Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

8900050357

MATHEMATICS (SYLLABUS D) **4024/22**

Paper 2 Calculator **October/November 2025**

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.
- You should use a scientific calculator where appropriate.
- You may use tracing paper.
- 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 π, use either your calculator value or 3.142.

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 **20** pages. Any blank pages are indicated.

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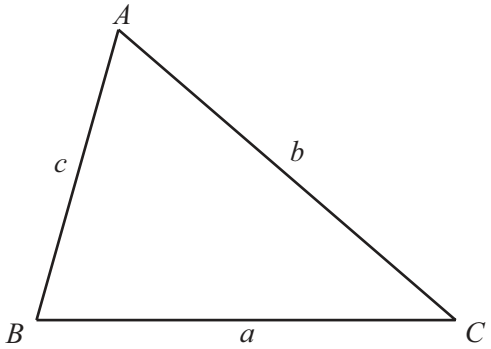
List of formulas

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,



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

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

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

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1 Work out $\frac{75.66 - 40.23}{2.19}$.

Give your answer correct to 2 decimal places.

..... [2]

2 These are the scores for 12 students in a quiz.

16 27 20 15 25 21 10 24 35 16 32 22

(a) Find the median.

..... [2]

(b) Find the range.

..... [1]

3 Idris has 5 kg of rice.
He cooks rice for 12 people.
He uses 75 g of rice for each person.

Work out how much rice Idris has left over.
Give your answer in grams.

..... g [2]

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4 In triangle ABC, $AB = 8.5$ cm, $AC = 6$ cm and $BC = 7$ cm.

(a) **Using a ruler and compasses only**, construct triangle ABC.
Side AB has been drawn for you.



[2]

(b) Measure angle BAC.

Angle BAC = ... [1]

5 **(a)** Sofia invests $400 in a savings account.
The account pays simple interest at a rate of 2.8% per year.

Calculate the total amount of interest Sofia receives at the end of 3 years.

$ ..... [2]

(b) Luis invests $400 in a different savings account that also pays simple interest.
The rate of interest for this account is 0.4% per year **more** than the rate for Sofia's account.

Calculate how much more interest Luis receives each year than Sofia receives each year.

$ ..... [1]

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6 The scale of a map is 1 : 5000.
The length of a path on the map is 8.3 cm.

Work out the actual length of the path.
Give your answer in metres.

..... m [2]

7 Factorise.

$20x^2 - 5xy$

..... [2]

8 Expand and simplify.

$4(3x + 2) + 5(x + 1)$

..... [2]

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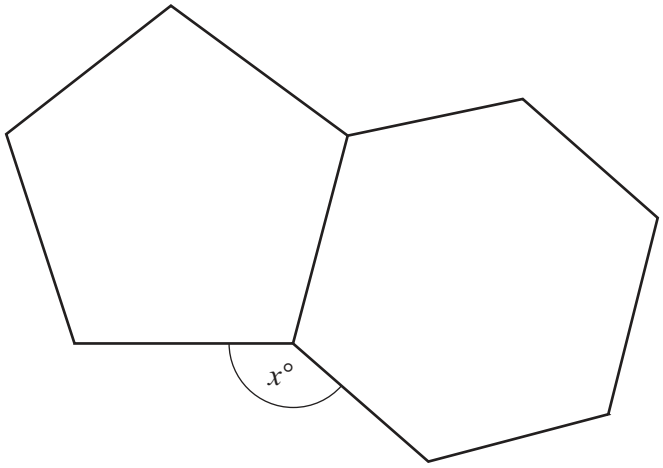

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The diagram shows a regular pentagon and a regular hexagon joined along one edge.

Find the value of x.

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

10 $\mathbf{a} = \begin{pmatrix} -3 \\ 4 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 8 \\ -2 \end{pmatrix}$

(a) Work out $3\mathbf{a} - \mathbf{b}$.

