



Cambridge IGCSE™

CANDIDATE NAME



CENTRE NUMBER

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CANDIDATE NUMBER

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ADDITIONAL MATHEMATICS

0606/22

Paper 2

May/June 2024

2 hours

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You must show all necessary working clearly; no marks will be given for unsupported answers from a calculator.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [].

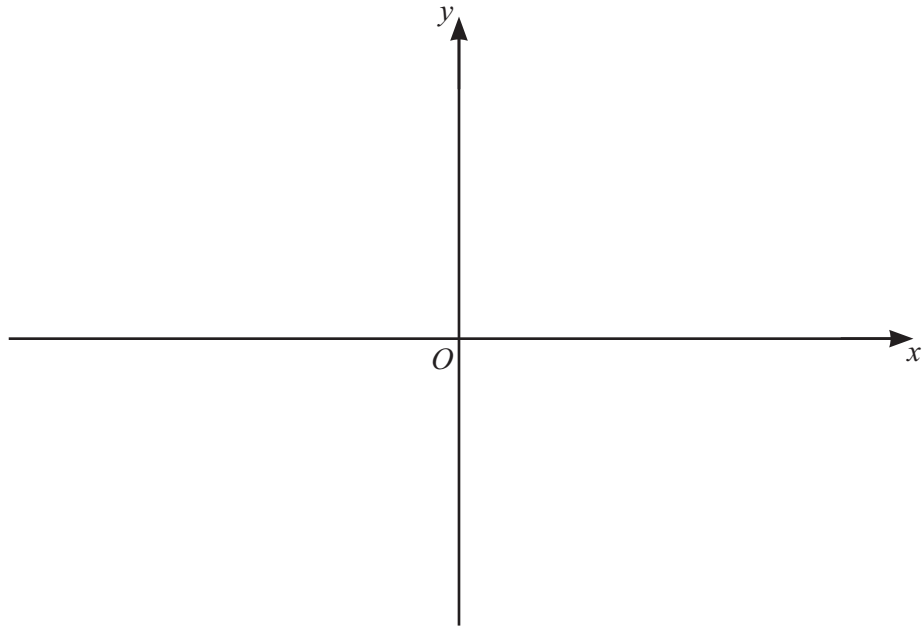
This document has **16** pages. Any blank pages are indicated.





1

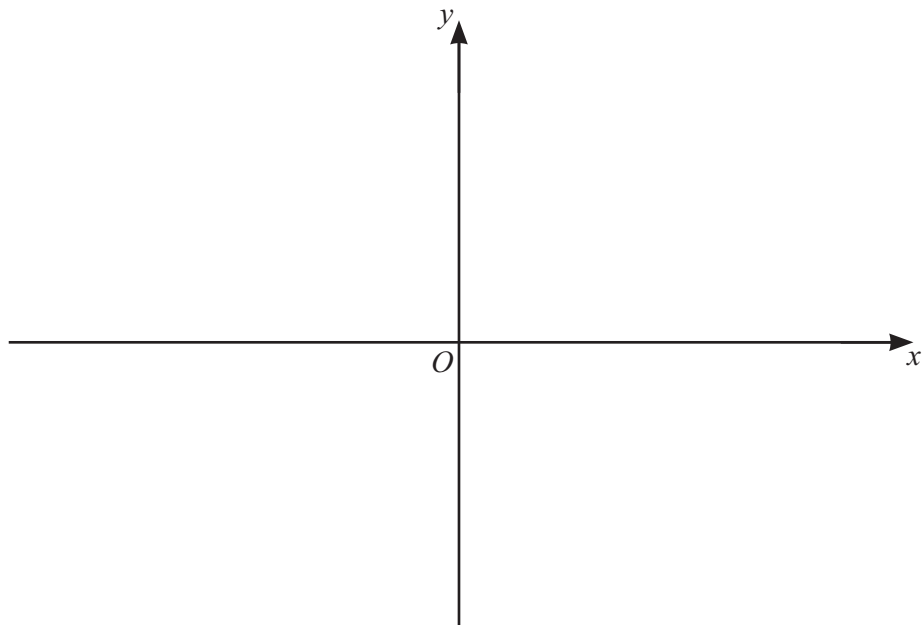
(a) On the axes, sketch the graph of $y = (2x - 5)(x + 3)(1 - x)$, stating the intercepts with the coordinate axes. [3]



