Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

0698096858

ADDITIONAL MATHEMATICS **0606/22**

Paper 2 **May/June 2020**

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 or correction fluid.
- Do **not** write on any bar codes.
- 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 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages. Blank pages are indicated.

DC (PQ/CB) 183938/6

1 Variables x and y are such that $y = \sin x + \mathrm{e}^{-x}$. Use differentiation to find the approximate change in y as x increases from $\frac{\pi}{4}$ to $\frac{\pi}{4} + h$, where h is small. [4]

2 **DO NOT USE A CALCULATOR IN THIS QUESTION.**

The point $\left(1-\sqrt{5}, p\right)$ lies on the curve $y = \frac{10+2\sqrt{5}}{x^2}$. Find the exact value of p, simplifying your answer. [5]

3 Find the values of k for which the line $y = x - 3$ intersects the curve $y = k^2x^2 + 5kx + 1$ at two distinct points. [6]

4 The three roots of $\mathrm{p}(x) = 0$, where $\mathrm{p}(x) = 2x^3 + ax^2 + bx + c$ are $x = \frac{1}{2}$, $x = n$ and $x = -n$, where a, b, c and n are integers. The y-intercept of the graph of $y = \mathrm{p}(x)$ is 4. Find $\mathrm{p}(x)$, simplifying your coefficients. [5]

5 **Solutions to this question by accurate drawing will not be accepted.**

The points A and B are (4, 3) and (12, −7) respectively.

(a) Find the equation of the line L, the perpendicular bisector of the line AB. [4]

(b) The line parallel to AB which passes through the point (5, 12) intersects L at the point C. Find the coordinates of C. [4]

6 **(a)** Find the equation of the tangent to the curve $2y = \tan 2x + 7$ at the point where $x = \frac{\pi}{8}$.

Give your answer in the form $ax - y = \frac{\pi}{b} + c$, where a, b and c are integers. [5]

(b) This tangent intersects the x-axis at P and the y-axis at Q. Find the length of PQ. [2]

7 Giving your answer in its simplest form, find the exact value of

(a) $\displaystyle\int_0^4 \frac{10}{5x+2}\,\mathrm{d}x$, [4]

(b) $\displaystyle\int_0^{\ln 2} \left(\mathrm{e}^{4x+2}\right)^2 \mathrm{d}x$. [5]

8 **(a)** Solve $3\cot^2 x - 14\operatorname{cosec} x - 2 = 0$ for $0° < x < 360°$. [5]

(b) Show that $\dfrac{\sin^4 y - \cos^4 y}{\cot y} = \tan y - 2\cos y \sin y$. [4]

9 **(a)** Solve the equation $\dfrac{9^{5x}}{27^{x-2}} = 243.$ [3]

(b) $\log_a \sqrt{b} - \dfrac{1}{2} = \log_b a$, where $a > 0$ and $b > 0$.

Solve this equation for b, giving your answers in terms of a. [5]

10 **(a)** The first 5 terms of a sequence are given below.

$$4 \qquad -2 \qquad 1 \qquad -0.5 \qquad 0.25$$

(i) Find the 20th term of the sequence. [2]

(ii) Explain why the sum to infinity exists for this sequence and find the value of this sum. [2]

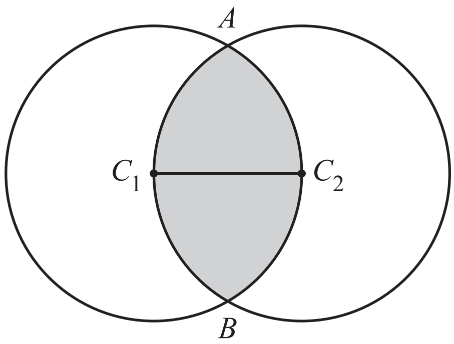
(b) The tenth term of an arithmetic progression is 15 times the second term. The sum of the first 6 terms of the progression is 87.

(i) Find the common difference of the progression. [4]

(ii) For this progression, the nth term is 6990. Find the value of n. [3]

Question 11 is printed on the next page.

11



The circles with centres C_1 and C_2 have equal radii of length r cm. The line C_1C_2 is a radius of both circles. The two circles intersect at A and B.

(a) Given that the perimeter of the shaded region is 4π cm, find the value of r. [4]

(b) Find the exact area of the shaded region. [4]

