



Cambridge IGCSE™

CANDIDATE NAME



CENTRE NUMBER

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CANDIDATE NUMBER

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ADDITIONAL MATHEMATICS

0606/13

Paper 1

October/November 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.





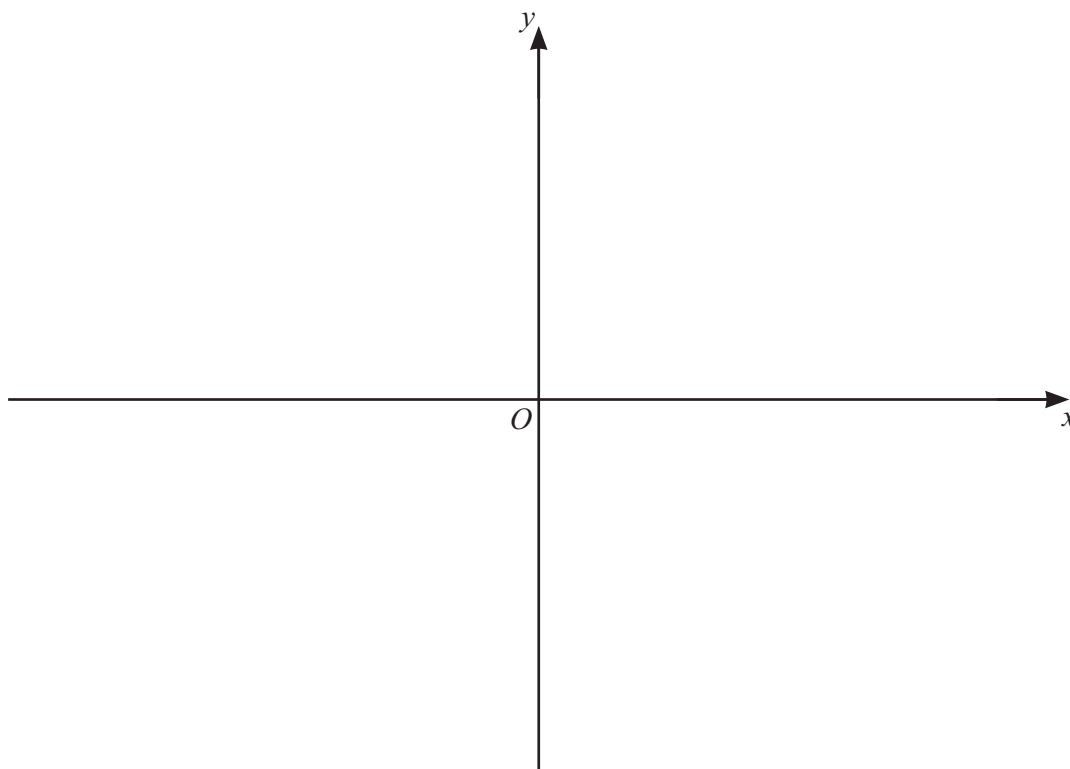
- 1 (a) Find the coordinates of the stationary point on the curve $y = (x+3)(x-4)$.

[3]



- (b) On the axes, sketch the graph of $y = |(x+3)(x-4)|$, stating the intercepts with the axes.

[2]



