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Cambridge Assessment International Education

# Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

*8388831607 4*

**CAMBRIDGE INTERNATIONAL MATHEMATICS** **0607/42**

Paper 4 (Extended) **May/June 2024**

**2 hours 15 minutes**

You must answer on the question paper.

You will need: Geometrical instruments

**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 graphic display calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
- 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 your calculator value.

**INFORMATION**

- The total mark for this paper is 120.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.


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## Formula List

For the equation $ax^2 + bx + c = 0$ $\quad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Curved surface area, $A$, of cylinder of radius $r$, height $h$. $\quad A = 2\pi rh$

Curved surface area, $A$, of cone of radius $r$, sloping edge $l$. $\quad A = \pi rl$

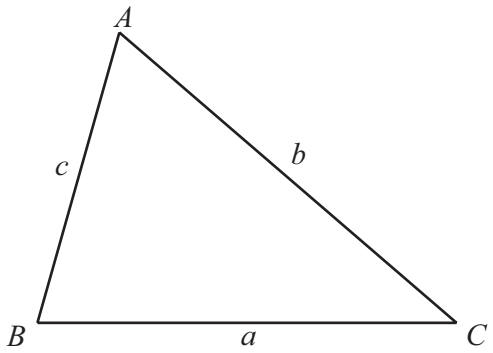
Curved surface area, $A$, of sphere of radius $r$. $\quad A = 4\pi r^2$

Volume, $V$, of pyramid, base area $A$, height $h$. $\quad V = \frac{1}{3}Ah$

Volume, $V$, of cylinder of radius $r$, height $h$. $\quad V = \pi r^2 h$

Volume, $V$, of cone of radius $r$, height $h$. $\quad V = \frac{1}{3}\pi r^2 h$

Volume, $V$, of sphere of radius $r$. $\quad V = \frac{4}{3}\pi r^3$




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

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

$$\text{Area} = \frac{1}{2}bc\sin A$$

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Answer **all** the questions.

**1** **(a)** The volume of a triangular prism is $476\,cm^3$.
The base of the triangle is 8 cm and the perpendicular height is 7 cm.

Calculate the length of the prism.

..... cm [3]

**(b)** The volume of a solid steel cube is $8000\,cm^3$.

**(i)** The mass of $1\,cm^3$ of the steel is 7.86 g.

Calculate the mass of the cube.
Give your answer in kilograms.

..... kg [1]

**(ii)** Calculate the total surface area of the cube.

..... $cm^2$ [3]

**(iii)** The steel cube is melted down and made into spheres with radius 3.5 cm.

Calculate the number of these spheres that are made.

..... [3]

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**2** **(a)** Yuri and Zoe share some money in the ratio 8 : 7.
Zoe receives $210.

Show that Yuri receives $240.

[1]

**(b)** Yuri uses some of his money to buy a set of books and a concert ticket.

**(i)** He spends 21% of his $240 on the set of books.

Calculate the cost of the set of books.

$ ..... [1]

**(ii)** He spends $75.50 on the concert ticket.

Calculate the amount Yuri has remaining as a percentage of the $240.

..... % [2]

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**(c)** Zoe spends $140 on software.
She is given a discount of 20% on the original price of the software.

Calculate the original price of the software.

