Cambridge Assessment International Education

# Cambridge IGCSE™ (9–1)

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| CANDIDATE NAME | | | | | | | | | |
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*0123456789*

**MATHEMATICS** **0980/02**

Paper 2 Non-calculator (Extended) **For examination from 2025**

SPECIMEN PAPER **2 hours**

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.
- Calculators must **not** be used in this paper.
- You may use tracing paper.
- You must show all necessary working clearly.

**INFORMATION**

- The total mark for this paper is 100.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **18** pages. Any blank pages are indicated.

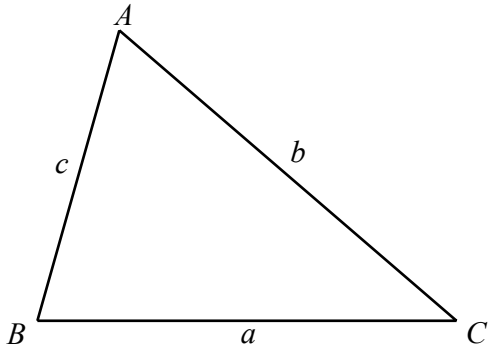


**[Turn over**

## List of formulas

| | |
|---|---|
| Area, $A$, of triangle, base $b$, height $h$. | $A = \frac{1}{2}bh$ |
| Area, $A$, of circle of radius $r$. | $A = \pi r^2$ |
| Circumference, $C$, of circle of radius $r$. | $C = 2\pi r$ |
| Curved surface area, $A$, of cylinder of radius $r$, height $h$. | $A = 2\pi rh$ |
| 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 prism, cross-sectional area $A$, length $l$. | $V = Al$ |
| Volume, $V$, of pyramid, base area $A$, height $h$. | $V = \frac{1}{3}Ah$ |
| Volume, $V$, of cylinder of radius $r$, height $h$. | $V = \pi r^2 h$ |
| Volume, $V$, of cone of radius $r$, height $h$. | $V = \frac{1}{3}\pi r^2 h$ |
| Volume, $V$, of sphere of radius $r$. | $V = \frac{4}{3}\pi r^3$ |
| For the equation $ax^2 + bx + c = 0$, where $a \neq 0$, | $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ |

For the triangle shown,




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

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

$$\text{Area} = \frac{1}{2}ab\sin C$$

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

**1** Work out $(0.01)^2$ .

..... [1]

**2** Write 57.3997 correct to 4 significant figures.

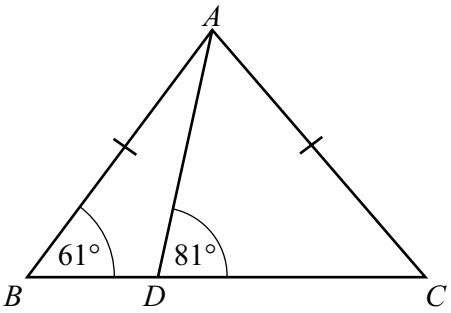
..... [1]

**3** Aimee changes 250 euros into dollars.
The exchange rate is 1 euro = \$1.10 .

Calculate the number of dollars Aimee receives.

\$ ..... [1]

**4** The diagram shows two triangles, *ABD* and *ADC*.




NOT TO SCALE

*BDC* is a straight line, *AB* = *AC*, angle *ABD* = 61º and angle *ADC* = 81º.

Work out angle *DAC*.

Angle *DAC* = ..... [2]

**5** Convert $0.17\,m^2$ into $cm^2$.

..... $cm^2$ [1]

**6** The mass of a solid metal cuboid is 4 kg. The volume of the cuboid is $600\,cm^3$.

Calculate the density of the metal, giving your answer in **g/cm$^3$**.
[Density = mass ÷ volume]

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

**7** $\mathbf{u} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$ $\mathbf{v} = \begin{pmatrix} -12 \\ 5 \end{pmatrix}$

**(a)** Find $\mathbf{u} - 2\mathbf{v}$.

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$

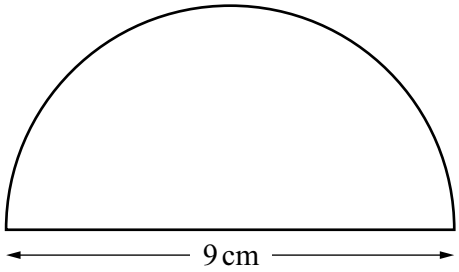
[2]

**(b)** Find $|\mathbf{v}|$.

..... [2]

**8**




NOT TO SCALE

The diagram shows a semicircle with diameter 9 cm.

Calculate the total perimeter of this semicircle.
Give your answer in exact form.

