Cambridge IGCSE™ (9–1)

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

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 [ ].

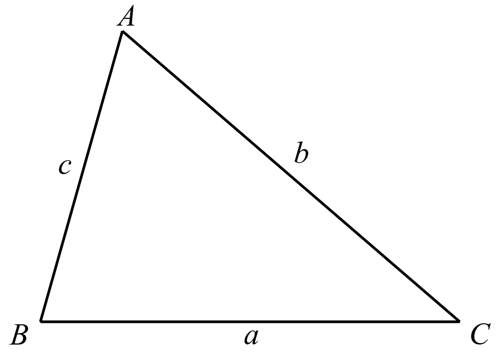
This document has **18** pages. Any blank pages are indicated.

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.

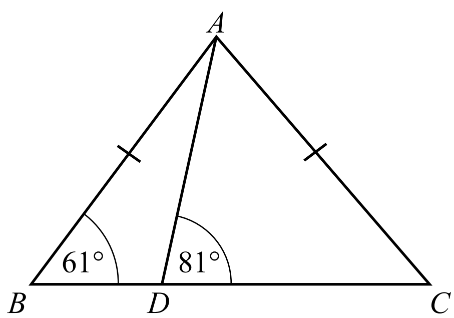
.... [1]

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* = 61° and angle *ADC* = 81°.

Work out angle *DAC*.

Angle *DAC* = ... [2]

5 Convert $0.17\,\text{m}^2$ into cm^2.

.... cm^2 [1]

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

Calculate the density of the metal, giving your answer in **g/cm³**.
[Density = mass ÷ volume]

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

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

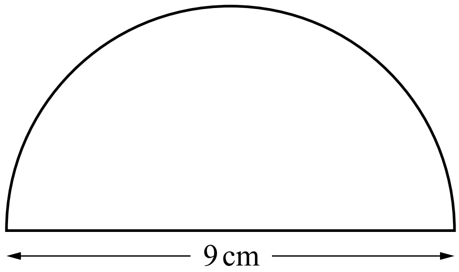
(a) Find $\mathbf{u} - 2\mathbf{v}$.

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [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°.

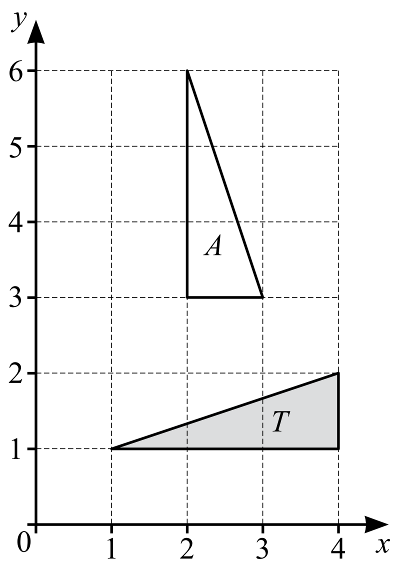
.... [2]