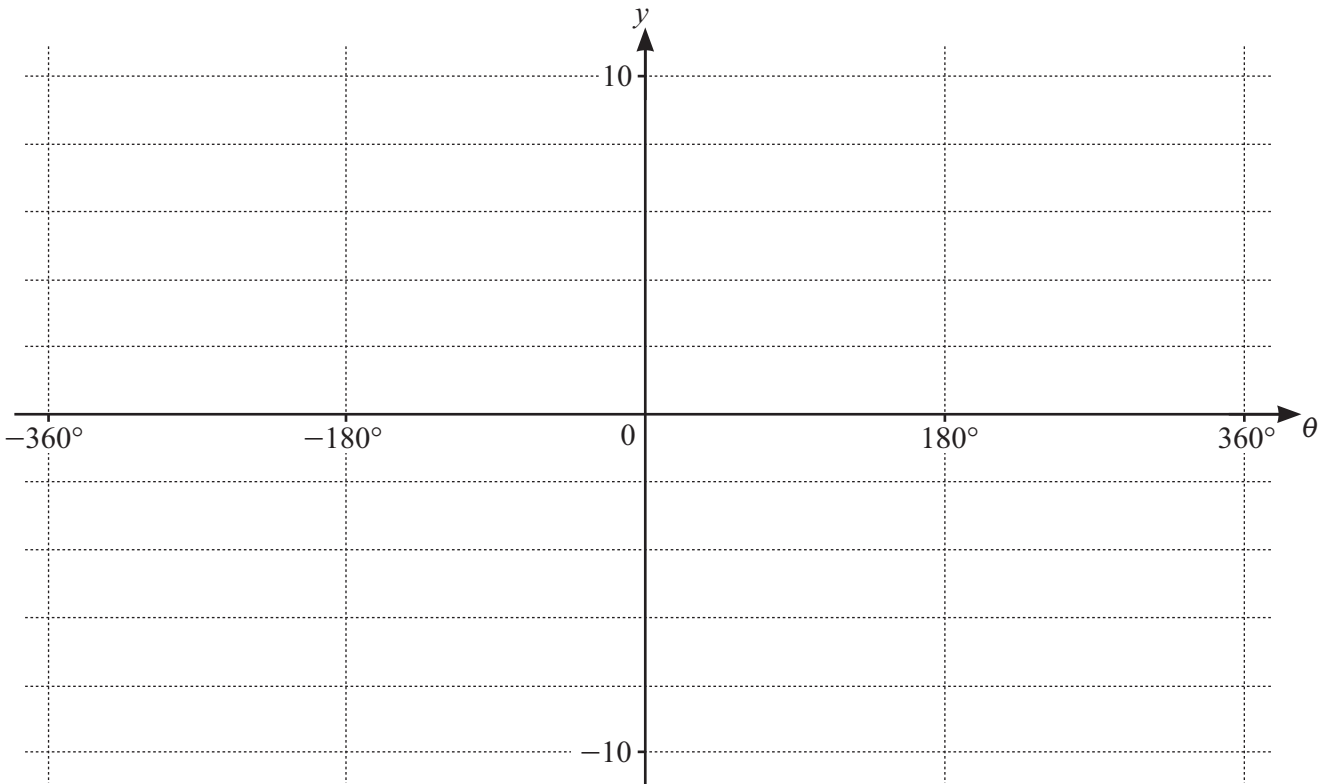
- (c) Given that $k > 0$, write down the values of k for which the equation $|(x+3)(x-4)| = k$ has exactly 2 distinct real roots.

[1]





- 2 On the axes, sketch the graph of $y = 4 + 5 \sin \frac{\theta}{2}$, for $-360^\circ \leq \theta \leq 360^\circ$. State the intercept with the y-axis. [4]



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3 Find the values of k for which the equation $4x^2 - k = 4kx - 2$ has no real roots.

[4]



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4 (a) Write $3 + 4 \log_2 a - \log_2 b$ as a single base 2 logarithm.

[3]



(b) Solve the equation $\lg x = 4 \log_x 10$.

[4]





5 The polynomial p is such that $p(x) = ax^3 + bx^2 - 19x + c$, where a , b and c are integers. It is given that $x + 2$ is a factor of $p(x)$. When $p(x)$ is divided by $x + 1$ the remainder is 20.



(a) Show that $7a - 3b = 39$.

[3]

It is also given that when $p'(x)$ is divided by $x - 1$ the remainder is 1.

(b) Find the values of a , b and c .

