Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

0123456789

ADDITIONAL MATHEMATICS 0606/01

Paper 1 Non-calculator **For examination from 2025**

SPECIMEN PAPER **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.
- Calculators must **not** be used in this paper.
- You must show all necessary working clearly.

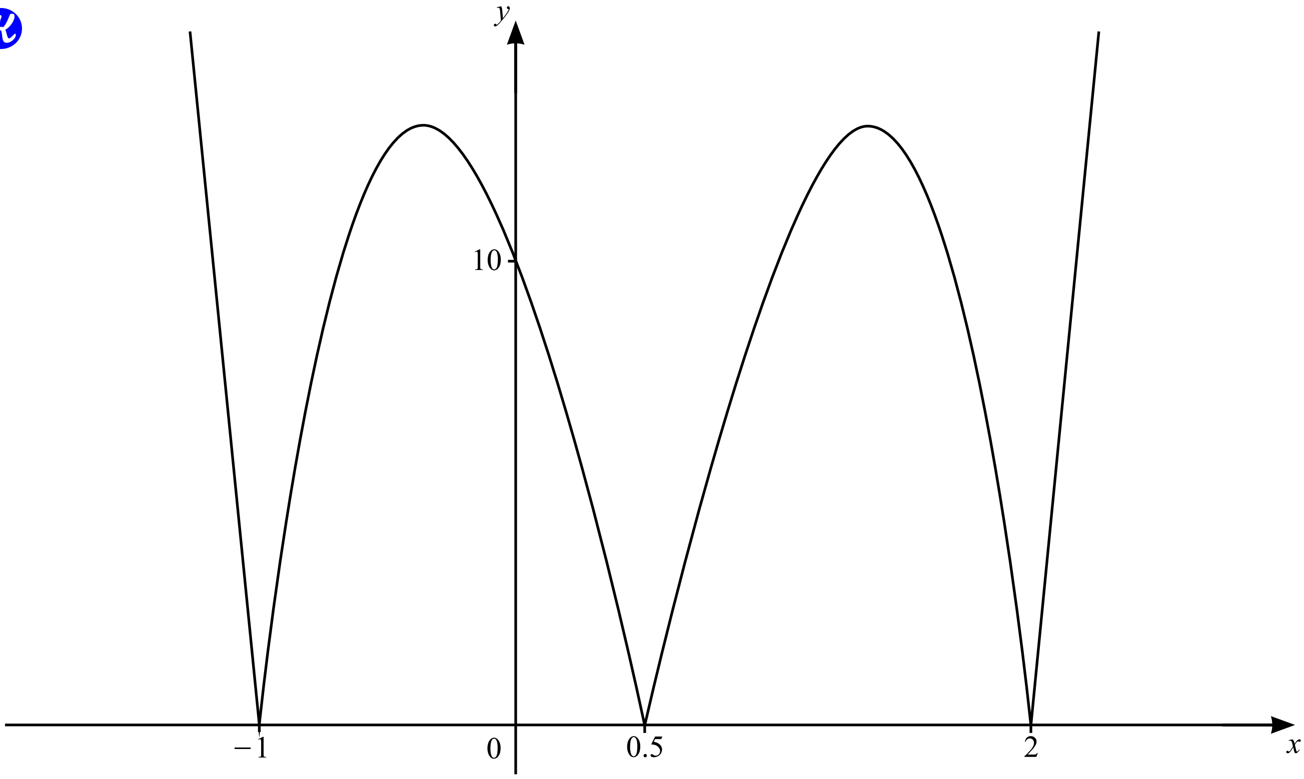
INFORMATION

- 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.

Calculators must **not** be used in this paper.

1



The diagram shows the graph of $y = |f(x)|$, where $f(x)$ is a cubic function.

Find the possible expressions for $f(x)$ in factorised form. [3]

2 The polynomial $p(x) = 6x^3 + ax^2 + bx + 2$, where a and b are integers, has a factor of $x - 2$.

(a) Given that $p(1) = -2p(0)$, find the values of a and b. [4]

(b) Using your values of a and b,

(i) find the remainder when $p(x)$ is divided by $2x - 1$ [2]