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [2]

(b) Find $|\mathbf{a} + \mathbf{b}|$.

..... [3]

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11 A factory makes batteries.
A batch of 2000 batteries are tested and 28 are found to be faulty.

The factory makes 125 000 batteries.

Calculate the number of these 125 000 batteries that are expected to be faulty.

..... [2]

12 **(a)** Write 372 000 000 in standard form.

..... [1]

(b) Work out.

$$\frac{2.21 \times 10^5}{6.5 \times 10^6}$$

Give your answer in standard form.

..... [2]

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13 **(a)** These are the first five terms of a sequence.

3 8 13 18 23

(i) Find the next term of the sequence.

..... [1]

(ii) Find an expression for the nth term of the sequence.

..... [2]

(b) T_n is the nth term of a different sequence.
These are the first five terms of this sequence.

$$T_1 = \frac{3}{4} \qquad T_2 = \frac{8}{9} \qquad T_3 = \frac{13}{16} \qquad T_4 = \frac{18}{25} \qquad T_5 = \frac{23}{36}$$

Find T_{25}.

$T_{25} =$ ..... [3]

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14 $N = 2 \times 3^x \times 5^y$

The lowest common multiple (LCM) of N and 360 is 16 200.

(a) Find the value of x and the value of y.

$x =$ .....

$y =$ .....

[2]

(b) Find the highest common factor (HCF) of N and 360.

..... [1]

(c) k is a positive integer.
kN is a cube number.

Find the smallest possible value of k.

$k =$ ..... [1]

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15 The mass of a bag of potatoes is 2.5 kg, correct to the nearest 0.1 kg.

(a) Write down the upper bound and the lower bound for the mass of a bag of potatoes.

Upper bound = ... kg

Lower bound = ... kg [2]

(b) The mass of a box is 8.0 kg, correct to the nearest 0.1 kg.
Bags of potatoes are packed into the box.

Calculate the upper bound for the total mass of a box containing 12 bags of potatoes.

..... kg [2]

16 The population of a town decreases exponentially at a rate of x% per year.
The population of the town on 1 January 2020 was 120 000.
The population of the town on 1 January 2023 was 102 885.

(a) Find the value of x.

x = ... [3]

(b) After 1 January 2023 the population of the town starts to increase exponentially at a rate of 1.6% per year.

Find the year in which the population on 1 January first becomes more than 120 000.

..... [3]

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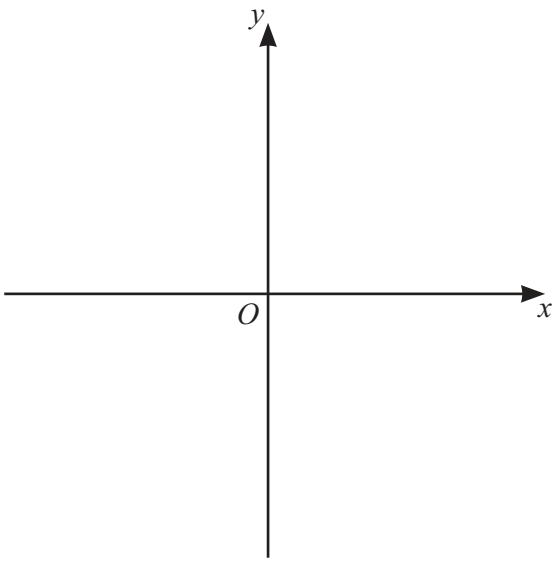
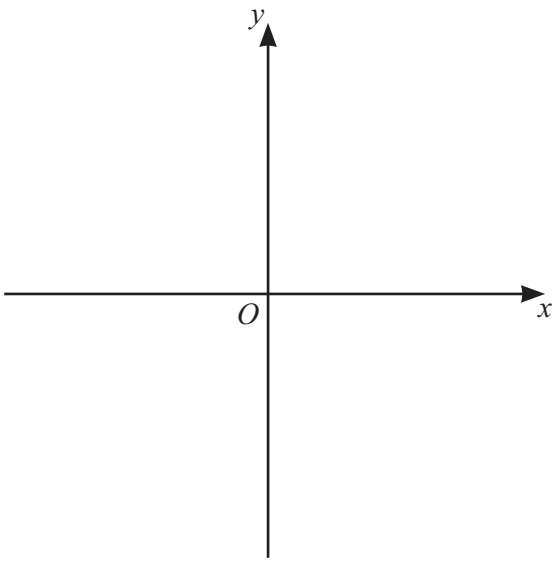
17 Sketch the graph of each function.
Show the value where each graph intersects the y-axis.