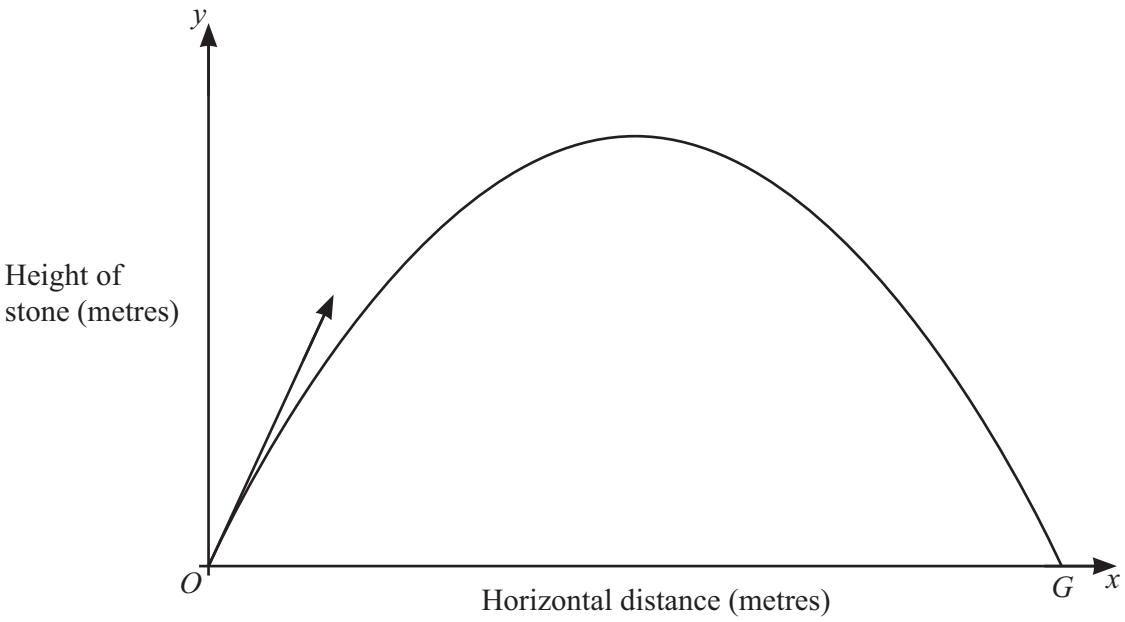
$ ..... [2]

**(d)** Find the ratio Yuri's remaining money : Zoe's remaining money.
Give your answer in the form $n$ : 1.

..... : 1 [2]

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**3 (a)**




Vic throws a stone from point $O$.
The stone travels through the air and lands at point $G$.
The sketch graph shows the path of the stone.

The equation of the path of the stone is $y = x - \frac{x^2}{10}$.

Draw this graph on your calculator to answer the following questions.

**(i)** Find the height of the stone when $x = 7$.

..... m [1]

**(ii)** Find the maximum height of the stone.

..... m [1]

**(iii)** Find the distance $OG$.

..... m [1]

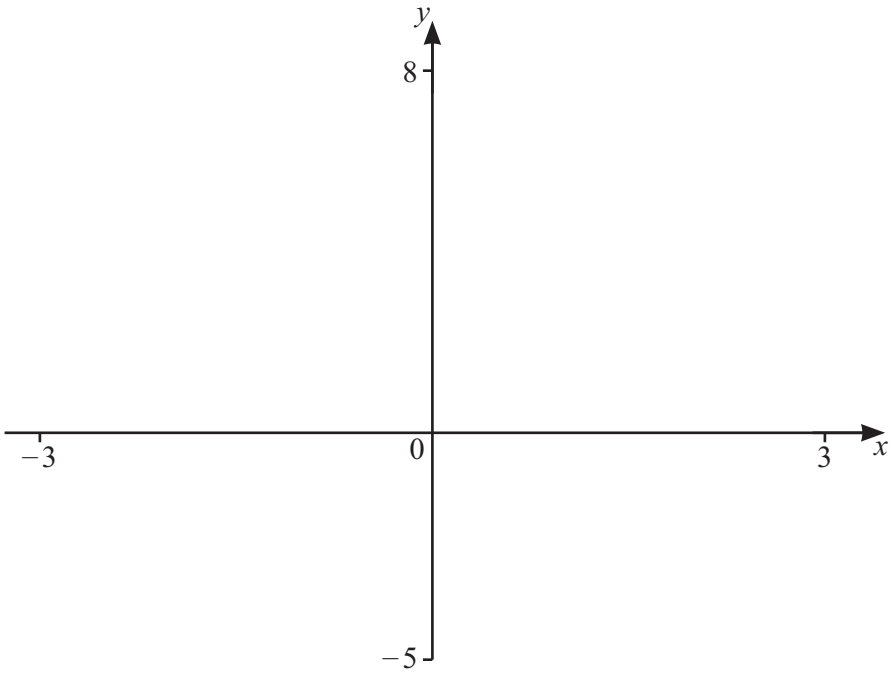
**(iv)** There are two points in the path of the stone where its height is 2 m.