[3]





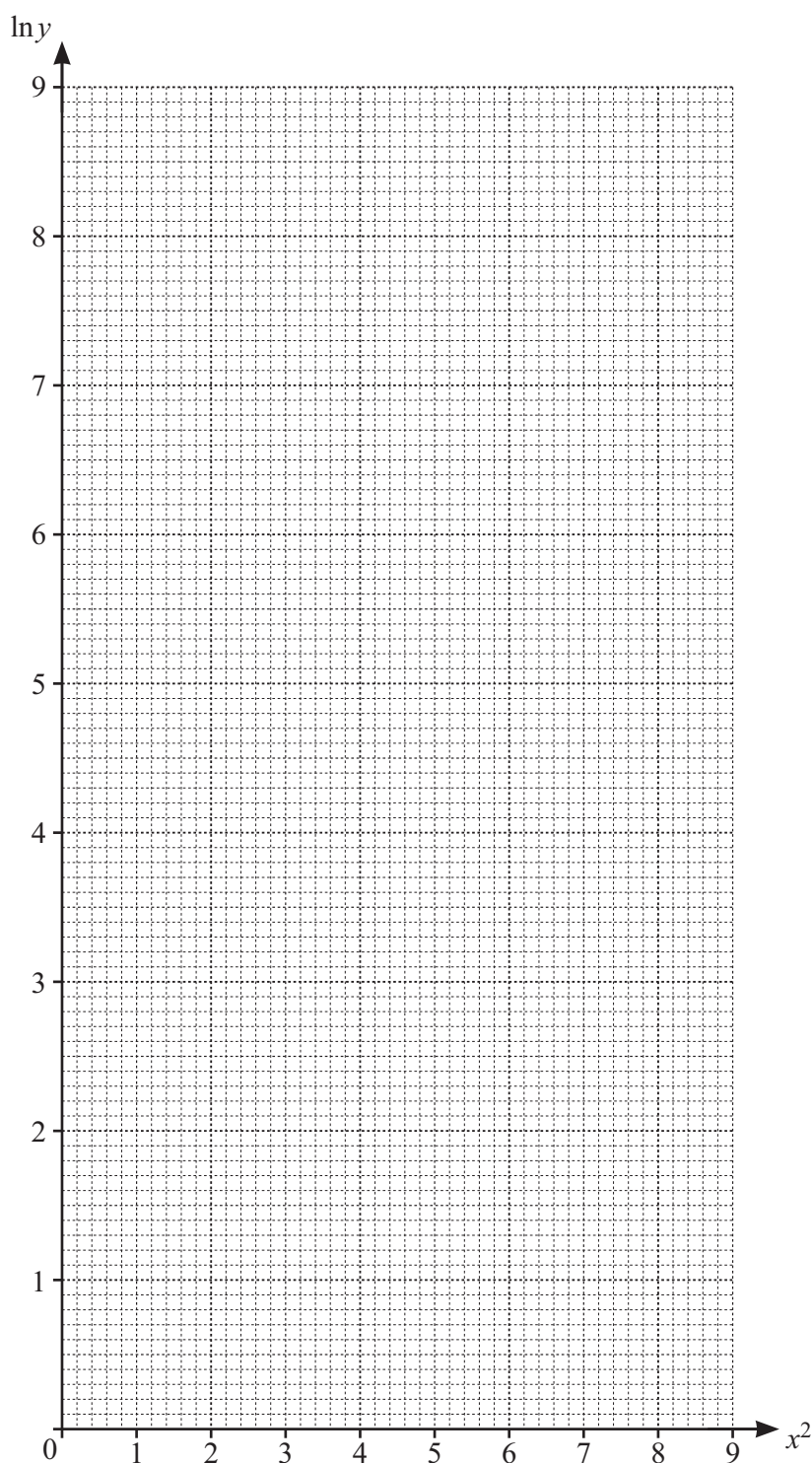
- 6 The table shows the variables x and y which are related by the equation $y = Ab^{x^2}$, where A and b are constants.



x	1	1.5	2	2.5	3
y	14	33.3	112	532.8	3584

- (a) Use the data to draw a straight line graph of $\ln y$ against x^2 .

[2]





(b) Use your graph to estimate the values of A and b . Give your answers correct to 1 significant figure. [5]

(c) Use your graph to estimate the value of x when $y = 200$. Give your answer correct to 2 significant figures. [2]

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7 (a) Given that $y = x^3 \ln x$, find $\frac{dy}{dx}$.