..... cm [3]

**9** In a sequence

$$T_1 = 17 \qquad T_2 = 12 \qquad T_3 = 7 \qquad T_4 = 2.$$

Find

**(a)** $T_5$

..... [1]

**(b)** $T_n$ .

..... [2]

**10** Work out $2\frac{2}{3} + 3\frac{1}{2}$.
Give your answer as a mixed number in its simplest form.

..... [3]

**11** Find the value of $64^{\frac{2}{3}}$.

..... [2]

**12** Work out, giving your answer in standard form,

**(a)** $(7.1 \times 10^{-15}) \times (2 \times 10^{3})$

..... [2]

**(b)** $(5.2 \times 10^{7}) + (5.2 \times 10^{6})$.

..... [2]

**13** Find the number of sides of a regular polygon with interior angle 162°.

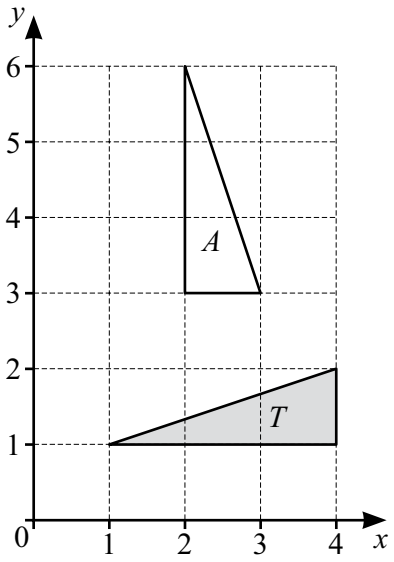
..... [2]

**14** The range, mode, median and mean of five positive integers are all equal to 10.

Find one possible set of these five integers.

..... , ..... , ..... , ..... , ..... [4]

**15**




Describe fully the **single** transformation that maps triangle $T$ onto triangle $A$.

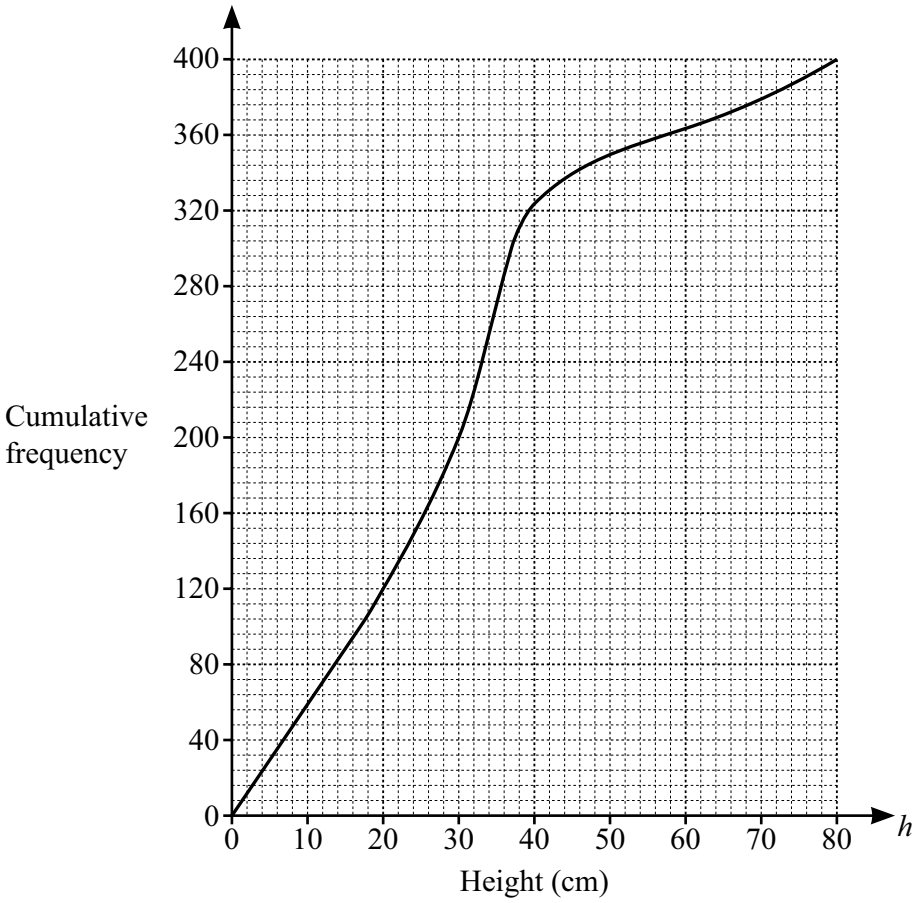
.....

