

Please write clearly in block capitals.

Centre number

Candidate number

Surname

Forename(s)

Candidate signature

I declare this is my own work.

INTERNATIONAL A-LEVEL

MATHEMATICS

(9660/MA03) Unit P2 Pure Mathematics

Wednesday 7 January 2026

07:00 UK Time

Time allowed: 2 hours 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 120.

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	
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10	
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12	
13	
14	
TOTAL	



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

1 A curve has equation $y = \ln(2x + 1)$

The curve intersects the line $y = 5 - 6x$ at a single point where $x = \alpha$

1 (a) Show that α lies between 0.6 and 0.7

[2 marks]

1 (b) The equation $\ln(2x + 1) = 5 - 6x$ can be rearranged into the form $x = \frac{1}{6}(5 - \ln(2x + 1))$

Use the iterative formula

$$x_{n+1} = \frac{1}{6}(5 - \ln(2x_n + 1))$$

with $x_1 = 0.7$ to find the value of x_2 and the value of x_3

Give your values correct to three decimal places.

[2 marks]

$x_2 =$ _____ $x_3 =$ _____



Describe a sequence of **two** geometrical transformations that maps the graph of $y = \sin\left(\frac{x}{4}\right)$ onto the graph of $y = 5\cos\left(\frac{x}{4}\right)$

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4

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- 3** The functions f and g including their domains are defined as

$$f(x) = 3\cos\left(\frac{x}{2}\right) \quad \text{for } 0 \leq x \leq 2\pi$$

$$g(x) = 1 - |x| \quad \text{for all real values of } x$$

- 3 (a)** Find the range of f

[2 marks]

Answer _____

- 3 (b)** The inverse of f is f^{-1}

- 3 (b) (i)** Find $f^{-1}(x)$

[3 marks]

Answer _____

- 3 (b) (ii)** Solve the equation $f^{-1}(x) = \frac{3\pi}{2}$

[2 marks]

Answer _____



3 (c) The composite function gf is denoted by h

3 (c) (i) Find $h(x)$

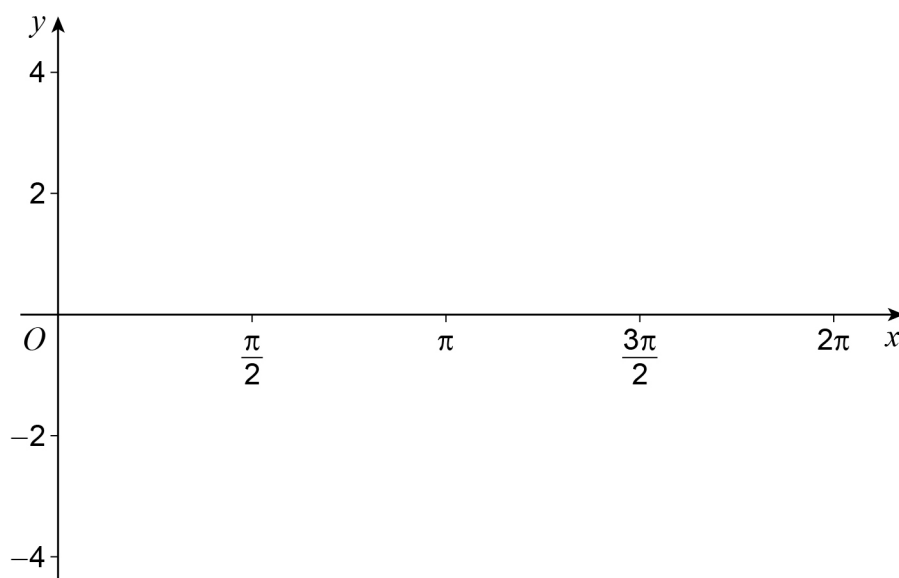
[1 mark]

Answer _____

3 (c) (ii) On **Figure 1** sketch the graph of $y = h(x)$ for $0 \leq x \leq 2\pi$

[3 marks]

Figure 1



The line l_2 has equation $\mathbf{r} = \begin{bmatrix} -1 \\ 4 \\ q \end{bmatrix} + \mu \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$ where q is a constant.

