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International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

* 9 9 3 3 2 7 3 3 1 0 *

MATHEMATICS **9709/12**

Paper 1 Pure Mathematics 1 **February/March 2026**

1 hour 50 minutes

You must answer on the question paper.

You will need: List of formulae (MF19)

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.
- If additional space is needed, you should use the lined page at the end of this booklet; the question number or numbers must be clearly shown.
- 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 75.
- 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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1 The equation of a curve is

$$y = x^3 - 3x^2 + 9.$$

Find the coordinates of the stationary points of the curve and determine their nature. [5]

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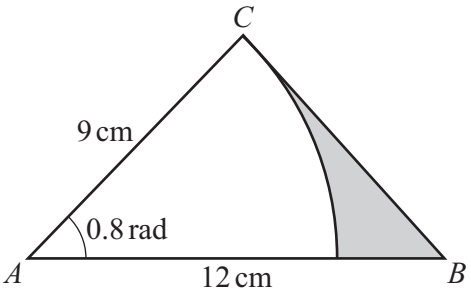

The diagram shows a triangle ABC with $AB = 12\,\text{cm}$, $AC = 9\,\text{cm}$ and angle $CAB = 0.8$ radians. An arc with centre A and radius 9 cm is drawn inside the triangle as shown. The shaded region is bounded by this arc, the line segment BC and part of the line segment AB.

(a) Find the perimeter of the shaded region. Give your answer correct to 3 significant figures. [4]

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(b) Find the area of the shaded region. Give your answer correct to 3 significant figures. [3]

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3 The graph of $y = ax^2 + bx + c$ has its vertex at $(3, -5)$ and intersects the y-axis at $(0, 31)$.

(a) Find the values of the constants a, b and c. [4]

(b) The graph is translated by the vector $\begin{pmatrix} -2 \\ 7 \end{pmatrix}$.

Find the equation of the translated graph. [2]

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4 The function f is defined by

$$\mathrm{f}(x) = \frac{2x+1}{x-3}$$

for $x < 3$.

(a) Find an expression for $\mathrm{f}^{-1}(x)$. [3]

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(b) Given that

$$\mathrm{ff}(x) \equiv \frac{px+q}{r+sx},$$

find the possible values of the integers p, q, r and s. [3]

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5 **(a)** Prove the identity

$$\frac{1}{1-\sin\theta}+\frac{1}{1+\sin\theta}\equiv\frac{2}{\cos^2\theta}.$$ [3]

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(b) Hence, solve the equation

$$\frac{3}{1-\sin\theta}+\frac{3}{1+\sin\theta}=12$$

for $0° \leqslant \theta \leqslant 360°$. [4]

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6 The equation of a circle is

$$x^2 + y^2 = \frac{45}{4}.$$

(a) State the centre and radius of the circle. [2]

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(b) The line $x + y = \frac{3}{2}$ intersects the circle at the points A and B.

Find the exact distance AB. [6]

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7 The equation of a curve, C, is such that

$$\frac{\mathrm{d}y}{\mathrm{d}x} = \frac{(x-3)^2}{\sqrt{x}}.$$

The curve passes through the point (4, 7).

(a) Find y in terms of x. [5]

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(b) The equation of a different curve, D, is also such that $\frac{\mathrm{d}y}{\mathrm{d}x} = \frac{(x-3)^2}{\sqrt{x}}$. This curve instead passes through the point $(4, k)$.

Describe, in terms of k, the transformation that maps curve C onto curve D. [2]

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8 **(a)** Find the complete expansion of $(3-2x)^4$. [3]

(b) Use your answer to **8(a)** to find $\left(3-2\sqrt{2}\right)^4$. Give your answer in the form $p+q\sqrt{2}$, where p and q are integers to be determined. [3]

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9 Solve the equation

$$x^{\frac{2}{3}} + (8x)^{\frac{1}{3}} = 24.$$ [4]

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10 The 7th term of an arithmetic progression is 77. The sum of the first n terms of the progression is denoted by S_n. It is given that $S_{11} = 880$.

(a) Find the 20th term of the progression. [4]

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(b) Find the smallest number of terms, N, such that $S_N < 50$. [4]

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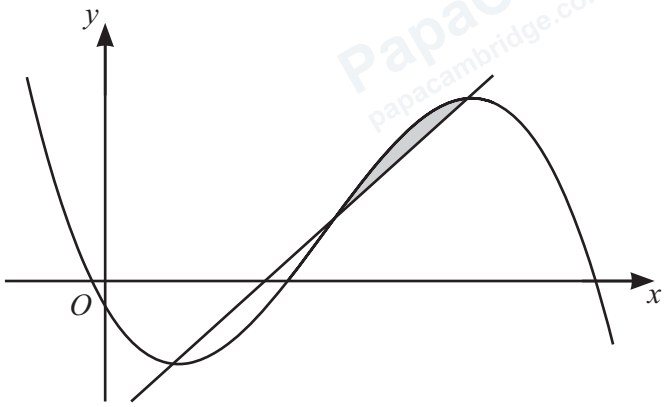

The diagram shows the curve with equation $y = -x^3 + 9x^2 - 15x - 3$ and a straight line. The straight line passes through the two stationary points of the curve.

(a) Show that the equation of the straight line is

$$y = 8x - 18.$$ [5]

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(b) Verify that the curve also meets the straight line when $x = 3$. [1]

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(c) The shaded region is bounded by the curve and the straight line.

Find the area of the shaded region. [5]

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Additional page

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