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# Cambridge IGCSE™

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| CANDIDATE NAME | | |
| CENTRE NUMBER | | CANDIDATE NUMBER |

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

Paper 2 **May/June 2026**

**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. Do **not** use correction fluid or tape.
- 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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## 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 $l$. $A = \pi r l$

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 $\Delta ABC$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$
$$a^2 = b^2 + c^2 - 2bc\cos A$$
$$\Delta = \frac{1}{2}ab\sin C$$

**1** The point $A$ is the minimum point on the curve $y = x^2 - 6x + 10$.

**(a)** Using the method of completing the square, find the coordinates of $A$. [2]

**(b)** The point $B$ has coordinates (6, 7).
The curve cuts the $y$-axis at the point $C$.

Find the equation of the line through $B$ parallel to the line $AC$. [2]

2 Show that there is no real value of $k$ for which the equation

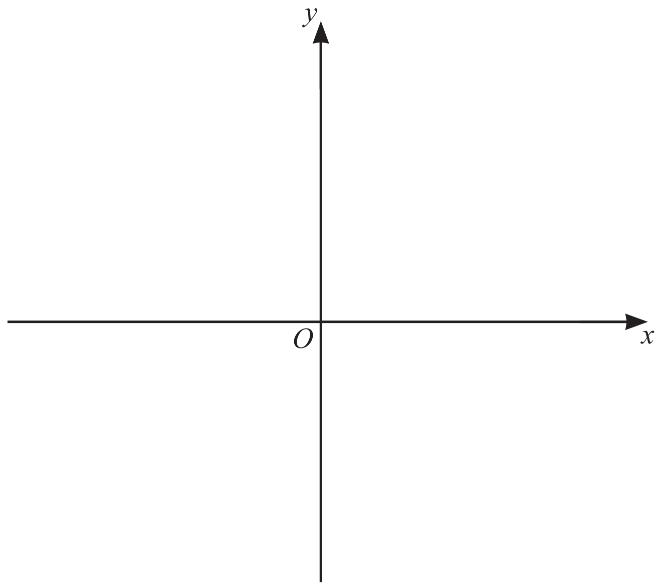
$$(k-2)x^2+(2k+3)x+3=0$$

has two equal roots. [3]

3 **(a)** Differentiate $y=\sqrt{x+1}+\cos(5x+3)$ with respect to $x$. [3]

**(b)** Find $\int \sec^2 \frac{x}{3} \mathrm{d}x$. [3]

**4** **(a)** On the axes, sketch the graph of $y=|x^2-5|$.
State the intercepts with the coordinate axes. [3]




**(b)** It is given that $f(x)=ax+b$ where $a$ and $b$ are non-zero integers.
The solutions of the equation $|f(x)|=4$ are $x=2.5$ and $x=-1.5$.

Find the possible expressions for $f(x)$. [4]

**5** **(a)** In this question, 6-digit numbers do not start with 0.

Find how many 6-digit numbers have 6 different digits and are divisible by 2. [3]

**(b)** A committee of 10 people is to be selected from 9 students and 7 teachers.

Find the number of different committees that can be selected if the committee must have at least 4 students and at least 4 teachers. [3]

**6** In this question, $a$, $b$ and $c$ are integers.

When the expansion of $(a+x)^4(1+ax)^5$ is written in ascending powers of $x$, the first three terms are $16+bx+cx^2$.

Find all the possible values of $a$, $b$ and $c$. [8]

7 In this question, $\mathbf{i}$ is a unit vector due east and $\mathbf{j}$ is a unit vector due north.
Distances are measured in kilometres and time is measured in hours.

Point $P$ has position vector $2\mathbf{i}+5\mathbf{j}$ relative to an origin $O$.
At 13 00, boat $A$ sails from point $P$ with velocity vector $8\mathbf{i}+8\mathbf{j}$.

