



Cambridge O Level

CANDIDATE
NAME

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CENTRE
NUMBER

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CANDIDATE
NUMBER

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ADDITIONAL MATHEMATICS

4037/21

Paper 2

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.
- You should use a scientific calculator where appropriate.
- You must show all necessary working clearly.
- 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.
- For π , use either your calculator value or 3.142.

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.

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

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

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

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 $\triangle ABC$

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

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

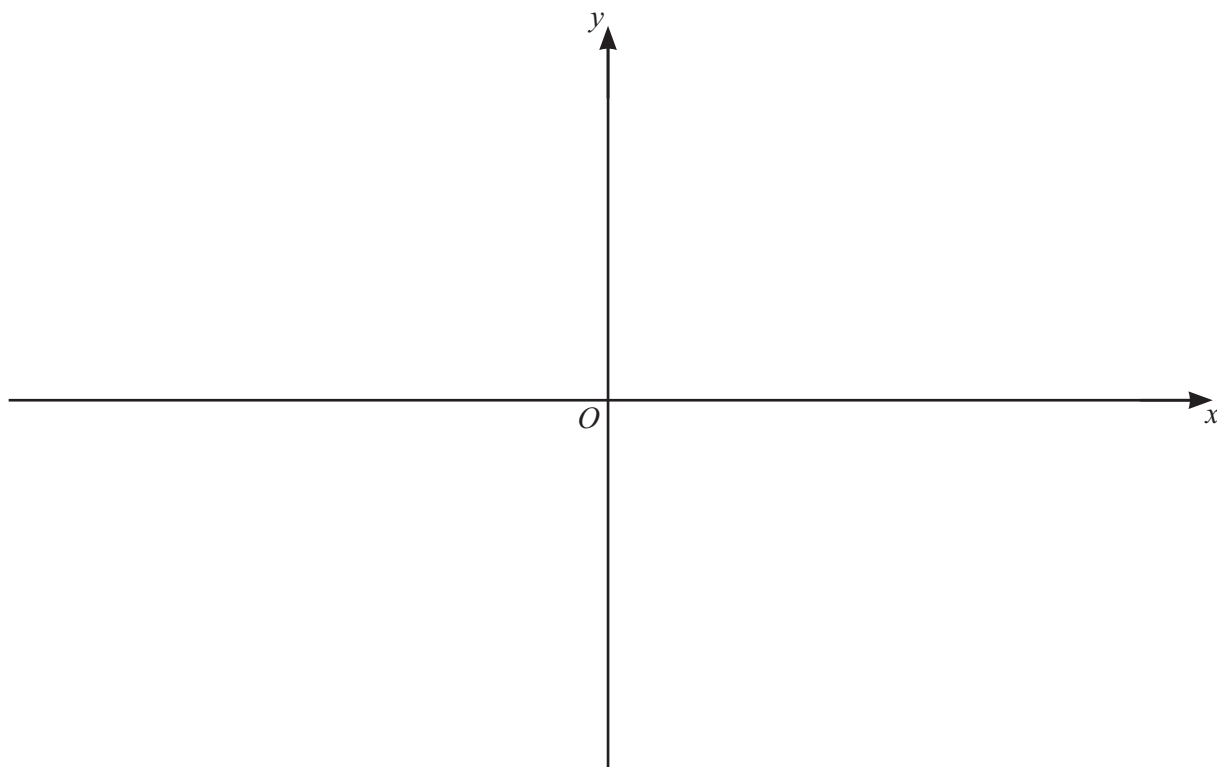
$$\Delta = \frac{1}{2} ab \sin C$$



- 1 (a) On the axes, sketch the graph of $y = \frac{1}{3}(2x-1)(x+3)(2x+5)$.

State the intercepts with the coordinate axes.

[3]



- (b) Solve the inequality $\frac{1}{3}(2x-1)(x+3)(2x+5) > 0$.