(b) Hence

(i) solve the inequality $(2x - 5)(x + 3)(1 - x) \leq 0$ [2]

(ii) on the axes below, sketch the graph of $y = |(2x - 5)(x + 3)(1 - x)|$. [1]



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2 (a) Evaluate $\int_{\frac{\pi}{3}}^{\frac{\pi}{2}} \cos \frac{x}{4} dx$. You must show all your working. [4]



(b) Find $\int \left(\frac{1}{4x-3} + \frac{1}{x^3} \right) dx$. [3]

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3

(a) Determine whether the equation $\frac{(4x+1)(3x+2)}{5x-3} = x+1$ has two distinct real roots, two equal roots or no real roots. [4]

(b) Solve the equation $\frac{12}{\sqrt[3]{x}} - \sqrt[3]{x} = 4$. [4]





4 The polynomial p is such that $p(x) = 6x^3 + x^2 - 12x + 5$.



(a) Find the remainder when $p(x)$ is divided by $x - 2$. [1]

(b) (i) Show that $2x - 1$ is a factor of $p(x)$. [1]

(ii) Hence write $p(x)$ as a product of linear factors. [3]

(iii) Hence solve the equation $6 \sin^3 \theta + \sin^2 \theta - 12 \sin \theta + 5 = 0$ for $0^\circ \leq \theta \leq 90^\circ$. [2]





5 A curve has equation $y = 5e^{2x-1} + e$. The tangent to the curve at the point where $x = 1$ cuts the x -axis at the point P .



Find the equation of the tangent in the form $y = mx + c$, where m and c are exact values, and hence find the x -coordinate of P . [6]

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6 (a) Show that $\sin^3 x \left(\frac{\operatorname{cosec} x}{\cot x} \right)$ can be written as $\sin^2 x \tan x$.

[3]



(b) Solve the equation $\cos^2 x \tan x - \frac{1}{2} \tan x = 0$ for $-\pi < x < \pi$.

[5]

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7 Find the number of different ways the 9 letters of the word POLYMATHS can be arranged when



(a) the O and A are **not** next to each other

[2]

(b) the letters MATHS are together in this order.

[2]





8 An experiment was carried out and values of y for certain values of x were recorded. The table shows the values recorded.