The acute angle between l_1 and l_2 is 60°

[5 marks]

[illegible]

$p =$ _____



4 (b) Find the value of q

[3 marks]

$q =$ _____

8

Turn over for the next question

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- 5** The polynomial $f(x)$ is defined by

$$f(x) = ax^3 + bx^2 + cx - 6$$

where a , b and c are constants.

When $f(x)$ is divided by $(x-1)$ the remainder is 45

When $f(x)$ is divided by $(x+1)$ the remainder is -5

When $f(x)$ is divided by $(2x+1)$ the remainder is -9

- 5 (a) (i)** Show that $b = 26$

[3 marks]

- 5 (a) (ii)** Find the value of a and the value of c

[3 marks]

$a =$ _____ $c =$ _____



5 (b) (i) Show that $f(-2) = 0$

[1 mark]

5 (b) (ii) Hence show that $\frac{f(x)}{(4x+1)(x+2)}$ can be written in the form

$$p(x+1) + \frac{q}{4x+1}$$

where p and q are constants.

[3 marks]

Answer _____

10

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6 (a)

$$\int_0^1 \sqrt{1 - \left(\frac{1}{2}x^3\right)} \, dx$$

Give your answer to four decimal places.

[4 marks]

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Answer _____



6 (b) Find the binomial expansion of $\sqrt{1 - \left(\frac{1}{2}x^3\right)}$ up to and including the term in x^6

[2 marks]

Answer _____

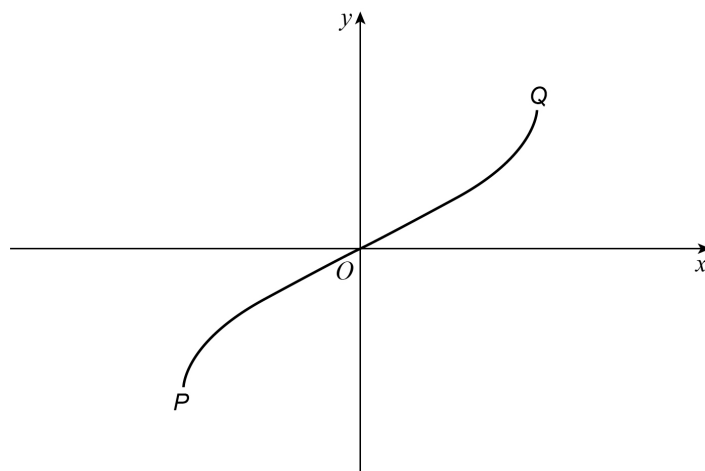
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- 7** **Figure 2** shows the graph of $y = \sin^{-1}x$ where y is in radians and the end-points of the graph are P and Q

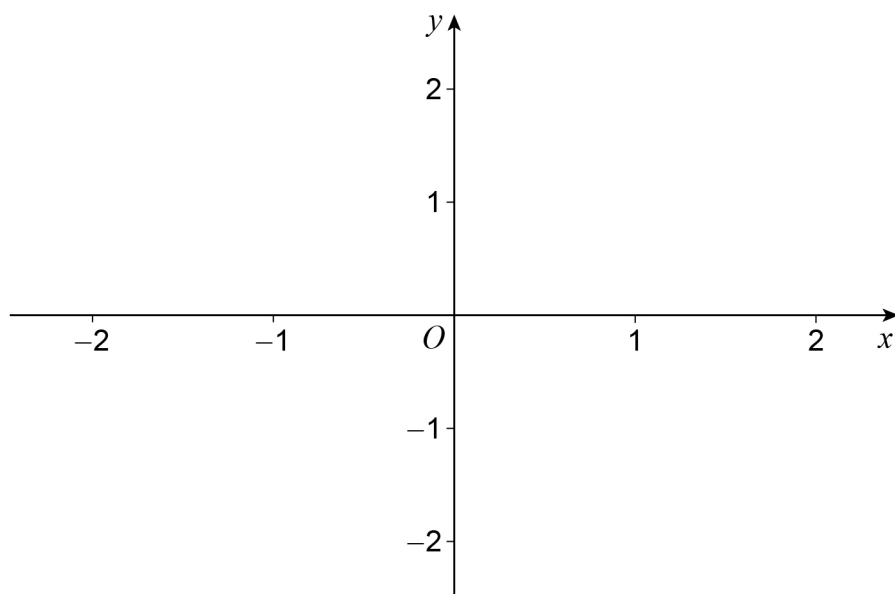
Figure 2

- 7 (a)** Find the coordinates of P and the coordinates of Q

[1 mark]

