Cambridge Assessment International Education

# Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER



**ADDITIONAL MATHEMATICS** **0606/22**

Paper 2 **February/March 2025**

**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 $\pi$, 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.




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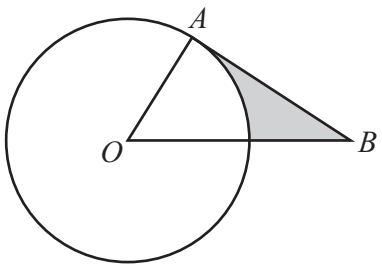
1




The diagram shows a circle with centre $O$ and radius 5 cm.
The point $A$ lies on the circle.
The point $B$ is such that the line $AB$ is a tangent to the circle.
$OB$ has length 13 cm.

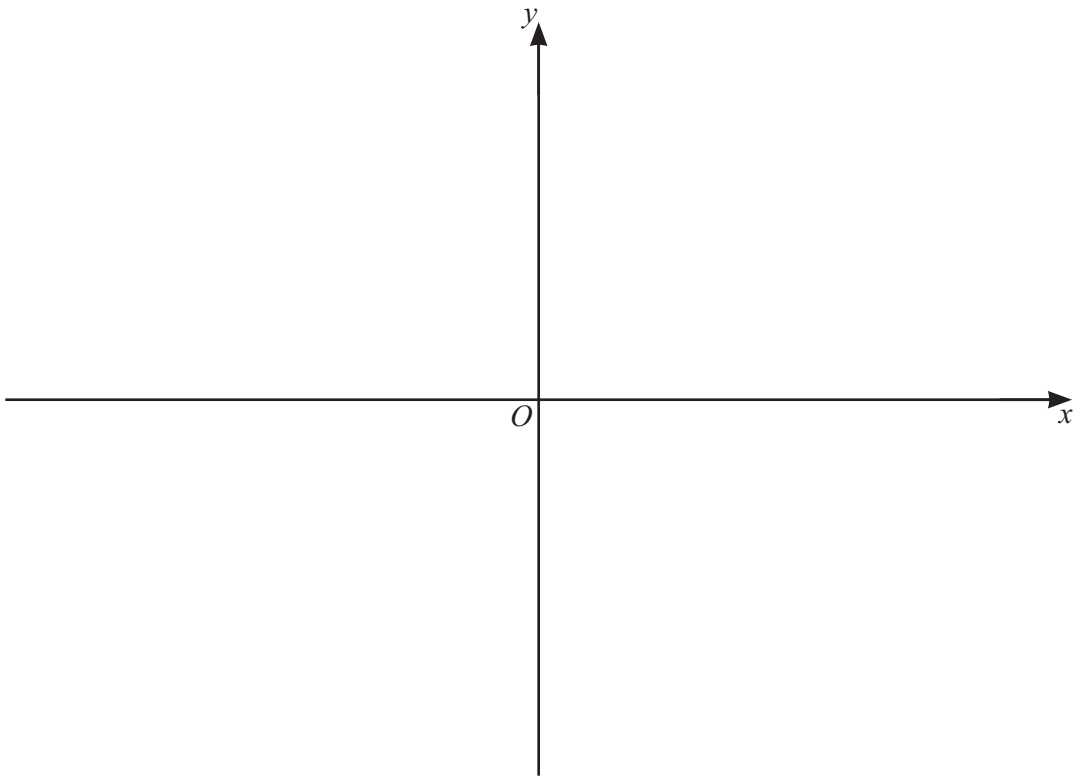
**(a)** Find angle $AOB$, giving your answer in radians. [2]

**(b)** Find the perimeter of the shaded region. [3]

**(c)** Find the area of the shaded region. [3]

**2** **(a)** Find the $x$-coordinates of the stationary points on the curve $y = \frac{1}{2}(3-2x)(x+2)^2$. [4]

**(b)** On the axes, sketch the graph of $y = \frac{1}{2}(3-2x)(x+2)^2$ stating the intercepts with the coordinate axes. [3]




**(c)** Find the values of $k$ for which the equation $\frac{1}{2}(3-2x)(x+2)^2 = k$ has three real and distinct roots. [2]

**3** Solve the equation $6x^{\frac{3}{5}} + 1 = \dfrac{12}{x^{\frac{3}{5}}}$, giving your answers correct to 2 decimal places. [4]

**4** **(a)** A team of 10 players is to be chosen from 15 players.

**(i)** Find the number of different teams that can be chosen if there are no restrictions. [1]

The 15 players include 3 sisters who must **not** be separated.

**(ii)** Find the number of different teams that can be chosen. [3]

**(b)** A 6-digit number is to be formed using the digits 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9.
The 6-digit number cannot start with 0 and all six digits must be different.

Find how many 6-digit numbers can be formed if the 6-digit number is even. [3]

**5** When $e^{y}$ is plotted against $x^2$, a straight-line graph with gradient $-3$ is obtained. The line passes through the point $(4.30, 5.85)$.

**(a)** Find $y$ in terms of $x$. [4]

**(b)** Find the values of $x$ for which $y$ exists. [3]

**6** It is given that $y = \dfrac{\ln\left(2x^2+1\right)}{x+2}$.

**(a)** Find $\dfrac{\mathrm{d}y}{\mathrm{d}x}$. [3]

**(b)** Given that $x$ increases from 2 to $2+h$, where $h$ is small, find the approximate change in $y$. [2]

**(c)** Given that $y$ is decreasing by 0.4 units per second, find the corresponding rate of change in $x$ when $x = 2$. [3]

**7** It is given that $f(x) = 2e^x + a$ for $x \geqslant 0$, where $a$ is an integer

and $g(x) = \sqrt{x-1}$ for $x \geqslant 1$.

**(a)** Find the least value of $a$ so that the function gf exists for all $x \geqslant 0$. [2]

**(b)** In the case where $a = 5$, solve the equation $gf(x) = 3$.
Give your answer correct to 3 decimal places. [3]

**8** **(a)** Show that $\dfrac{\sin\theta\tan^2\theta}{1+\tan^2\theta}$ can be written as $\sin^3\theta$. [2]

**(b)** Hence solve the equation $\dfrac{\sin 3x\tan^2 3x}{1+\tan^2 3x} = \dfrac{1}{8}$ for $-180° \leqslant x \leqslant 180°$. [5]

**9** In this question, all lengths are in metres and time is in seconds.

A particle, $P$, moves in a straight line such that $t$ seconds after passing through a fixed point $O$ its displacement, $s$, is given by $s = 5\ln(2t+1) - 5t$.

**(a)** Find the value of $t$ for which $P$ is instantaneously at rest. [4]

**(b)** Find the distance $P$ travels between $t = 0$ and $t = 2$. [4]

**(c)** Find an expression for the acceleration of $P$ in terms of $t$. [2]

**(d)** Find the acceleration when $t = 4.5$. [1]

**10** The expansion of $(ax-2)^4\left(1+\frac{b}{x}\right)^3$ is written in descending powers of $x$.

The first 3 terms of this expansion are $81x^4+999x^3+cx^2$.
It is given that $a$, $b$ and $c$ are positive integers.

Find the values of $a$, $b$ and $c$. [10]

**11** Solve the equation $\cot(y+1.5)=3$ where $y$ is in radians and $0<y<6$. [4]