Find the horizontal distance between these two points.

..... m [2]

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**(b)**




$f(x) = 2^x - \frac{1}{x}, x \neq 0$

**(i)** On the diagram, sketch the graph of $y = f(x)$ for values of $x$ between $-3$ and 3. [3]

**(ii)** Write down the equation of each asymptote.

..... [2]

**(iii)** $f(x) = k$ has two solutions.

Find the range of values of $k$.

..... [1]

**(iv)** $g(x) = 3 - x$

**(a)** On the diagram, sketch the graph of $y = g(x)$ for values of $x$ between $-3$ and 3. [2]

**(b)** Solve the equation $f(x) = 3 - x$.

..... [2]

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**4** **(a)** Erin rolls a biased die a number of times.
The table shows the results.

| Score | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Frequency | 6 | 6 | 3 | 6 | $x$ | 4 |

The mean score is 3.75 .

Find the value of $x$.

$x =$ ..... [3]

**(b)** 70 students each record the time taken to complete their mathematics homework.
The table shows the results.

| Time, $t$ minutes | $0 < t \leqslant 5$ | $5 < t \leqslant 10$ | $10 < t \leqslant 15$ | $15 < t \leqslant 25$ | $25 < t \leqslant 50$ |
|---|---|---|---|---|---|
| Frequency | 7 | 21 | 23 | 16 | 3 |

**(i)** Calculate an estimate of the mean.

..... min [2]

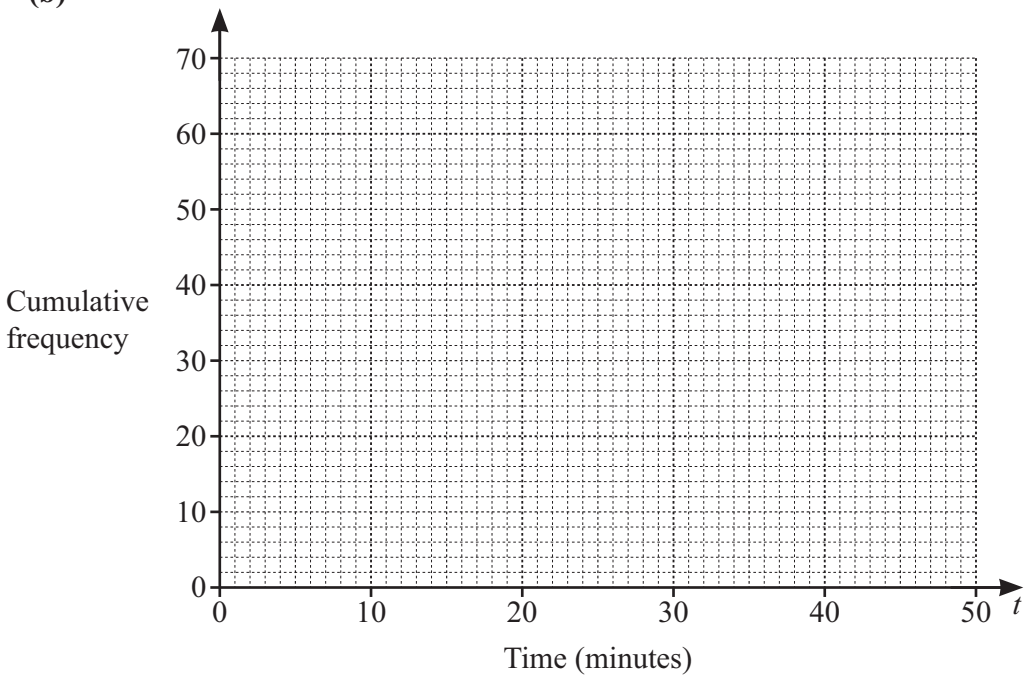
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**(ii)** **(a)** Use the information in the table to complete the cumulative frequency table.