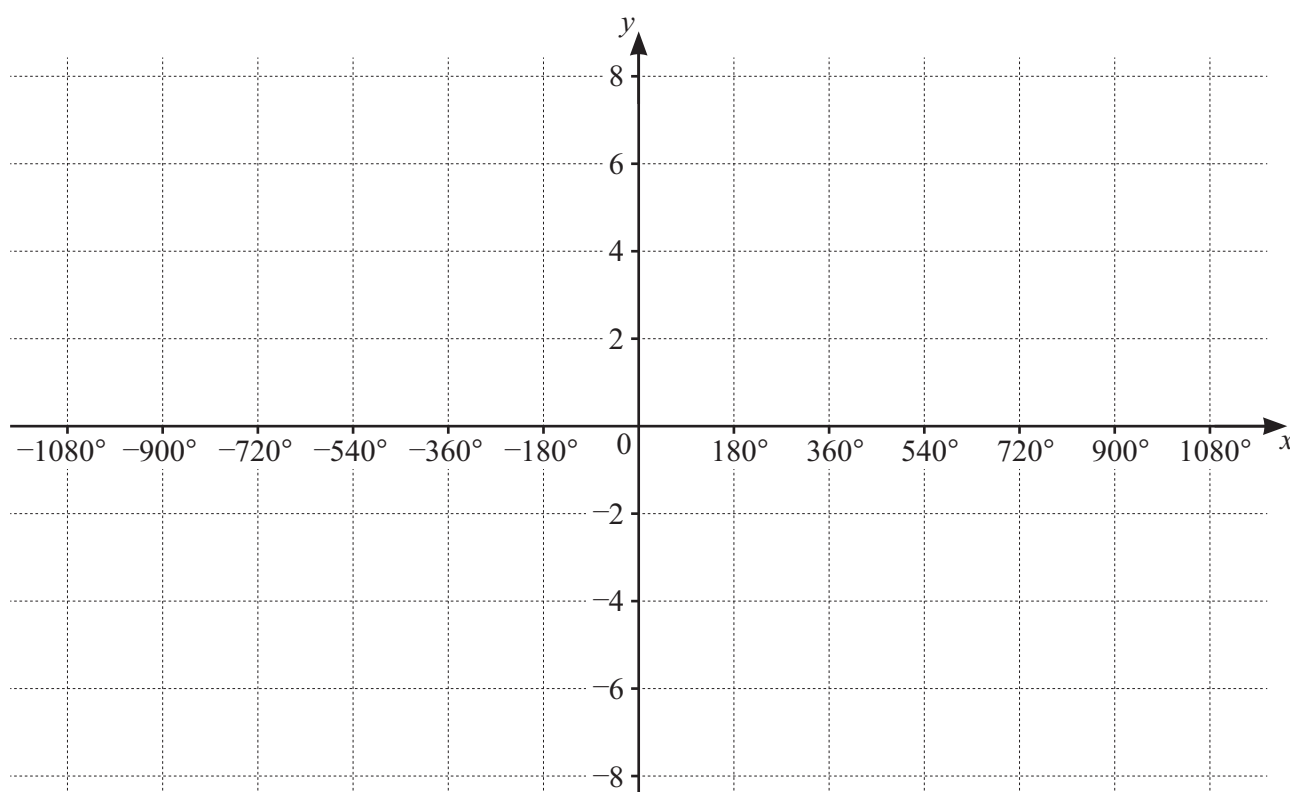
[2]

2 (a) Write down the amplitude of $4 \cos\left(\frac{x}{8}\right) + 2$. [1]

(b) Write down the period, in degrees, of $4 \cos\left(\frac{x}{8}\right) + 2$. [1]

(c) Solve the equation $4 \cos\left(\frac{x}{8}\right) + 2 = 0$ for $-1080^\circ \leq x \leq 1080^\circ$. [3]

(d) On the axes sketch the graph of $y = 4 \cos\left(\frac{x}{8}\right) + 2$ for $-1080^\circ \leq x \leq 1080^\circ$. [2]



- 3 An arithmetic progression has first term a and common difference d .

The 6th term is 1.5 times the 3rd term.

The sum of the first ten terms is 255.

- (a) Find the values of a and d .

[4]

- (b) Using your values of a and d , find the least number of terms for the sum of this arithmetic progression to be greater than 40 000.

[4]

- 4 It is given that x and y are variables.

When $\ln 3y$ is plotted against x^2 a straight line is obtained.

This straight line passes through the points (4.64, 12.24) and (6.84, 8.94).

- (a) Show that $y = ke^{ax^2}$ where k and a are exact constants. [6]

- (b) Find the value of y when $x = 3$. [1]

- (c) Find the values of x when $y = 10$. [2]





5 It is given that $y = \tan^3 5x$.

(a) Find $\frac{dy}{dx}$ in terms of $\tan 5x$.

[4]

(b) Hence solve the equation $\frac{dy}{dx} = 0$ for $0 \leq x < \frac{4\pi}{5}$.

[5]





6 A 5-digit number is to be formed from the digits 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9.

No digit may be used more than once in any 5-digit number.

Find how many of these 5-digit numbers are greater than 40 000 and divisible by 5.

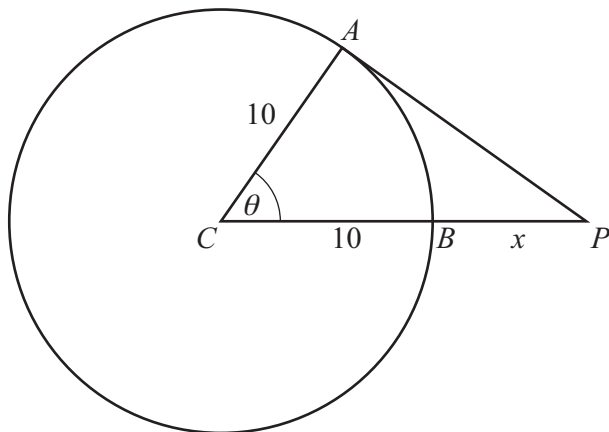
[3]



7 Find the term independent of x in the expansion of $(2 - 3x)^6 \left(1 + \frac{1}{4x}\right)^2$.

[6]

- 8 In this question lengths are in centimetres and angles are in radians.