[2]



(b) Hence find $\int_1^2 3x^2 \ln x \, dx$, giving your answer in the form $\ln a + b$, where a is an integer and b is a rational number.

[4]

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8 The straight line $y = 2x + 1$ intersects the curve $y + xy + 3x^2 = 15$ at the points A and B . The point C with coordinates $\left(\frac{21}{10}, k\right)$ lies on the perpendicular bisector of AB .

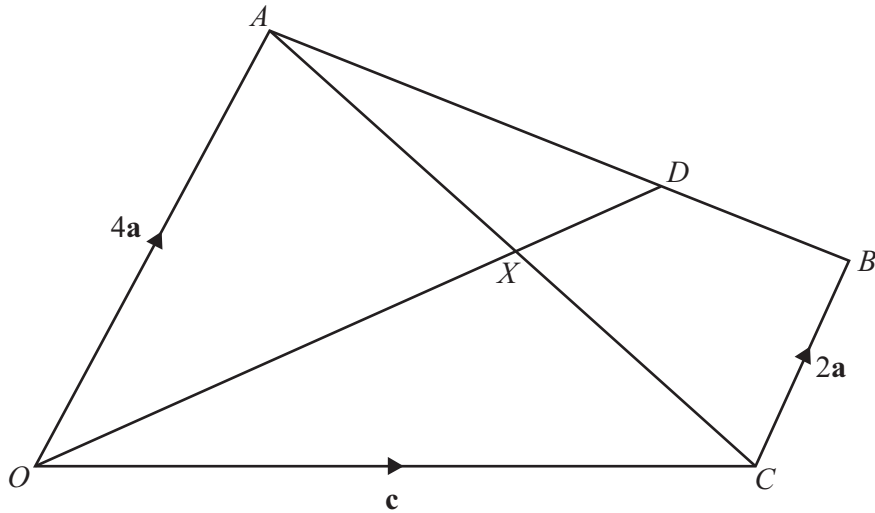
(a) Find the exact value of k . [8]

(b) The point D lies on the perpendicular bisector of AB such that its perpendicular distance from AB is twice that of the point C from AB . Find the possible coordinates of D . [4]





9



The diagram shows the trapezium $OABC$, where $\overrightarrow{OA} = 4\mathbf{a}$, $\overrightarrow{OC} = \mathbf{c}$, and $\overrightarrow{CB} = 2\mathbf{a}$. The point D lies on AB such that $AD:DB = 2:1$. The point X is the point of intersection of the lines OD and AC . It is given that $\overrightarrow{AX} = \lambda\overrightarrow{AC}$ and $\overrightarrow{OX} = \mu\overrightarrow{OD}$.

Find in terms of \mathbf{a} and \mathbf{c}

(a) \overrightarrow{AB} [1]

(b) \overrightarrow{OD} . [2]

(c) Find \overrightarrow{OX} in terms of \mathbf{a} , \mathbf{c} and μ . [1]

(d) Find \overrightarrow{AX} in terms of \mathbf{a} , \mathbf{c} and λ . [2]





(e) Hence find the values of λ and μ .

[4]

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10 (a) Solve the equation $7 \tan^2 \theta + 5 \tan \theta - 2 = 0$, for $-180^\circ \leq \theta \leq 180^\circ$. [4]



(b) Solve the equation $3 \sin(3\phi - 1.5) - 2 = 0$, for $0 < \phi < 3$, where ϕ is in radians. [5]

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- 11 (a) The first 3 terms of an arithmetic progression are $\log_x 3$, $\log_x 81$, $\log_x 2187$. Find the sum to n terms, giving your answer in the form $k \log_x 3$, where k is in terms of n . [3]



- (b) The first 3 terms of a geometric progression are 1 , $3 \tan^2 \theta$, $9 \tan^4 \theta$, for $0 < \theta < \frac{\pi}{2}$.

Find the values of θ for which this geometric progression has a sum to infinity. [4]