P _____ Q _____

- 7 (b)** On **Figure 3** sketch the graph of $y = \frac{1}{2}\sin^{-1}(x+1)$

[2 marks]**Figure 3**

7 (c) (i) Express the equation $y = \frac{1}{2} \sin^{-1}(x+1)$ in the form $x = f(y)$

[2 marks]

Answer _____

7 (c) (ii) Hence find the value of $\frac{dx}{dy}$ when $y = \frac{\pi}{12}$

Give your answer in an exact form.

[2 marks]

$\frac{dx}{dy} =$ _____

$\frac{\quad}{7}$

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8 (a) It is given that $8\sin\theta + 15\cos\theta = 17\sin(\theta + 62^\circ)$ correct to the nearest degree.

It is also given that the maximum value of $17\sin(\theta + 62^\circ)$ is 17

8 (a) (i) Find the smallest positive value of the angle θ at which this maximum occurs.

[1 mark]

Answer _____

8 (a) (ii) Find the minimum value of $\frac{34}{34 - (8\sin\theta + 15\cos\theta)}$

[1 mark]

Answer _____



$$\tan^2(2y-0.7)+9=6\sec(2y-0.7) \quad \text{for } 0 < y < \pi$$

[5 marks]

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Answer _____

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Find $\int \frac{14}{2-x-6x^2} dx$

[6 marks]

[illegible]

Answer _____

6

- 10** A curve C has equation $4x + y = (x - y)^2$
- The curve C has exactly one stationary point at D

10 (a) Show that $\frac{dy}{dx} = \frac{2x - 2y - 4}{1 + 2x - 2y}$

[3 marks]

- 10 (b)** Find the coordinates of D

[4 marks]

Answer _____



[5 marks]

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- 11** A curve is defined by the parametric equations

$$x = \frac{2pt}{t-1} \quad \text{and} \quad y = \frac{pt^2}{t-1}$$

where $t \neq 1$ and p is a non-zero constant.

- 11 (a)** Find $\frac{dy}{dx}$ in terms of t

[3 marks]

$$\frac{dy}{dx} = \underline{\hspace{10cm}}$$

- 11 (b)** Find an equation for the tangent to the curve at the point where $t = 3$

Give your answer in the form $ax + by + cp = 0$ where a , b and c are integers.

[4 marks]



Answer _____

11 (c) Find a Cartesian equation of the curve.

Give your answer in the form $y = \frac{1}{2}f(x)$

[4 marks]

Answer _____



12 (a) It is given that $y = \frac{5x}{5x+3}$

Use the quotient rule to show that $\frac{dy}{dx} = \frac{n}{(5x+3)^2}$ where n is an integer.

[2 marks]

12 (b) A curve has equation $y = x \ln(5x+3)$

12 (b) (i) Find $\frac{dy}{dx}$

[3 marks]

$$\frac{dy}{dx} =$$

12 (b) (ii) Find an equation for the normal to the curve at the point where $x = 1$

Give your answer in an exact form.

[3 marks]

Answer



12 (c) (i) Use the substitution $u = 5x + 3$ to find $\int \frac{5x}{5x+3} dx$

[4 marks]

Answer _____

12 (c) (ii) Find $\int \ln(5x+3) dx$

[4 marks]

Answer _____



It is given that $y = f(x)$ satisfies the differential equation

It is also given that $y = 4$ when $x = 0$

[8 marks]

[illegible]

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Answer _____

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14 (a) (i) It is given that $y = \frac{1}{\cos x}$

Use the quotient rule to show that $\frac{dy}{dx} = \sec x \tan x$

[2 marks]

14 (a) (ii) It is given that $y = \ln(\sec x + \tan x)$

Show that $\frac{dy}{dx} = \sec x$

[2 marks]

- Give your answer in the form $\frac{\pi}{6}(\pi + a - \sqrt{b} + c \ln 3)$ where a , b and c are integers.

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