Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME						
CENTRE NUMBER					CANDIDATE NUMBER	

0123456789

ADDITIONAL MATHEMATICS **0606/02**

Paper 2 **For examination from 2025**

PRACTICE 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.
- 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.

v1

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. $A = \pi rl$

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

$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

$a^2 = b^2 + c^2 - 2bc\cos A$

$\Delta = \frac{1}{2}ab\sin C$

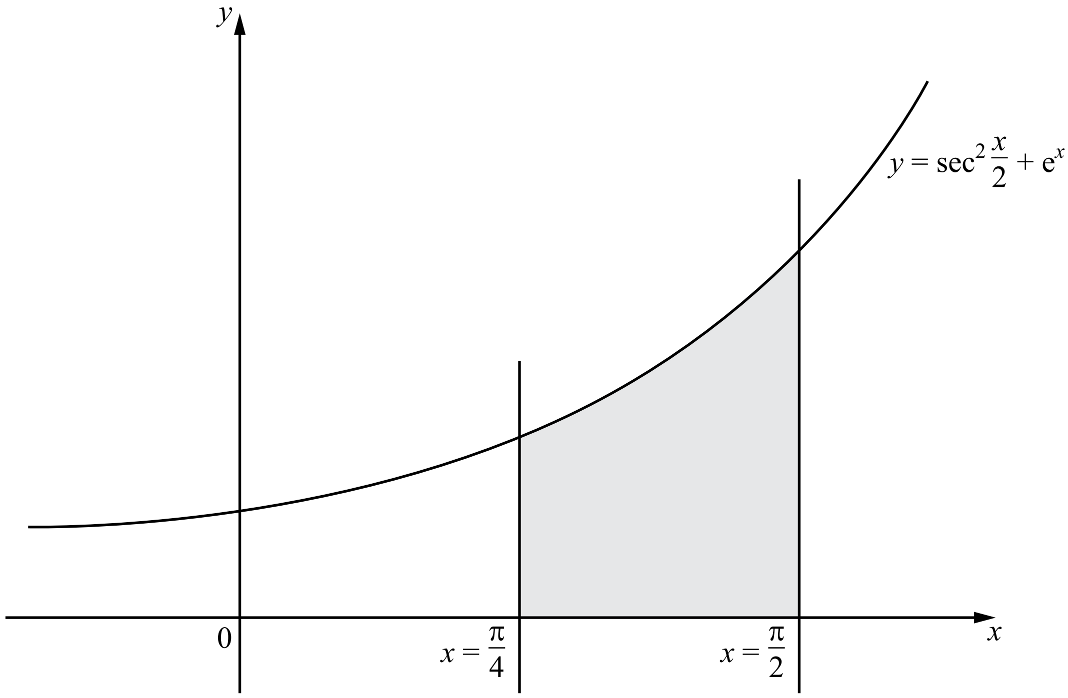
1 Variables b and t are related by the equation $b = P + Qe^{2t}$ where P and Q are constants.
It is given that when $t = 0$, $b = 500$ and when $t = 1$, $b = 600$.

(a) Find the value of b when $t = 2$. [5]

(b) Find the smallest value of t that gives a value of b greater than 2 000 000. [3]

2 Find the coefficient of x^2 in the expansion of $\left(x-\dfrac{3}{x}\right)\left(x+\dfrac{2}{x}\right)^5$. [5]

3



The graph shows part of the curve $y = \sec^2\frac{x}{2} + e^x$ and the lines $x = \frac{\pi}{4}$ and $x = \frac{\pi}{2}$.

Find the area of the shaded region.
Give your answer correct to 2 decimal places. [5]

4 **(a)** In an arithmetic progression the first term is 176 and the tenth term is 149.

(i) Find the common difference of the progression. [2]

(ii) Find the least number of terms for their sum to be negative. [3]

(b) In a geometric progression the first term is 3 and the second term is 2.4.