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



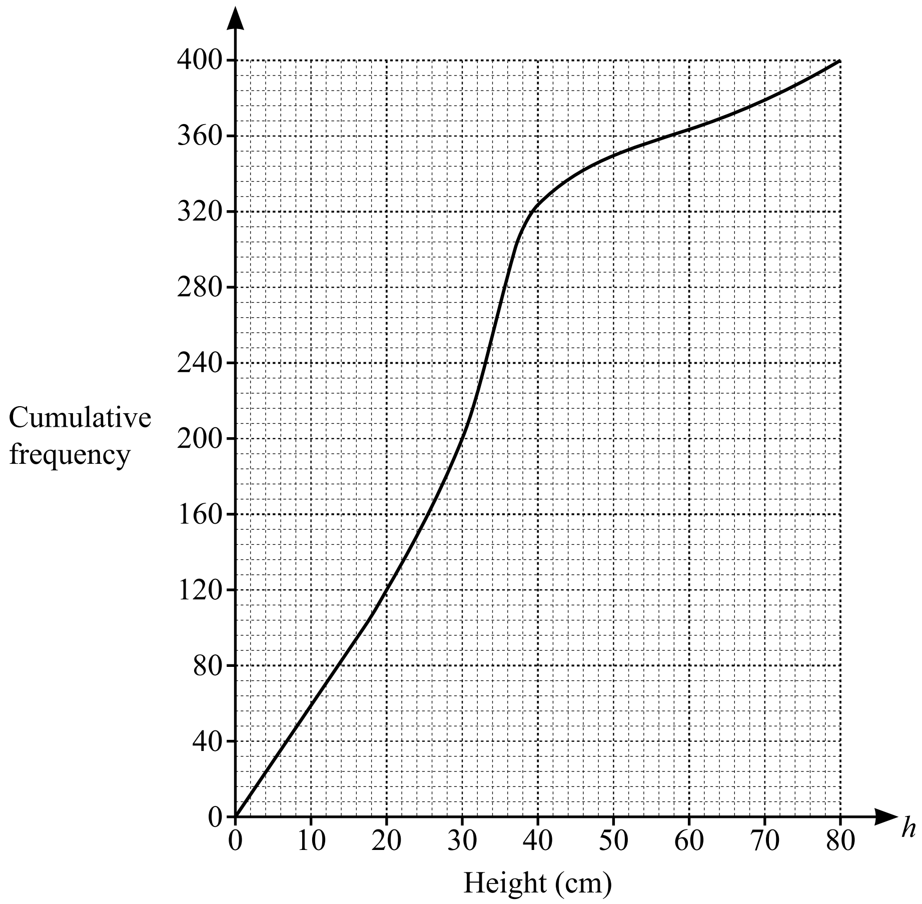
Describe fully the **single** transformation that maps triangle T onto triangle A.

....

.... [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]

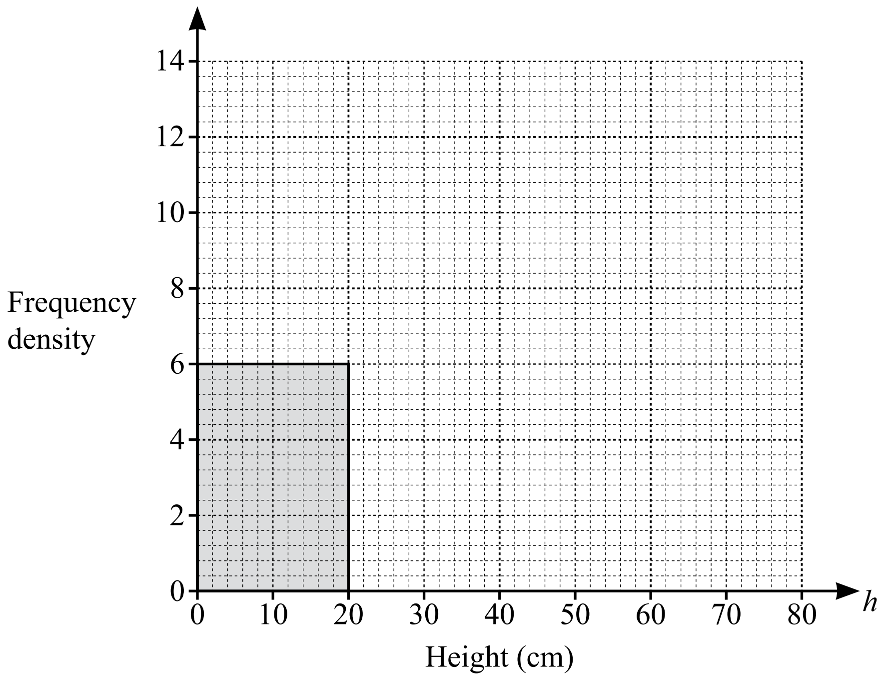
(iv) the number of plants with a height greater than 60 cm.