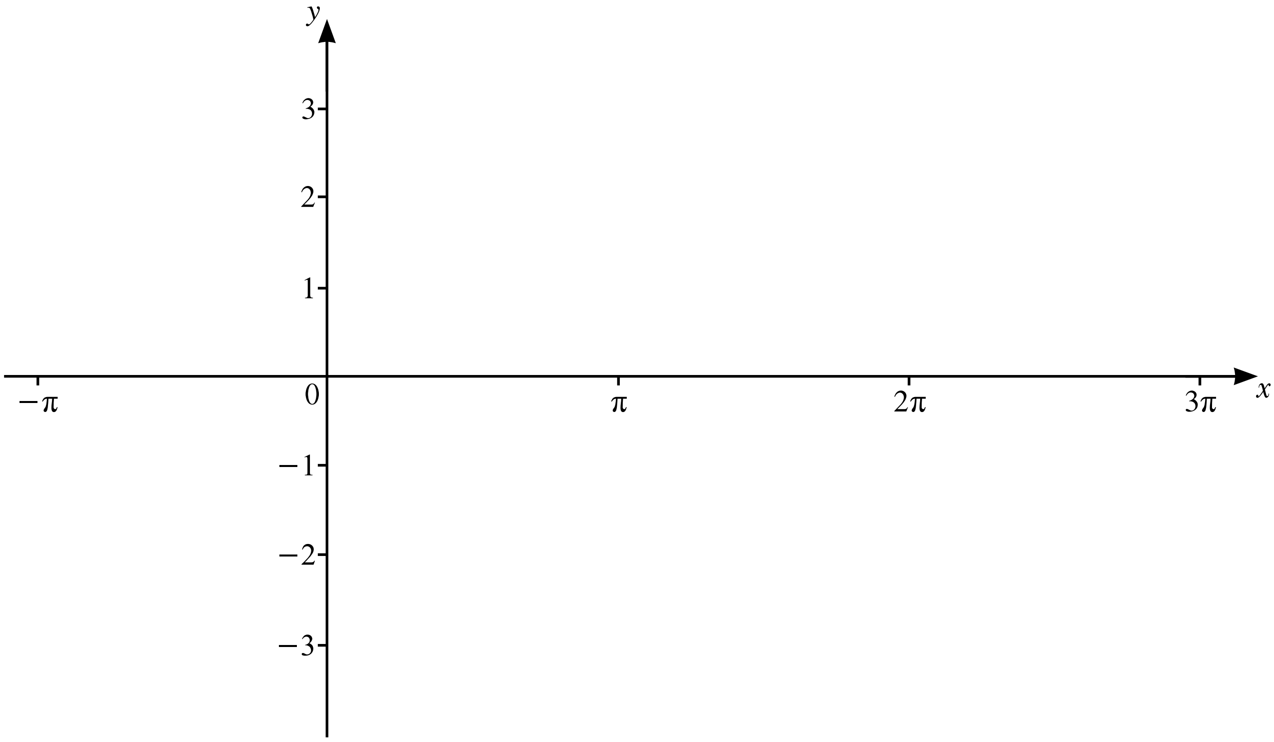
(ii) factorise $p(x)$. [2]

3 In this question, all angles are in radians.

(a) Write down the amplitude of $2\cos\dfrac{x}{3} - 1$. [1]

(b) Write down the period of $2\cos\dfrac{x}{3} - 1$. [1]

(c) On the axes below, sketch the graph of $y = 2\cos\dfrac{x}{3} - 1$ for $-\pi \leqslant x \leqslant 3\pi$. [3]



4 The parallelogram $OABC$ is such that $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OC} = \mathbf{c}$. The point D lies on OC such that $OD:DC = 1:2$. The point E lies on AC such that $AE:EC = 2:1$.

Show that $\overrightarrow{OB} = k\overrightarrow{DE}$, where k is an integer to be found. [5]

5 **(a)** Given that $\log_a p + \log_a 5 - \log_a 4 = \log_a 20$, find the value of p. [2]

(b) Solve the equation $3^{2x+1} + 8(3^x) - 3 = 0$. [3]

(c) Solve the equation $4\log_y 2 + \log_2 y = 4$. [3]