(i) Find the sum of the first 8 terms of the progression. [3]

(ii) Find the sum to infinity of the progression. [1]

(iii) Starting with the 10th term, find the sum of 50 terms of the progression. [4]

5 **(a)** 4-digit numbers are to be formed using four of the digits 2, 3, 7, 8 and 9.
Each digit may be used once only in any 4-digit number.

(i) Find how many 4-digit numbers can be formed when there are no restrictions. [1]

(ii) Find how many 4-digit numbers can be formed when the number is even. [1]

(iii) Find how many 4-digit numbers can be formed when the number is greater than 7000 and odd. [3]

(b) Find the number of ways 12 people can be put into 3 groups containing 3, 4 and 5 people. [3]

6 A curve has equation $y = \dfrac{\ln(3x^2 - 5)}{2x + 1}$ for $3x^2 > 5$.

(a) Find the equation of the normal to the curve at the point where $x = \sqrt{2}$. [6]

(b) Find the approximate change in y as x increases from $\sqrt{2}$ to $\sqrt{2} + h$ where h is small. [1]

7 Solve the equation $5\tan x - 3\cot x = 2\sec x$ for $0° \leqslant x \leqslant 360°$. [6]

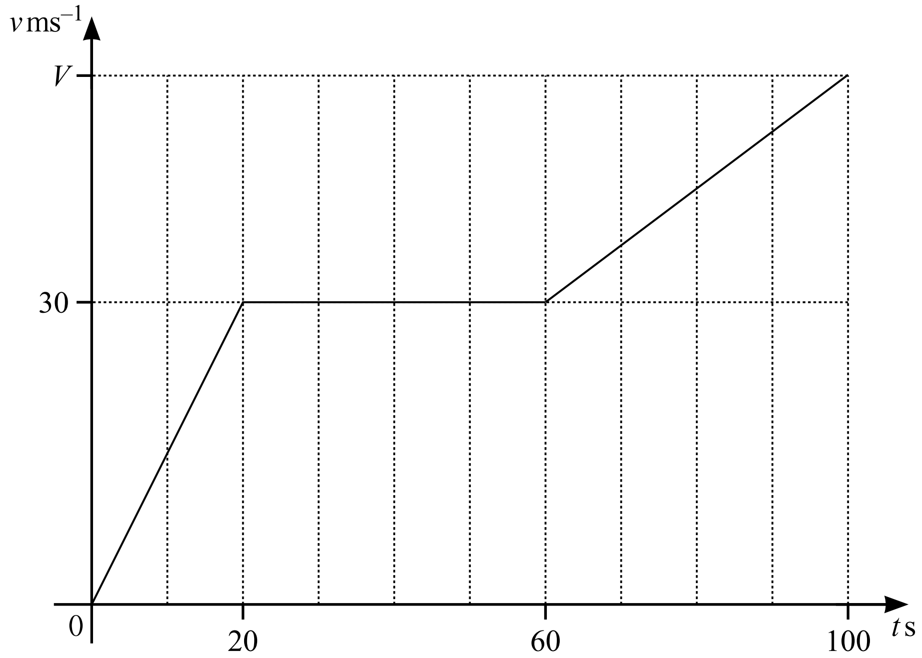
8 A curve has equation $y = (2x - 1)\sqrt{4x + 3}$.

(a) Show that $\dfrac{\mathrm{d}y}{\mathrm{d}x} = \dfrac{k(3x + 1)}{\sqrt{4x + 3}}$, where k is a constant. [5]

(b) Hence write down the x-coordinate of the stationary point of the curve. [1]

(c) Determine the nature of this stationary point. [2]

