructions
- Use black ink or black ball-point pen. Pencil should only be used for drawing.
 - Fill in the boxes at the top of this page.
 - Answer **all** questions.
 - You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
 - If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
 - Do all rough work in this book. Cross through any work you do not want to be marked.
- Information
- The marks for questions are shown in brackets.
 - The maximum mark for this paper is 80.
- Advice
- Unless stated otherwise, you may quote formulae, without proof, from the booklet.
 - Show all necessary working; otherwise marks may be lost.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
TOTAL	



Answer **all** questions in the spaces provided.

1 (a) It is given that

$$m = 12p^{\frac{3}{4}} \quad \text{and} \quad n = 3p^{\frac{1}{6}}$$

where p is a positive constant.

1 (a) (i) Find $\left(\frac{m}{n}\right)^2$

Circle your answer.

[1 mark]

$$16p^{\frac{7}{6}}$$

$$81p^{\frac{7}{6}}$$

$$16p^{\frac{11}{6}}$$

$$81p^{\frac{11}{6}}$$

1 (a) (ii) Find $\sqrt{mn}$

Circle your answer.

[1 mark]

$$\sqrt{15} p^{\frac{1}{16}}$$

$$6p^{\frac{1}{16}}$$

$$\sqrt{15} p^{\frac{11}{24}}$$

$$6p^{\frac{11}{24}}$$



1 (b) It is given that

$$(a - 5\sqrt{7})^2 = b - 30\sqrt{7}$$

where a and b are integers.

Find the value of a and the value of b

[3 marks]

$a =$ _____ $b =$ _____

5

Turn over for the next question

Turn over ►



- 2 (a)** Express $3x^2 + 24x + 54$ in the form $a(x+b)^2 + c$ where a , b and c are constants.

[3 marks]

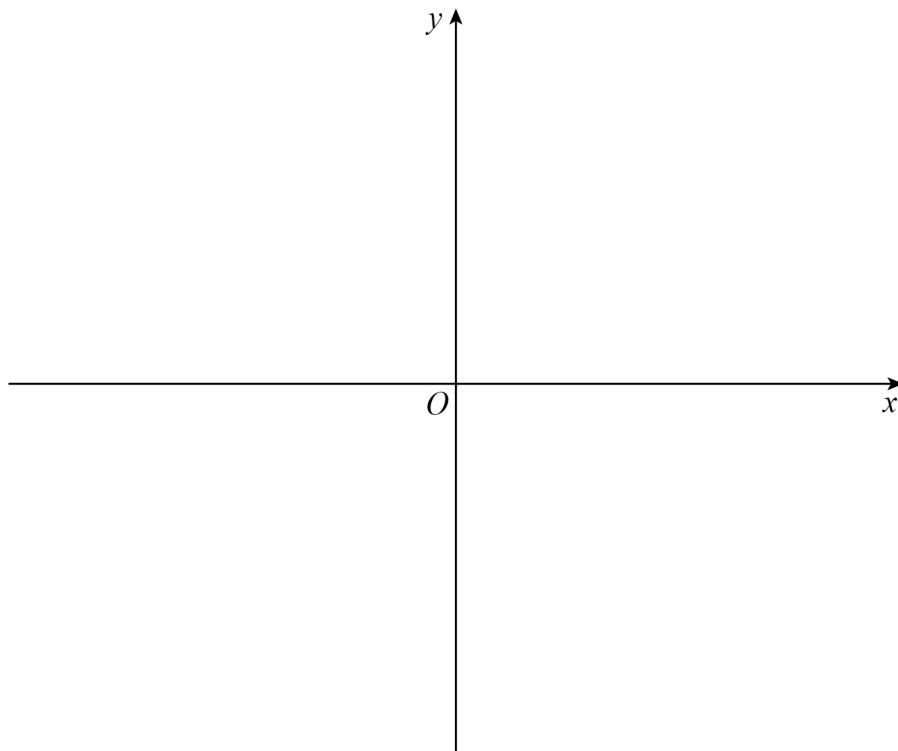
Answer _____

- 2 (b)** The curve C has equation $y = 3x^2 + 24x + 54$

Sketch the curve C on the axes below.

Show the coordinates of the vertex and the coordinates of any intercepts with the axes.

[3 marks]



2 (c) The curve D has equation $y = 3x^2 + mx + n$ where m and n are constants.