.... [2]

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

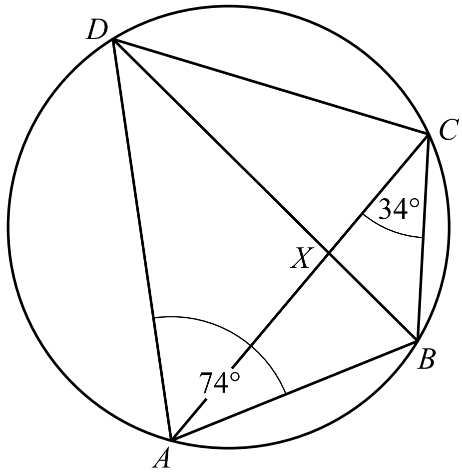
Height (h cm)	$0 < h \leqslant 20$	$20 < h \leqslant 30$	$30 < h \leqslant 40$	$40 < h \leqslant 80$
Frequency	120	80	124	76

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]

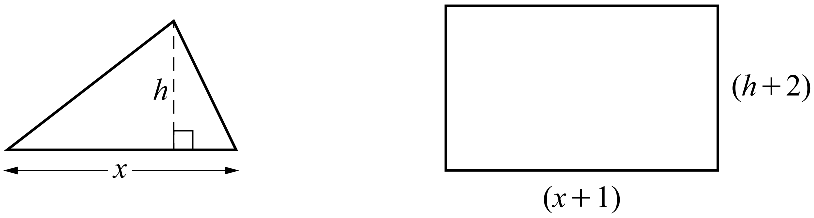
20 $$y \propto \frac{1}{\sqrt{x}}$$

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]

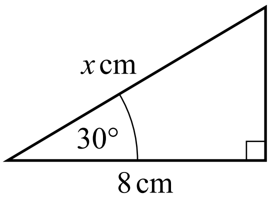
(b) Show that $2x^2 - 15x + 22 = 0$.

[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]

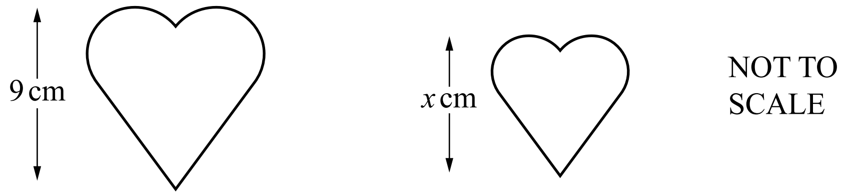
24 **(a)** Write $x^2 - 4x + 7$ in the form $(x - a)^2 + b$.

.... [2]

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

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

25

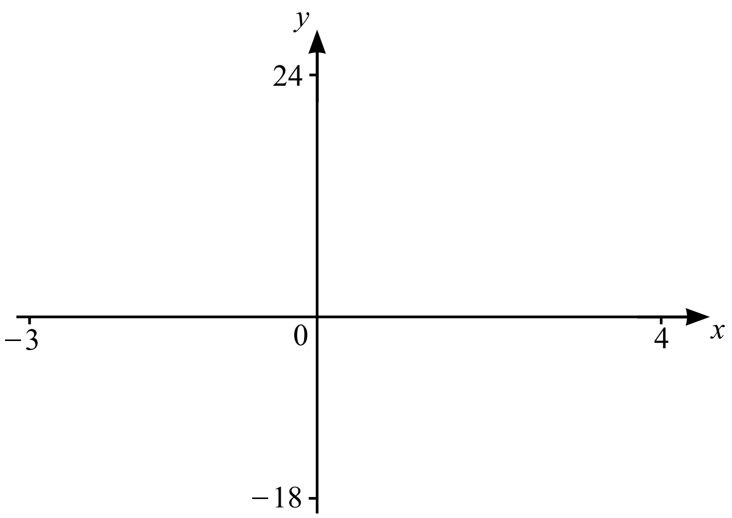


The two shapes are mathematically similar.
The area of the larger shape is $36\,\text{cm}^2$ and the area of the smaller shape is $25\,\text{cm}^2$.
The height of the larger shape is $9\,\text{cm}$ and the height of the smaller shape is $x\,\text{cm}$.

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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