The diagram shows a circle, centre C , radius 10.
The points A and B lie on the circumference of the circle.
The point P is such that CBP is a straight line.
The line BP has length x .
The line AP is a tangent to the circle at A .
Angle ACB is θ .
The perimeter of the triangle APC is 38.

- (a) Show that the value of θ is 0.885 radians correct to 3 decimal places.

[6]



(b) Find the length of the arc AB .

[1]

(c) Find the area of the sector ACB .

[1]

- 9 Solve the equation $5 - 2 \operatorname{cosec}(\theta - 0.5) = 0$ where θ is in radians and $-3.5 \leq \theta \leq 3.5$.

[5]

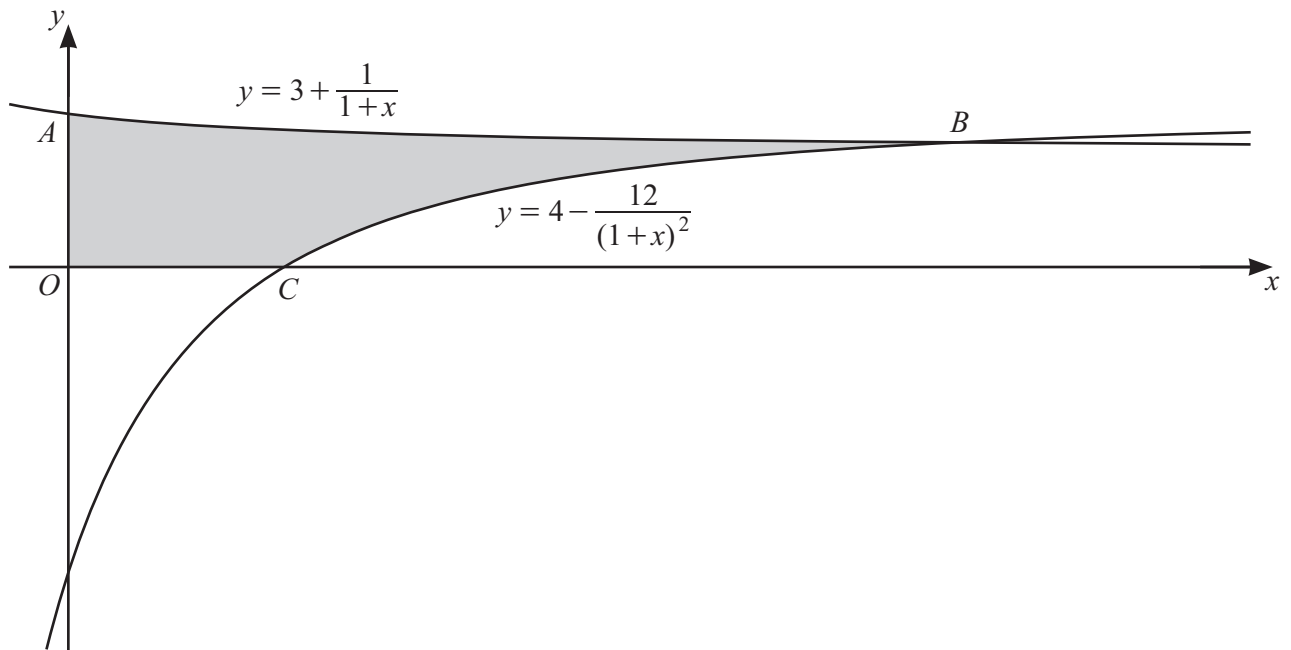
- 10 A curve has equation $y = x^2 \ln(3x^2 + 5)$.

The normal to the curve at the point where $x = -1$ meets the x -axis at the point P and the y -axis at the point Q .

Find the area of the triangle OPQ , where O is the origin.
Give your answer correct to 3 significant figures.

[10]

11



The diagram shows part of the curve $y = 3 + \frac{1}{1+x}$ and part of the curve $y = 4 - \frac{12}{(1+x)^2}$.

The curve $y = 3 + \frac{1}{1+x}$ meets the y -axis at the point A .

The curve $y = 4 - \frac{12}{(1+x)^2}$ meets the x -axis at the point C .

The curves intersect at the point B .

Find the area of the shaded region $OABC$.

Give your answer in exact form.

[10]





Continuation of working space for question 11.





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