| Time, $t$ minutes | $t \leqslant 5$ | $t \leqslant 10$ | $t \leqslant 15$ | $t \leqslant 25$ | $t \leqslant 50$ |
|---|---|---|---|---|---|
| Cumulative frequency | | | | | |

[2]

**(b)**




On the grid, draw the cumulative frequency curve. [3]

**(c)** Use your curve to estimate the median.

..... min [1]

**(d)** Use your curve to estimate the number of students who took more than 13 minutes to complete their mathematics homework.

..... [2]

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**5** **(a)** Calculate the area of an equilateral triangle with side length 12 cm.

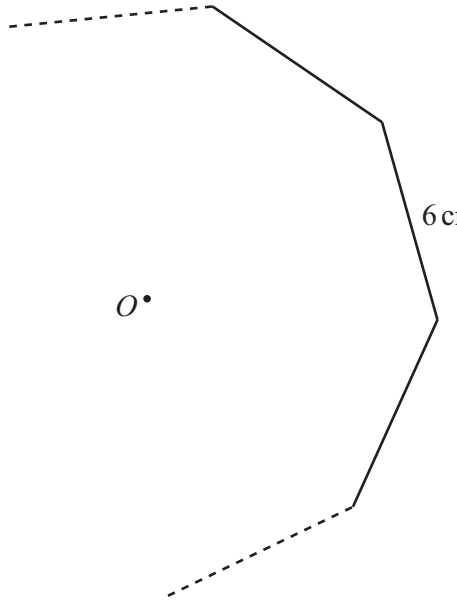
..... $cm^2$ [2]

**(b)** Calculate the area of a circle with circumference 60 cm.

..... $cm^2$ [3]

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**(c)**




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The diagram shows part of a regular 10-sided polygon with centre $O$ and side length 6 cm.

Calculate the area of the polygon.

..... $cm^2$ [4]

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**6** Xavier started a new job in 2000.
His annual pay increases each year by 2.5% of his pay in the previous year.

**(a)** Calculate the number of complete years it took for Xavier's annual pay to be 30% greater than his annual pay in 2000.

..... [4]

**(b)** In 2024 Xavier's annual pay is $25 215.

Calculate the amount Xavier's pay will increase from his annual pay in 2022 to his annual pay in 2027.
Give your answer correct to the nearest dollar.

$ ..... [4]

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**7** **(a)** Solve $63 = 8(3-2a)$.

$a =$ ..... [3]

**(b)** Solve the simultaneous equations.
You must show all your working.

$$\frac{p}{3} - q = \frac{5}{12}$$

$$2p + \frac{q}{2} = \frac{7}{8}$$

$p =$ .....

$q =$ ..... [3]

**(c)** **(i)** Factorise $c^2 - c - 56$.

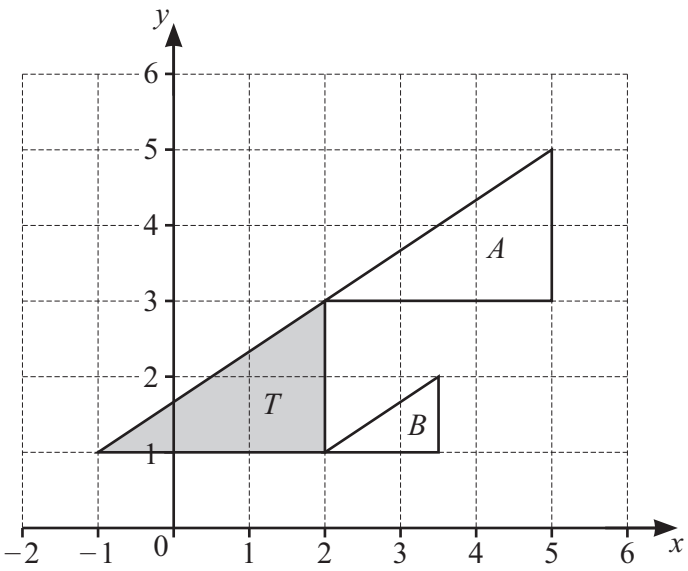
..... [2]

