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CAMBRIDGE International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

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.

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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

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

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

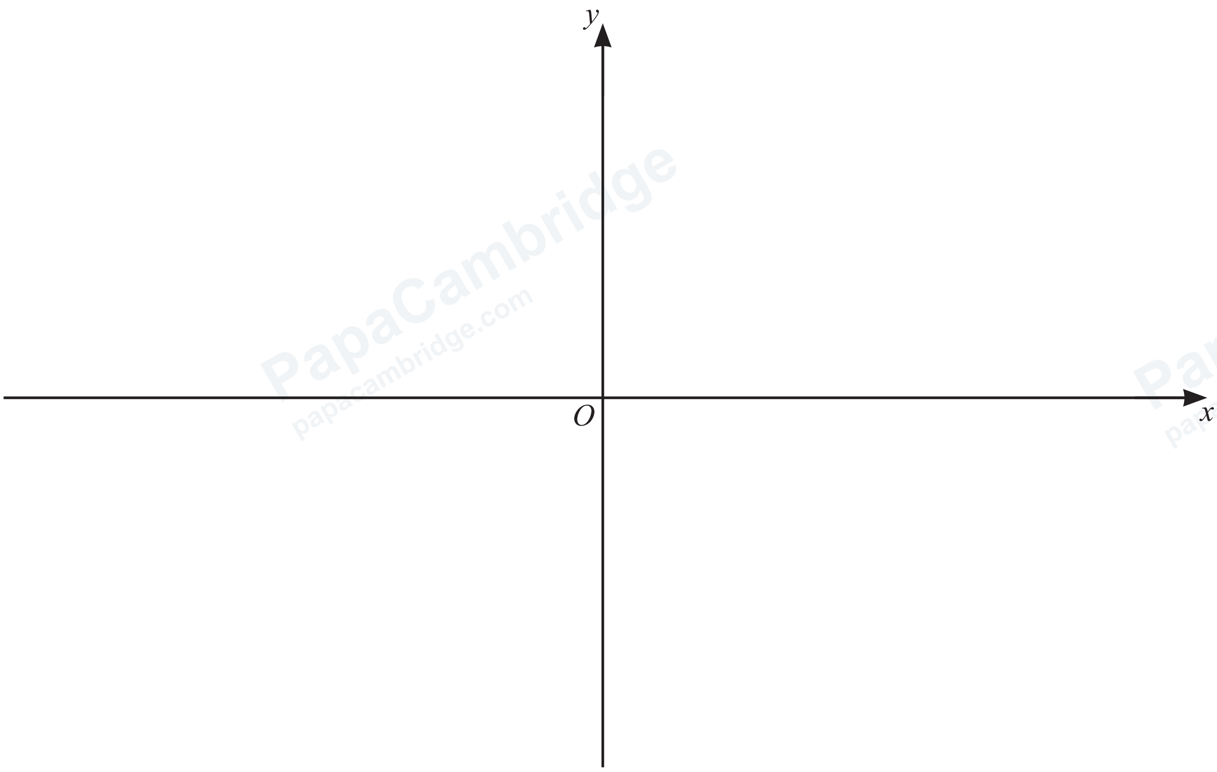
$$\sin^2 A + \cos^2 A = 1$$
$$\sec^2 A = 1 + \tan^2 A$$
$$\operatorname{cosec}^2 A = 1 + \cot^2 A$$

Formulas for ΔABC

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$
$$a^2 = b^2 + c^2 - 2bc\cos A$$
$$\Delta = \frac{1}{2}ab\sin C$$

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]



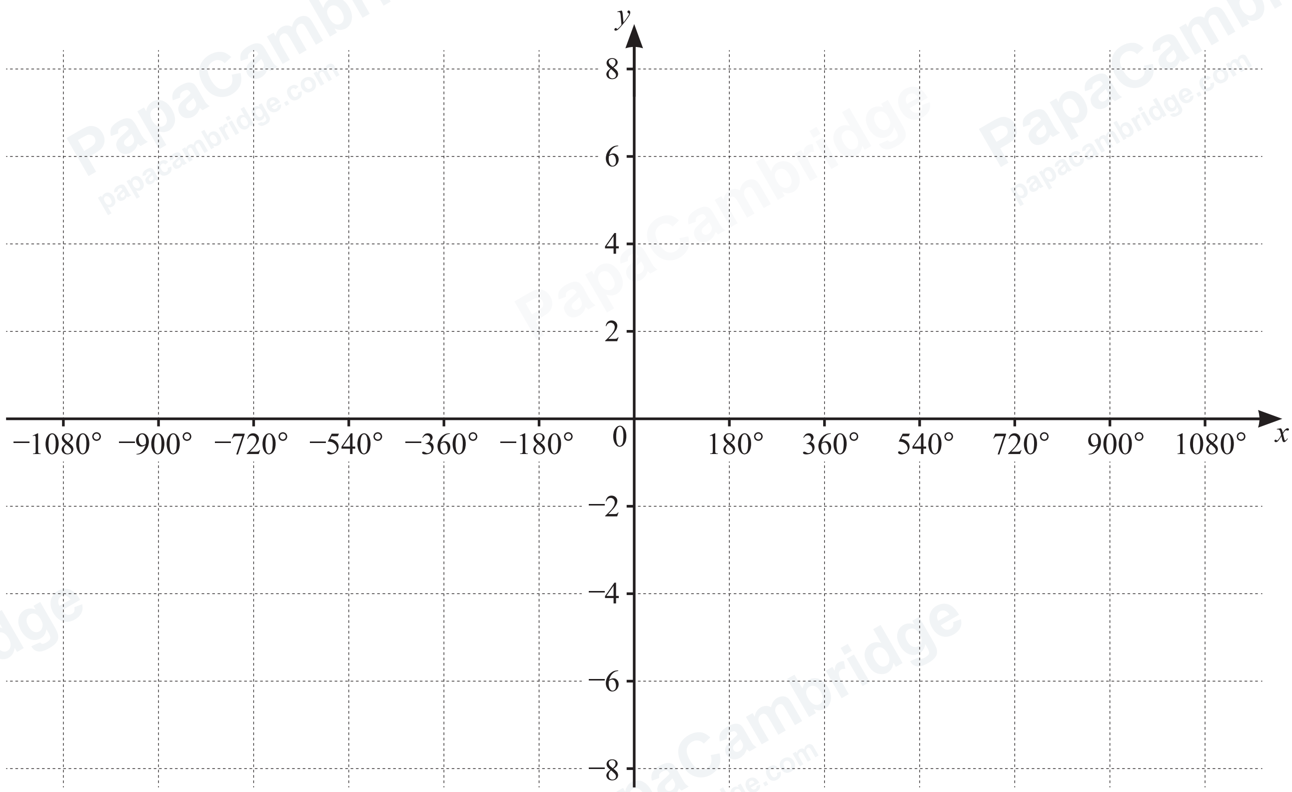
(b) Solve the inequality $\frac{1}{3}(2x-1)(x+3)(2x+5) > 0$. [2]