D has reflectional symmetry in the line with equation $x = 5$

The y -coordinate of the vertex of C is equal to the y -coordinate of the vertex of D

Describe the single transformation which maps C onto D

[2 marks]

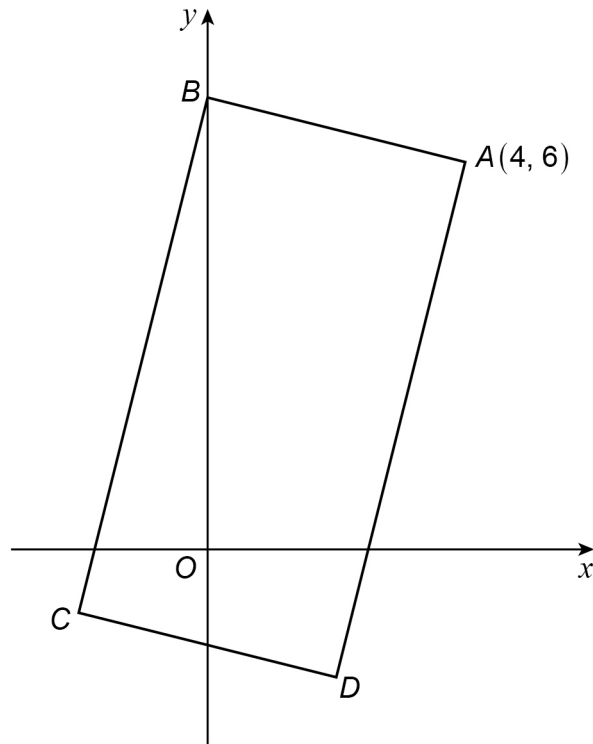
8

Turn over for the next question

Turn over ►



- 3** A rectangle with vertices at the points A , B , C and D is shown in the diagram below.



The point A has coordinates $(4, 6)$

The point B lies on the y -axis.

The points C and D lie on the line with equation $y = -\frac{1}{4}x - \frac{3}{2}$

- 3 (a)** Show that the y -coordinate of B is 7

[2 marks]

3 (b) Find the coordinates of D

[3 marks]

Answer _____

3 (c) Find the perimeter of the rectangle.

Give your answer in an exact form.

[4 marks]

Answer _____



[illegible]

[4 marks]

[illegible]

Answer _____

Turn over for the next question

9

Turn over ►



5 (a) Solve the inequalities

$$x - 2 \leq 3x + 6 \leq x + 34$$

[2 marks]

Answer

5 (b) (i) Show that

$$(6x - 5)(x + 14) > 126x - 147$$

can be written in the form

$$(ax - b)(cx - d) > 0$$

where a , b , c and d are prime numbers.

[3 marks]



5 (b) (ii) Hence, or otherwise, solve the inequality

$$(6x - 5)(x + 14) > 126x - 147$$

[1 mark]

Answer _____

5 (c) Use your answers to **part (a)** and **part (b)(ii)** to find the values of x which satisfy

$$x - 2 \leq 3x + 6 \leq x + 34 \quad \text{and} \quad (6x - 5)(x + 14) > 126x - 147$$

[2 marks]

Answer _____



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The curves with equations

where c is a constant, touch at exactly one point P

[6 marks]

[illegible]

Answer _____

6



7 (a) Use the trapezium rule with six ordinates (five strips) to find an approximate value for

$$\int_0^3 \frac{4^x}{x+7} \, dx$$

Give your answer to two decimal places.

[4 marks]

[illegible]

Answer

7 (b) Explain how to obtain an improved approximate value for $\int_0^3 \frac{4^x}{x+7} dx$ using the trapezium rule.

[1 mark]



7 (c) (i) Describe the single transformation which maps the graph of

$$y = \frac{4^x}{x+7}$$

onto the graph of

$$y = \frac{4^x}{3x+21}$$

[2 marks]

7 (c) (ii) Use your answers to **part (a)** and **part (c)(i)** to find an approximate value for

$$\int_0^3 \left(\frac{4^x}{x+7} + \frac{4^x}{3x+21} \right) dx$$

Give your answer to two decimal places.

[2 marks]

Answer _____

9

Turn over for the next question

Turn over ►



8 The curve C has equation

$$y = 3x^2 - \frac{11}{2}x + \frac{10}{x}$$

The point $P(2, 6)$ lies on C

The line L is the tangent to C at the point P

8 (a) Show that the equation of L is

$$y = 4x - 2$$

[4 marks]



- 8 (b)** The curve D is such that at any point on D

$$\frac{dy}{dx} = x^2 - 4x + a$$

where a is a constant.

The point $Q(3, 10)$ lies on D

The line L is the normal to D at the point Q

- 8 (b) (i)** Find the value of a

[3 marks]

Answer _____

- 8 (b) (ii)** Find the equation of D

[4 marks]

Answer _____



9 It is given that

$$p(x) = x^3 + bx^2 - 31x - 52$$

where b is a constant.

When $p(x)$ is divided by $(x + 3)$ the remainder is 77

9 (a) Use the Remainder Theorem to show that $b = 7$

[2 marks]

9 (b) (i) Use the Factor Theorem to show that $(x - 4)$ is a factor of $p(x)$

[2 marks]



$$\int \frac{x^3 + 7x^2 - 31x - 52}{x\sqrt{x}(x-4)} \, dx$$

[5 marks]

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Answer _____



A geometric series has n th term u_n

Show that

$$\sum_{n=1}^{\infty} u_n - \sum_{n=1}^k u_n = a \times b^{c-k}$$

where a , b and c are prime numbers.

[6 marks]

[illegible]

END OF QUESTIONS



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[illegible]