..... [3]

**16** A student measures the height, $h$ cm, of each of 400 plants.

**(a)** The cumulative frequency diagram shows the results.




Use the diagram to find an estimate for

**(i)** the median

..... cm [1]

**(ii)** the interquartile range

..... cm [2]

**(iii)** the 80th percentile

..... cm [2]

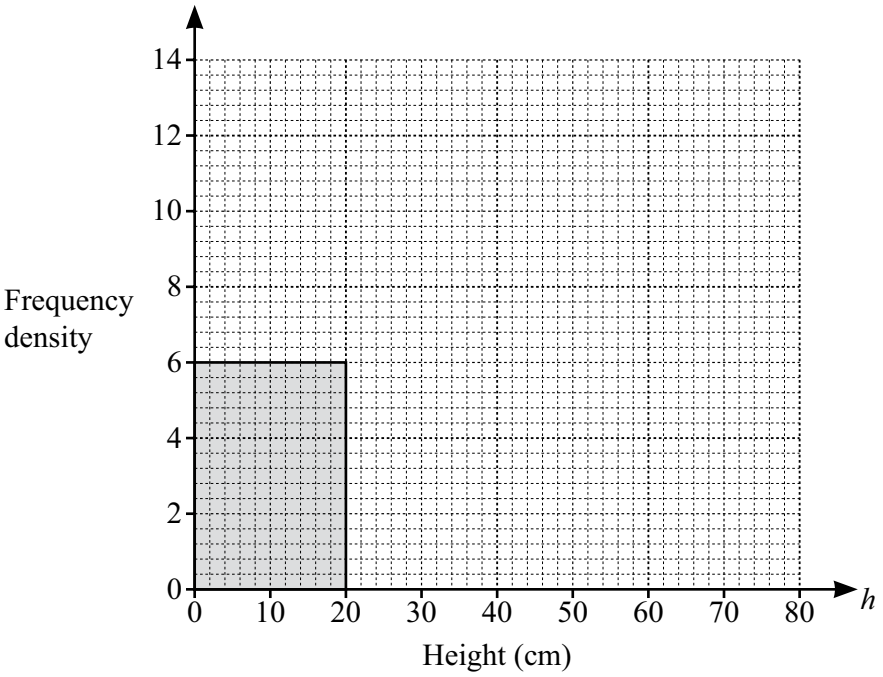
**(iv)** the number of plants with a height greater than 60 cm.

..... [2]

**(b)** The heights are also shown in the frequency table.

| Height ($h$ cm) | $0 < h \leqslant 20$ | $20 < h \leqslant 30$ | $30 < h \leqslant 40$ | $40 < h \leqslant 80$ |
|---|---|---|---|---|
| Frequency | 120 | 80 | 124 | 76 |

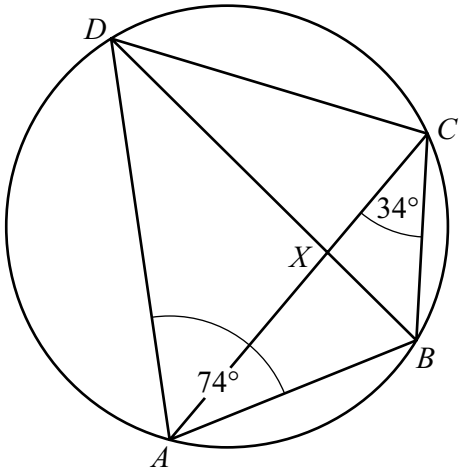
Complete the histogram to show this information.




[3]

**17**




NOT TO SCALE

The diagram shows a cyclic quadrilateral $ABCD$.
$BD$ and $AC$ intersect at $X$.

**(a)** Angle $BAD = 74°$ and angle $BCA = 34°$.

Find

**(i)** angle $BDA$

Angle $BDA$ = ..... [1]

**(ii)** angle $BCD$

Angle $BCD$ = ..... [1]

**(iii)** angle $ABD$.

Angle $ABD$ = ..... [1]

**(b)** In the diagram, triangle $ADX$ is similar to triangle $BCX$.
$BC = 4.5$ cm, $AD = 9$ cm and $CX = 3.3$ cm.

Work out $XD$.

$XD$ = ..... cm [2]

**18** $f(x) = 3 - 2x$ $g(x) = 2x + 3$ $h(x) = 2^x$

**(a) (i)** Find $f(-3)$.

..... [1]

**(ii)** Find $gf(-3)$.

..... [1]

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

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

**(c)** Find $x$ when $gg(x) = 7$ .

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

**(d)** Find $x$ when $h^{-1}(x) = 5$ .

$x =$ ..... [2]

**19** **(a)** Simplify.

$$\sqrt{32} + \sqrt{98}$$

..... [2]

**(b)** Rationalise the denominator.

$$\frac{1}{\sqrt{2}+1}$$

..... [2]

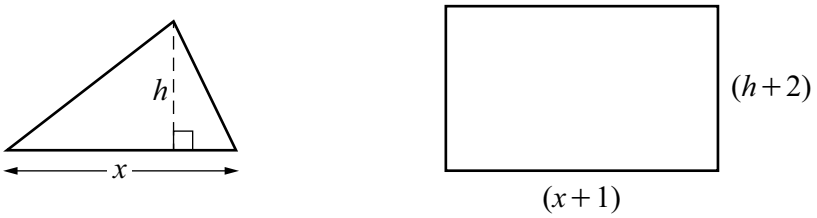
**20** $y \propto \frac{1}{\sqrt{x}}$

When $y = 8$, $x = 4$.