**(a)** Find the position vector of $A$ at the end of 2 hours of sailing. [1]

**(b)** Write down the position vector of $A$ at the end of $t$ hours of sailing. [1]

**(c)** Point $Q$ has position vector $20\mathbf{i}+8\mathbf{j}$ relative to the origin $O$.
At 15 00, boat $B$ sails from point $Q$ on a bearing of 300° with a constant speed of $5\sqrt{3}$.

Find the position vector of $B$ at 17 00. [3]

**(d)** Find the distance between the two boats at 17 00. [3]

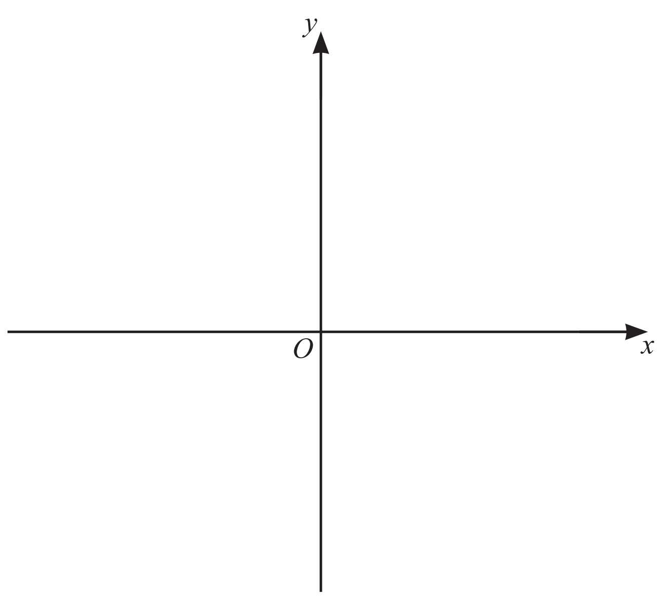
8 The function f is defined, for $x \geqslant -1$, by $\mathrm{f}(x) = 1 + 2^{x}$.

(a) Find the range of f. [1]

(b) (i) Write down the domain of $\mathrm{f}^{-1}$. [1]

(ii) Find an expression for $\mathrm{f}^{-1}(x)$. [2]

(iii) On the axes, sketch the graph of $y = \mathrm{f}(x)$ and hence the graph of $y = \mathrm{f}^{-1}(x)$.
State any intercepts with the coordinate axes. [4]



**(c)** The function g is defined, for $x \geqslant -1$, by $g(x) = x(x+k)$ where $k$ is a constant.

**(i)** Explain why gf exists. [1]

**(ii)** Find an expression for $gf(x)$. [1]

**(iii)** It is given that $gf(3) = 126$.

Find the value of $k$. [2]



**9** A particle $P$ moves in a straight line such that $t$ seconds after passing through a fixed point $O$, its displacement from $O$, $s$ metres, is given by $s = e^{4t} - 10e^{2t} + 9$.

**(a)** The velocity of $P$ is $v\,\text{ms}^{-1}$.

Find the value of $t$ for which $v$ has a stationary value. [5]

**(b)** Find the acceleration of $P$ when $t = \ln 2$. [2]

**10** Solve the equation $\tan(3x+1) = 5\sin(3x+1)$ for $-\frac{\pi}{3} < x < \frac{\pi}{3}$. [6]

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

A circle $C_1$ has centre (3, 5).
The point $P(1, 4)$ lies on circle $C_1$.

A circle $C_2$ has centre (12, 8).
The line with equation $y = 19 - 3x$ is the common chord of circles $C_1$ and $C_2$.

Find the radius of circle $C_2$. [9]

**Continuation of working space for Question 11.**

**Question 12 is on the back page.**

**12** A sphere has volume $V\,\text{cm}^3$ and radius $r$ cm.

Given that $r$ varies with time $t$, find $V$ at the instant when $\dfrac{dV}{dt} = 9\dfrac{dr}{dt}$. [4]