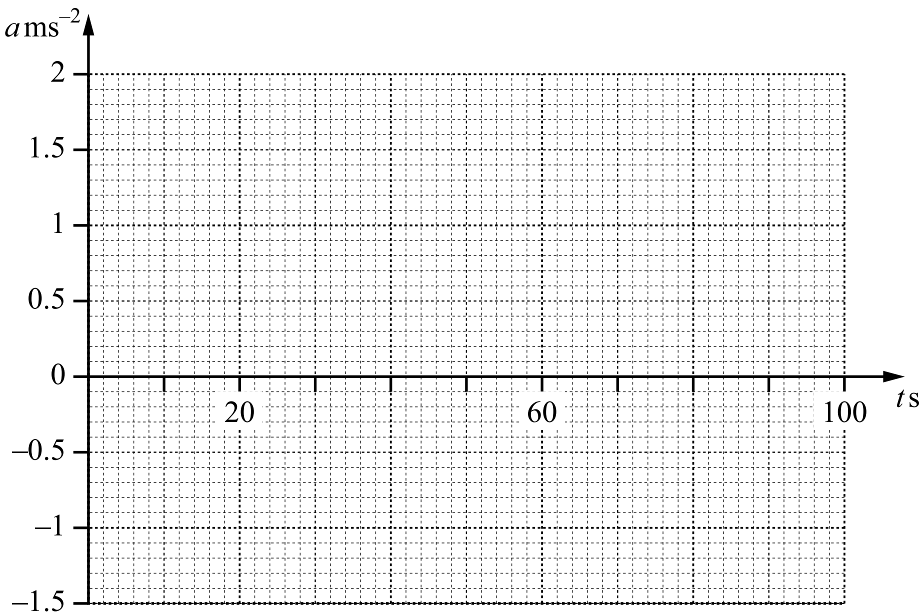
9



(a) The diagram shows the velocity–time graph of a particle P.
P travels 3260 m in 100 s, reaching a final velocity of V ms^{-1}.

(i) Find the value of V. [3]

(ii) On the axes below, draw the acceleration–time graph for P. [2]

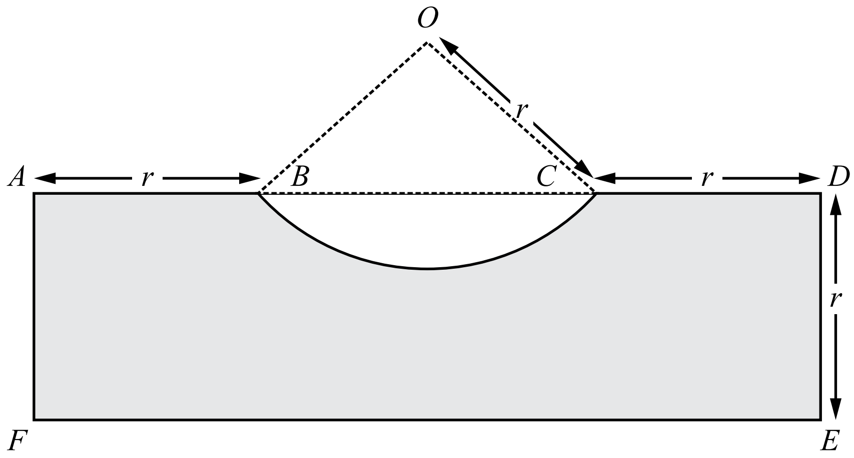


(b) Particle Q is travelling in a straight line.
The acceleration, $a\,\mathrm{ms}^{-2}$, of Q is given by $a = 6\cos 2t$ at time t s.
When $t = 0$, Q is at point O and is travelling with a velocity of $10\,\mathrm{ms}^{-1}$.

(i) Find the velocity of Q at time t. [3]

(ii) Find the displacement of Q from O at time t. [3]

10 In this question all lengths are in centimetres and all angles are in radians.



The diagram shows the rectangle $ADEF$, where $AF = DE = r$.
The points B and C lie on AD such that $AB = CD = r$.
The curve BC is an arc of the circle, centre O, radius r.
Arc BC has a length of $1.5r$.

(a) Show that the perimeter of the shaded region is $(7.5 + 2\sin 0.75)r$. [5]

(b) Find the area of the shaded region.
Give your answer in the form kr^2, where k is a constant correct to 2 decimal places. [4]

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