(a) $y = x^3 - 3$



[2]

(b) $y = 3^x$



[2]

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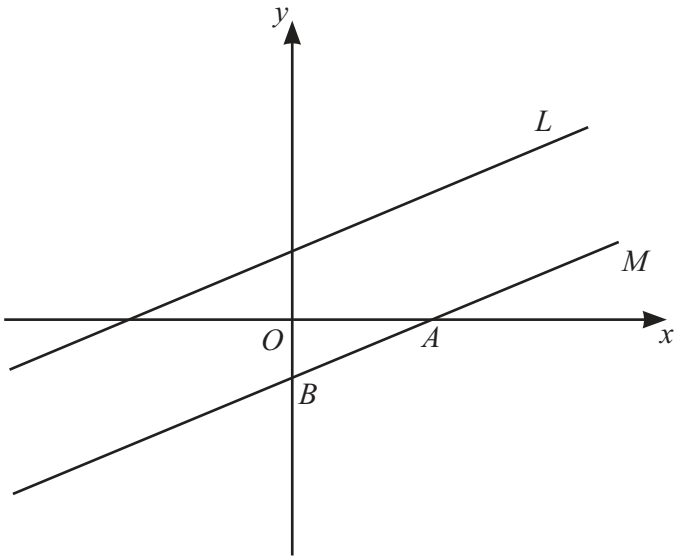

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The equation of line L is $y = \frac{x}{5} + 3$.

(a) Write down the gradient of line L.

..... [1]

(b) Line M is parallel to line L.
Line M crosses the x-axis at point A and the y-axis at point B.
The coordinates of point A are $(15, 0)$.

(i) Show that the coordinates of point B are $(0, -3)$.

[3]

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(ii) Line N is the perpendicular bisector of the line joining point A and point B. Line N crosses the x-axis at point C.

Find the coordinates of point C.

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

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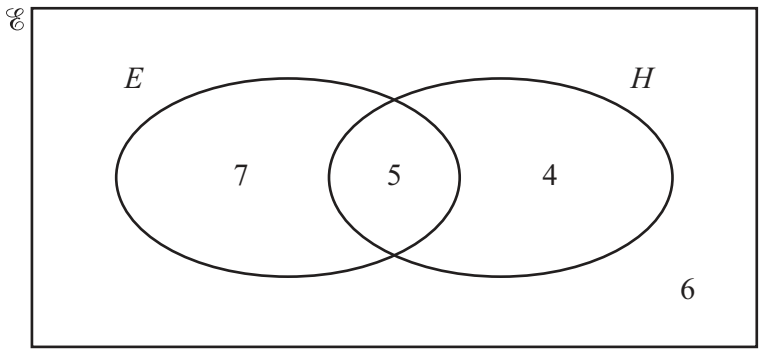
19 A group of 22 students are asked if they study Economics (E) or History (H).
The Venn diagram shows the results.



(a) Write down the number of students who study both Economics and History.

..... [1]

(b) Find $n(E \cap H')$.

..... [1]

(c) Three of the students from the group are selected at random.

Find the probability that they all study History.

..... [3]

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20 y is inversely proportional to $(x-3)^2$.
$y = 4$ when $x = 7$.