Find $y$ when $x = 49$.

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

**21** In this question, all measurements are in centimetres.




NOT TO SCALE

The height of the triangle is $h$ and the height of the rectangle is $(h + 2)$.
The length of the base of the triangle is $x$ and the length of the rectangle is $(x + 1)$.
The area of the triangle is $11\,\text{cm}^2$ and the area of the rectangle is $39\,\text{cm}^2$.

**(a)** Write down an expression, in terms of $x$, for the height of the rectangle.

..... [1]

**(b)** Show that $2x^2 - 15x + 22 = 0$ .

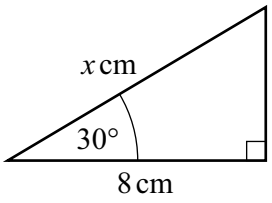
[3]

**(c)** By factorising and solving $2x^2 - 15x + 22 = 0$ , find the two possible heights of the triangle.

$h$ = ..... or $h$ = ..... [5]

**22**




NOT TO SCALE

Find the exact value of $x$.

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

**23** Write as a single fraction in its simplest form.

$$\frac{3}{x-4} - \frac{4}{x+3}$$

..... [3]

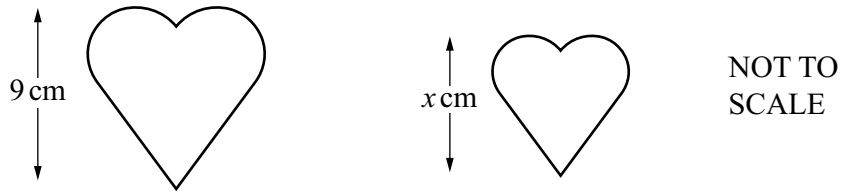
**24** **(a)** Write $x^2 - 4x + 7$ in the form $(x - a)^2 + b$.

..... [2]

**(b)** Write down the coordinates of the turning point of the graph of $y = x^2 - 4x + 7$.

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

**25**



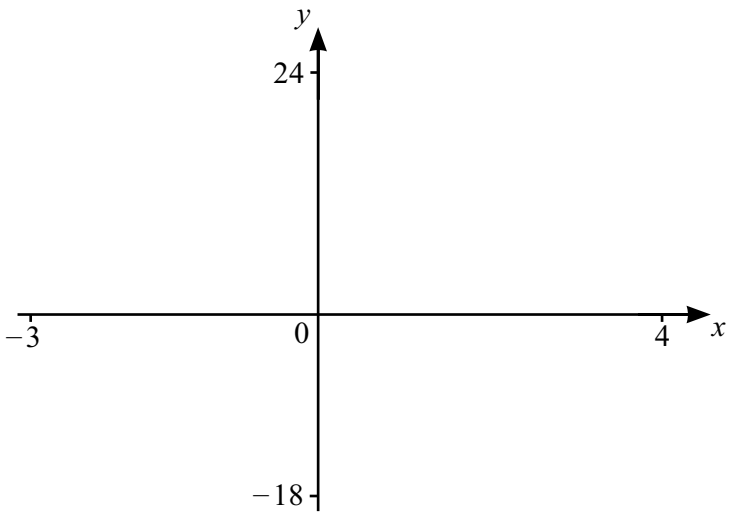

The two shapes are mathematically similar.
The area of the larger shape is 36 cm$^2$ and the area of the smaller shape is 25 cm$^2$.
The height of the larger shape is 9 cm and the height of the smaller shape is $x$ cm.

Find the value of $x$.

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

**26**




$f(x) = x(x + 2)(x – 3)$

**(a)** On the diagram, sketch the graph of $y = f(x)$ for $–3 \leqslant x \leqslant 4$.
Show the values of the intersections with the axes. [3]

**(b)** Expand and simplify.

$x(x + 2)(x – 3)$

..... [3]

**(c)** $A$ is the point $(1, –6)$.
The tangent to the graph of $y = f(x)$ at $A$ meets the $y$-axis at $B$.

Find the coordinates of $B$.

( ..... , ..... ) [5]

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