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 $-1080° \leqslant x \leqslant 1080°$. [3]

(d) On the axes sketch the graph of $y=4\cos\left(\frac{x}{8}\right)+2$ for $-1080° \leqslant x \leqslant 1080°$. [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 $y = k\mathrm{e}^{ax^2}$ 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 $0 \leqslant x < \frac{4\pi}{5}$. [5]

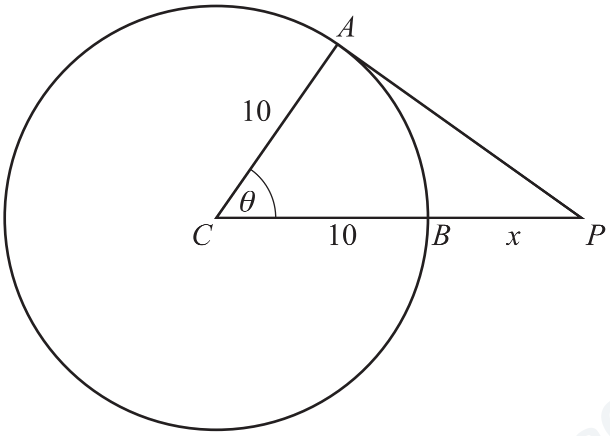
6 A 5-digit number is to be formed from the digits 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9.

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 $(2-3x)^6\left(1+\dfrac{1}{4x}\right)^2$. [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]

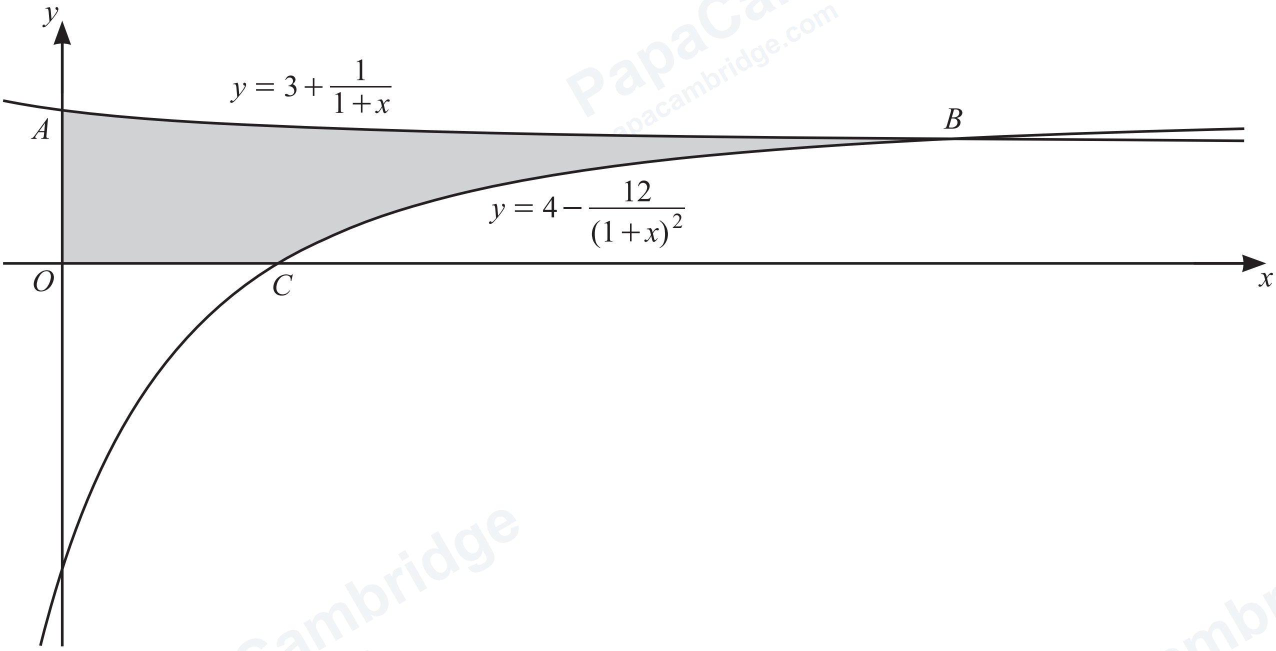
9 Solve the equation $5 - 2\,\mathrm{cosec}\,(\theta - 0.5) = 0$ where θ is in radians and $-3.5 \leqslant \theta \leqslant 3.5$. [5]

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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