



Cambridge O Level

CANDIDATE
NAME



CENTRE
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ADDITIONAL MATHEMATICS

4037/11

Paper 1 Non-calculator

May/June 2026

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. Do **not** use correction fluid or tape.
- Do **not** write on any bar codes.
- Calculators must **not** be used in this paper.
- You must show all necessary working clearly.

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.

List of formulas

Equation of a circle with centre (a, b) and radius r .

$$(x - a)^2 + (y - b)^2 = r^2$$

Curved surface area, A , of cone of radius r , sloping edge l .

$$A = \pi r l$$

Surface area, A , of sphere of radius r .

$$A = 4\pi r^2$$

Volume, V , of pyramid or cone, base area A , height h .

$$V = \frac{1}{3} Ah$$

Volume, V , of sphere of radius r .

$$V = \frac{4}{3} \pi r^3$$

Quadratic equation

For the equation $ax^2 + bx + c = 0$,

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Binomial theorem

$$(a + b)^n = a^n + \binom{n}{1} a^{n-1} b + \binom{n}{2} a^{n-2} b^2 + \dots + \binom{n}{r} a^{n-r} b^r + \dots + b^n,$$

where n is a positive integer and $\binom{n}{r} = \frac{n!}{(n-r)!r!}$

Arithmetic series

$$u_n = a + (n-1)d$$

$$S_n = \frac{1}{2} n(a + l) = \frac{1}{2} n\{2a + (n-1)d\}$$

Geometric series

$$u_n = ar^{n-1}$$

$$S_n = \frac{a(1-r^n)}{1-r} \quad (r \neq 1)$$

$$S_\infty = \frac{a}{1-r} \quad (|r| < 1)$$

Identities

$$\sin^2 A + \cos^2 A = 1$$

$$\sec^2 A = 1 + \tan^2 A$$

$$\operatorname{cosec}^2 A = 1 + \cot^2 A$$

Formulas for $\triangle ABC$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\Delta = \frac{1}{2} ab \sin C$$





1 Solve the equation $|5x + 4| = |3x - 2|$.

[3]

2 A circle has equation $(x-3)^2 + (y-4)^2 = 20$.

(a) Write down the coordinates of the centre of the circle.

[1]

(b) Write down the radius of the circle.

[1]

(c) The line AB is a diameter of this circle.
The point A has coordinates $(-1, 6)$.

Find the coordinates of the point B .

[2]

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- 3 Show that $(3 + 5 \cot \theta)^2 + (3 - 5 \cot \theta)^2 - 50 \operatorname{cosec}^2 \theta$, where $0 < \theta < \frac{\pi}{2}$, can be simplified to a constant.

[4]

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- 4 Given that $\int_0^a \frac{1}{3x+2} dx = \ln 4$, find the value of the constant a .

[5]

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- 5 The polynomial p is such that $p(x) = ax^3 + 4x^2 - ax - 28$, where a is a positive constant.

It is given that $p(a) = 0$.

- (a) Find the value of a .

[4]

- (b) Using your value of a , find $p(x)$ as a product of a linear factor and a quadratic factor.

[2]

- (c) Hence show that the equation $p(x) = 0$ has exactly one root.

[2]



- 6 The function f is such that $f(x) = 3x^2 + 8x$ for $x \geq k$, where k is a constant. It is given that f^{-1} exists. k has the least possible value for which f^{-1} exists.

(a) Find the value of k .

[2]

(b) Find the range of f .

[2]

(c) Find an expression for f^{-1} .

[3]

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(d) The function g is such that $g(x) = 3^x$ for $x > -6$.

(i) Write down the domain of gf .

[1]

(ii) Solve the equation $gf(x) = 27$.

[4]

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7 A curve has equation $y = \frac{4 + e^{2x}}{2 + e^x}$.

(a) Show that, when $\frac{dy}{dx} = 0$, $e^{2x} + 4e^x - 4 = 0$.

[5]

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- (b) Hence find the x -coordinate of the stationary point on the curve.
Give your answer in the form $\ln(a\sqrt{b} + c)$, where a , b and c are integers.

[4]

8 (a) Write down the value of $\lg(10000)$.

[1]

(b) Solve the equation $\log_2(\log_3 x) = 2$.

[3]

(c) Solve the equation $\log_x 5 = \log_5 x^4$.

[4]

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- 9 (a) A geometric progression has common ratio r and first term a , where $a \neq 0$.
The 4th term is -8 times the 7th term.

(i) Find the value of r .

[2]

- (ii) The sum of the first 5 terms of this progression is $\frac{99}{32}$.

Find the value of a .

[2]

- (b) The first three terms of a different geometric progression are $\cos \theta \sin \theta$, $\cos \theta \sin^3 \theta$ and $\cos \theta \sin^5 \theta$, for $0 < \theta < \frac{\pi}{2}$.

Show that the sum to infinity of this progression is $\tan \theta$.

[4]



- 10 A curve has equation $y = f(x)$, where $f''(x) = (2x + 10)^{-\frac{1}{2}} - 2x$.
The curve has a stationary point at $\left(3, \frac{64}{3}\right)$.
Find the equation of the curve.

[8]

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- 11 A triangle OAB is such that $\vec{OA} = \mathbf{a}$ and $\vec{OB} = \mathbf{b}$.

The point X lies on OA such that $\vec{OA} = 3\vec{OX}$.

The point Y lies on XB such that $\vec{XB} = 5\vec{XY}$.

The point Z lies on OB such that $\vec{OB} = m\vec{OZ}$, where m is a scalar.

$\vec{OX} = n\vec{ZY}$, where n is a scalar.

Use a vector method to find the values of m and n .

[8]

Question 12 is on the back page.





12 Find the value of n such that ${}^{n+3}C_6 = 12 \times {}^{n+2}C_5$.

[3]

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