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CAMBRIDGE
International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

* 0 4 0 2 3 0 8 2 8 7 *

MATHEMATICS **9709/32**

Paper 3 Pure Mathematics 3 **May/June 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 **20** pages. Any blank pages are indicated.

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1 Solve the equation $\ln x + \ln(2x+1) = 2\ln(x+1)$. Give your answer correct to 3 significant figures. [4]

2 The parametric equations of a curve are

$$x = 3e^{2t}, \qquad y = (5 - e^{t})^3.$$

Find the exact gradient of the curve at the point where $t = \ln 2$, simplifying your answer. [4]

3 (a) Find the coefficient of x^3 in the expansion of $(5-3x)\sqrt{1+2x}$. [4]

(b) State the set of values of x for which the expansion is valid. [1]

4 The equation of a curve is $y = \dfrac{e^{-2x}\cos x}{3 + 2\sin x}$.

Find an equation of the tangent to the curve at the point where $x = 0$. Give your answer in the form $ay + bx = c$, where a, b and c are integers. [5]

5 Solve the equation $\tan\left(\theta + \frac{1}{4}\pi\right) + 3\cot\theta + 5 = 0$ for $-\pi < \theta < \pi$. [6]

6 (a) Show that $8\cos^4 x \equiv 3 + \cos 4x + 4\cos 2x$. [3]

(b) Find the exact value of $\displaystyle\int_{\frac{1}{6}\pi}^{\frac{1}{3}\pi} 8\cos^4 x \, dx$. [4]

7 With respect to the origin, O, the position vectors of the points A and B are given by

$$\overrightarrow{OA} = 2\mathbf{i} - 3\mathbf{j} + 4\mathbf{k},$$
$$\overrightarrow{OB} = 3\mathbf{i} + \mathbf{j} - 2\mathbf{k}.$$

(a) Find the exact value of the cosine of angle AOB. [3]

(b) The quadrilateral $OABC$ is a parallelogram.

Find the position vector of C. [2]

(c) Find the exact area of $OABC$. [3]

8 The variables x and y satisfy the differential equation

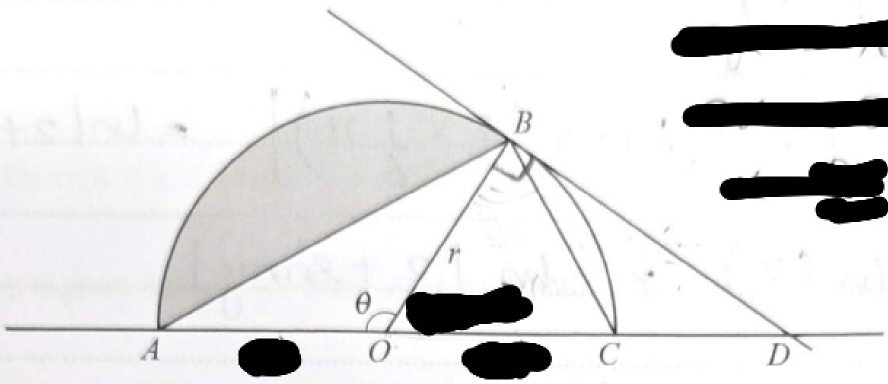
$$2(2+\sin y)\sin 2x = (1+2\cos 2x)\cos y\frac{\mathrm{d}y}{\mathrm{d}x}$$

for $-\frac{1}{3}\pi < x < \frac{1}{3}\pi$ and $0 < y < 2\pi$.

It is given that $y = \frac{1}{2}\pi$ when $x = \frac{1}{4}\pi$.

Solve the differential equation to obtain an equation in x and y, and hence find the values of y for which $x = \frac{1}{6}\pi$. [8]

9



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The diagram shows a semicircle ABC with radius r and centre O. The tangent at B intersects OC extended at D. The angle AOB is equal to θ radians. The area of triangle BCD is equal to half the area of the shaded region.

(a) Show that $2\tan(\pi-\theta) = \theta+\sin\theta$. [4]

(b) Verify by calculation that $2.1 < \theta < 2.2$. [2]

(c) Use the iterative formula

$$\theta_{n+1} = \pi - \tan^{-1}\left(\frac{\theta_n+\sin\theta_n}{2}\right)$$

to determine the value of θ correct to 3 decimal places. Give the result of each iteration to 5 decimal places. [3]

10 **(a)** Find the quotient and remainder when x^2 is divided by $x+2$. [2]

(b) Hence, find the exact value of

$$\int_0^4 x\ln(x+2)\,dx.$$

Give your answer in the form $p\ln 2+q\ln 3$, where p and q are integers. [7]

11 The polynomial $2z^4-3z^3-4z^2+z+30$ is denoted by $p(z)$.

(a) Show that $z=2-i$ is a root of $p(z)=0$. [3]

(b) Hence, find integers a and b for which z^2+az+b is a factor of $p(z)$. [3]

(c) Hence, find the exact complex numbers, z, which are roots of $p(z)=0$. [4]