**(ii)** Solve $c^2 - c - 56 = 0$.

$c =$ ..... or $c =$ ..... [1]

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**8 (a)**




Describe fully the **single** transformation that maps

**(i)** triangle $T$ onto triangle $A$

.....

..... [2]

**(ii)** triangle $T$ onto triangle $B$.

.....

..... [3]

**(b)** $P$ is the point $(-3, 2)$.

The vector from $P$ to $Q$ is $\begin{pmatrix} 5 \\ -7 \end{pmatrix}$.

**(i)** Find the coordinates of $Q$.

( ..... , ..... ) [1]

**(ii)** Find the magnitude of the vector $\begin{pmatrix} 5 \\ -7 \end{pmatrix}$.

..... [2]

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**(c)** Find the equation of the line that passes through the points $(-3, -1)$ and $(1, 11)$.
Give your answer in the form $y = mx + c$.

$y =$ ..... [3]

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**9** **(a)** $f(x) = 3 + 2x$ $g(x) = x^2 + 1$ $h(x) = x^5$

**(i)** Find $f(-5)$.

..... [1]

**(ii)** Find the value of h(f(9)).
Give your answer in standard form correct to 4 significant figures.

..... [3]

**(iii)** Find g(f($x$)), giving your answer in the form $ax^2 + bx + c$.

..... [3]

**(iv)** Find $f^{-1}(x)$.

$f^{-1}(x) =$ ..... [2]

**(v)** The domain of h($x$) is $-1 \leqslant x \leqslant 2$.

Find the range of h($x$).

..... [2]

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**(b)** $\mathrm{j}(x) = \log(2x), x > 0$

**(i)** Find $x$ when $\mathrm{j}(x) = 3$.

..... [2]

**(ii)** Find $\mathrm{j}^{-1}(x)$.

$\mathrm{j}^{-1}(x) =$ ..... [2]

**(iii)** $\mathrm{j}(w) = 3\mathrm{j}(x)$

Find $w$ in terms of $x$.

$w =$ ..... [2]

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**10** A bag contains 5 red balls, 4 blue balls and 3 green balls.

**(a)** **(i)** Tina picks one ball at random, notes the colour and replaces it in the bag.

Find the probability that Tina picks a red ball.

..... [1]

**(ii)** Tina repeats this 60 times.

Find the number of times the ball she picks is expected to be red.

..... [1]

**(b)** Eli picks two balls at random without replacement.

Find the probability that

**(i)** both balls are blue

..... [2]

**(ii)** one ball is red and one ball is blue.

..... [3]

**(c)** The balls are replaced in the bag.

Ida picks one ball at random, notes the colour and replaces it in the bag.
She then picks another ball at random.

Find the probability that the two balls are the same colour.

..... [3]

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**11** **(a)** Simplify.

$$\frac{9x^2 - 4y^2}{9x^2 - 6xy}$$

..... [3]

**(b)** $\frac{5}{2x-3} - \frac{7}{4-x} = 2$

**(i)** Show that $4x^2 - 41x + 65 = 0$.

[3]

**(ii)** Solve $\frac{5}{2x-3} - \frac{7}{4-x} = 2$, giving your answers correct to 2 decimal places.

You must show all your working.

$x =$ ..... or $x =$ ..... [4]

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