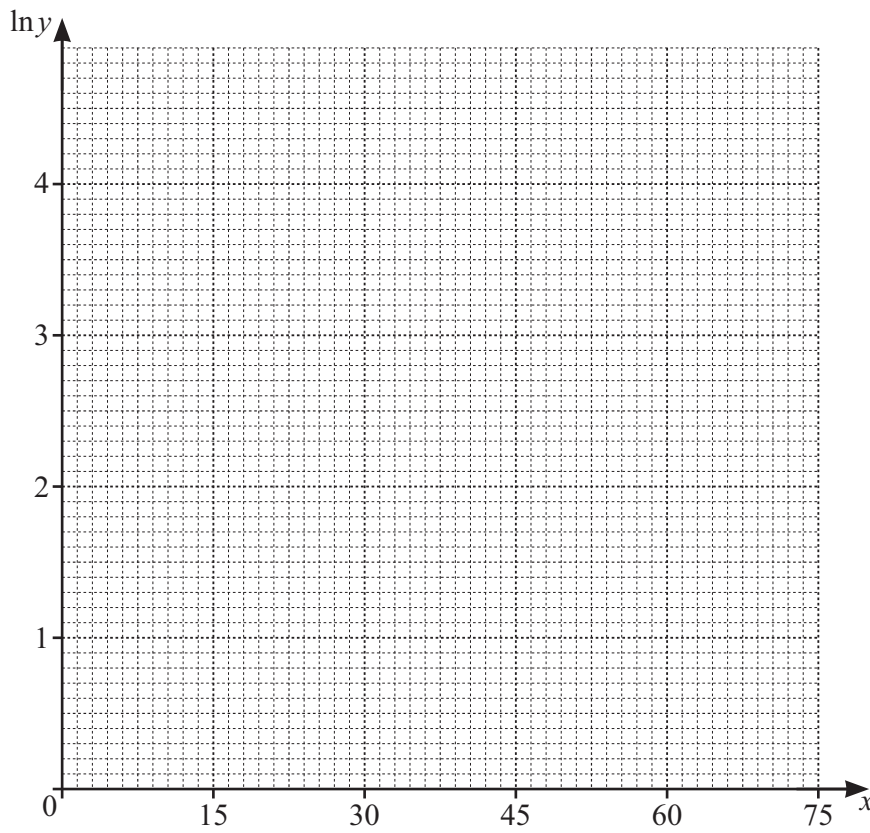


x	15	30	45	60	75
y	10	13	22	35	50

The relationship between y and x is modelled by $y = Ae^{kx}$, where A and k are constants.

(a) Draw a straight line graph for $\ln y$ against x .

[2]



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(b) Find the equation of the line in **part (a)** and hence find the values of A and k . Give each value correct to 1 significant figure. [5]

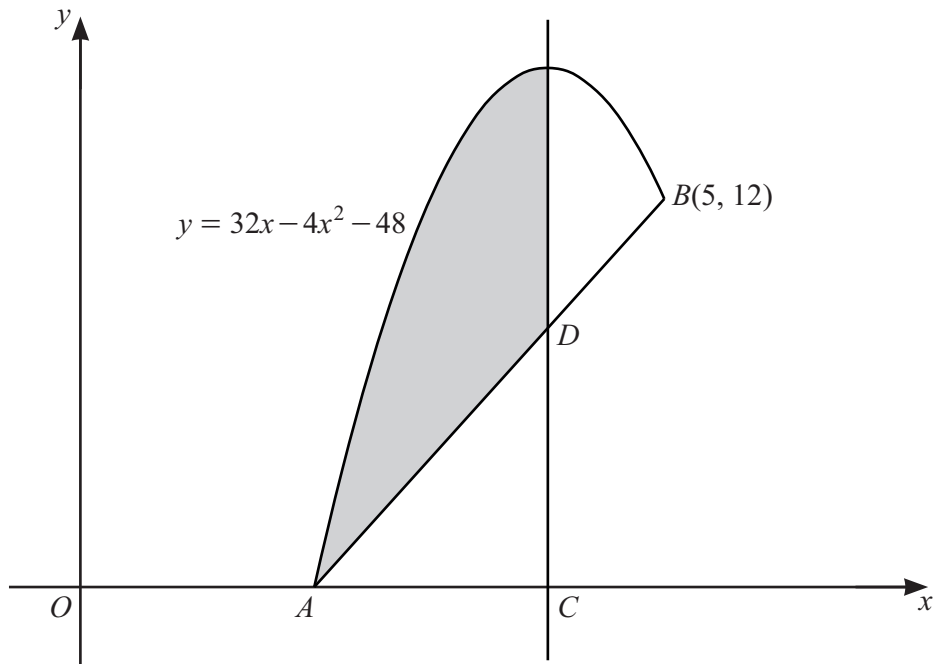
(c) Find the value of x for which $y = 17$. [2]



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9



The diagram shows part of the curve $y = 32x - 4x^2 - 48$ and the line AB .
 The curve and the line AB meet the x -axis at A and meet again at the point $B(5, 12)$.
 The line CD extended is parallel to the y -axis and passes through the maximum point of the curve.
 Find the area of the shaded region. [9]



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Continuation of working space for Question 9.

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10 The functions f and fg are defined by



$$f(x) = e^{x^2+3} \quad \text{for } x < 0$$

$$fg(x) = e^{2x} \quad \text{for } x > \frac{3}{2}.$$

(a) Explain why f^{-1} exists. [1]

(b) Find an expression for $f^{-1}(x)$ and state the domain and range of f^{-1} . [5]

(c) Hence find and simplify an expression for $g(x)$. [2]

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11 In the binomial expansion of $\left(2 + \frac{x}{2}\right)^n$, the first three terms in increasing powers of x are $b + abx + \frac{9}{8}abx^2$. Find the values of the constants n , a and b .

[8]

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