6 **(a)** $f(x) = 3e^{2x} + 1$ for $x \in \mathbb{R}$

$g(x) = x + 1$ for $x \in \mathbb{R}$

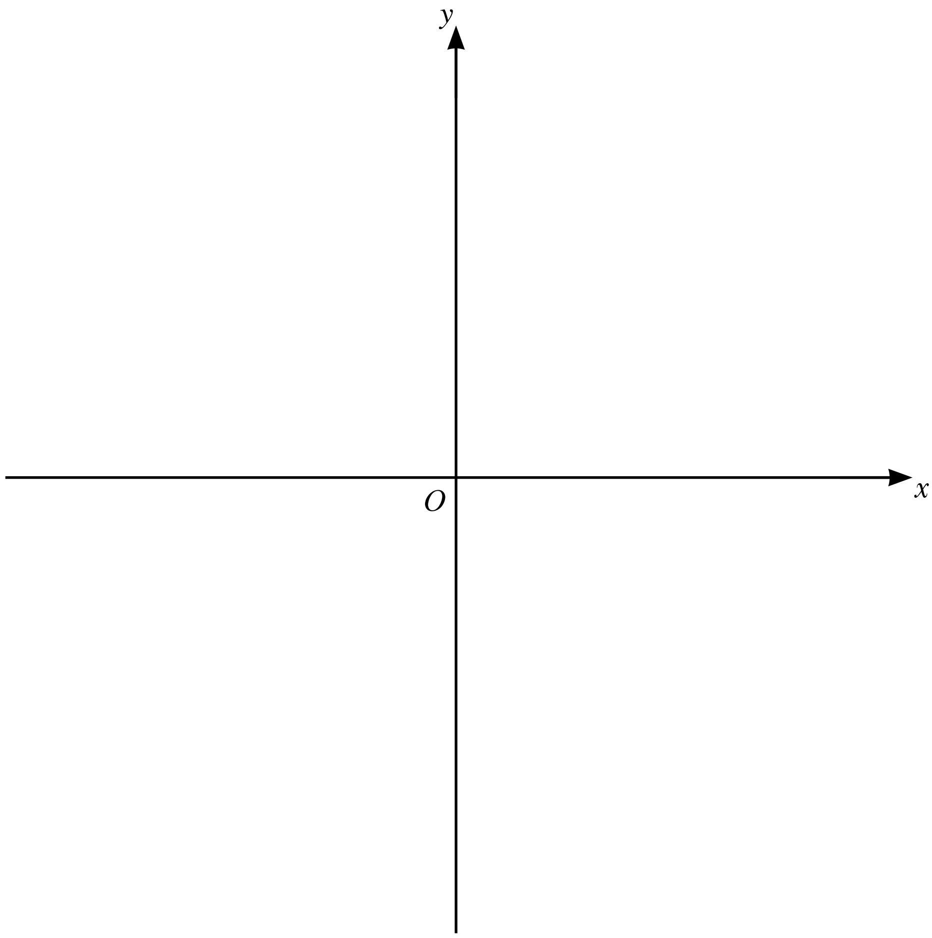
(i) Write down the range of f and the range of g. [2]

(ii) Find $g^2(0)$. [1]

(iii) Hence find $fg^2(0)$. [2]

(iv) On the axes below, sketch the graphs of $y = f(x)$ and $y = f^{-1}(x)$.

State the intercepts with the coordinate axes and the equations of any asymptotes. [4]



(b) It is given that $h(x) = a + \frac{b}{x^2}$, where a and b are constants.

(i) Explain why $-2 \leqslant x \leqslant 2$ is not a suitable domain for $h(x)$. [1]

(ii) Given that $h(1) = 4$ and $h'(1) = 16$, find the values of a and b. [2]

7 **(a)** In an arithmetic progression, the 5th term is equal to $\frac{1}{3}$ of the 16th term. The sum of the 5th term and the 16th term is equal to 33.

Find the sum of the first 10 terms of this progression. [6]

(b) In a geometric progression, the sum of the first two terms is equal to 16. The sum to infinity is equal to 25.

Find the possible values of the first term. [6]

8 **(a)** Given that $\int_1^a \left(\frac{2}{2x+3}+\frac{3}{3x-1}-\frac{1}{x}\right)\mathrm{d}x = \ln 2.4$, where $a>1$, find the value of a. [7]

(b) **(i)** Find $\dfrac{\mathrm{d}}{\mathrm{d}x}(6\sin^3 kx)$, where k is a constant. [2]

(ii) Hence find $\int(\sin^2 2x\cos 2x)\,\mathrm{d}x$. [2]

9 In this question, the units are metres and seconds.

A particle P is travelling in a straight line. Its acceleration, a, away from a fixed point O, at time t, is given by $a = (3t+2)^{-\frac{1}{3}}$, where $t \geqslant 0$.

When $t = 2$, P is travelling with a velocity of 8 and has a displacement of -4.8 from O.

(a) Find an expression for the velocity of P at time t. [3]

(b) Explain why P is never at rest. [1]

(c) Find the displacement of P from O when $t = \dfrac{25}{3}$. [4]

10 A circle has a centre $(2, -4)$ and radius 3.
The line $y = 2x - 3$ intersects the circle at points A and B.
The perpendicular bisector of line AB intersects the circle at points X and Y.

Find the area of kite $AXBY$. [8]