Find the value of y when $x = -2$.

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

21 Solve the equation.

$$\frac{2x+1}{x+4} + 5 = x$$

You must show all your working and give your answers correct to 2 decimal places.

$x =$ ..... or $x =$ ..... [6]

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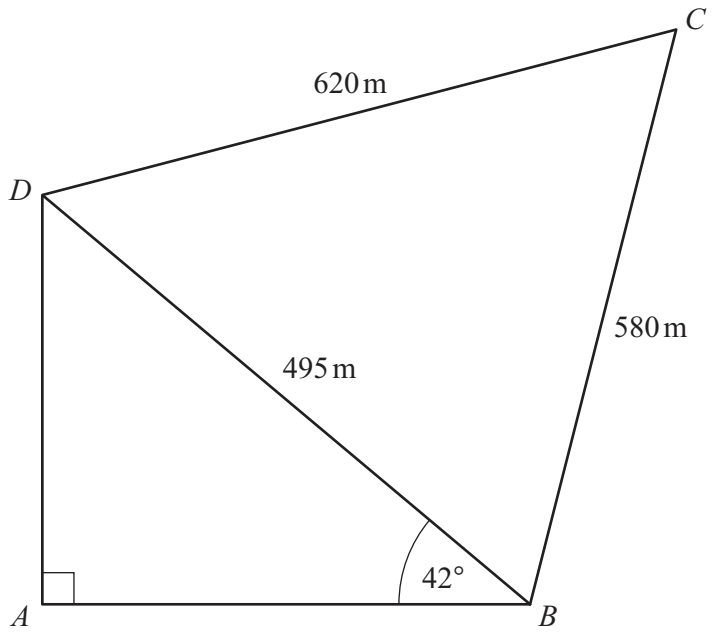
22 *ABCD* is a field.
A straight path crosses the field from *B* to *D*.



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(a) Calculate *AB*.

AB = ... m [2]

(b) Show that angle *BDC* = 61.5°, correct to 1 decimal place.

[3]

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(c) A second path crosses the field from C to meet path BD at point X.
CX is the shortest distance from C to BD.

Lara takes 6 minutes 24 seconds to walk along path CX.

Calculate Lara's average speed.
Give your answer in kilometres per hour.

..... km/h [5]

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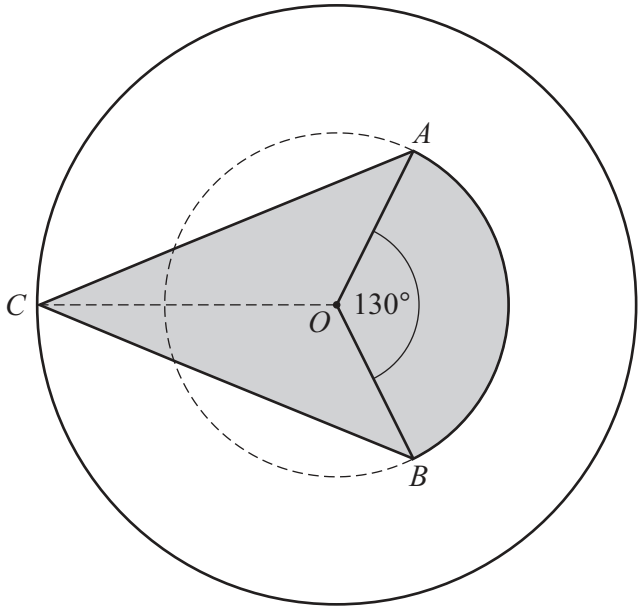

NOT TO SCALE

The diagram shows a shaded area in a large circle, centre O.
The radius of the large circle is 10 cm.

OAB is a sector of a small circle, centre O.
The radius of the small circle is 7 cm and the sector angle is 130°.
C is on the circumference of the large circle and $AC = BC$.

Calculate the percentage of the area of the large circle that is shaded.

..... % [5]

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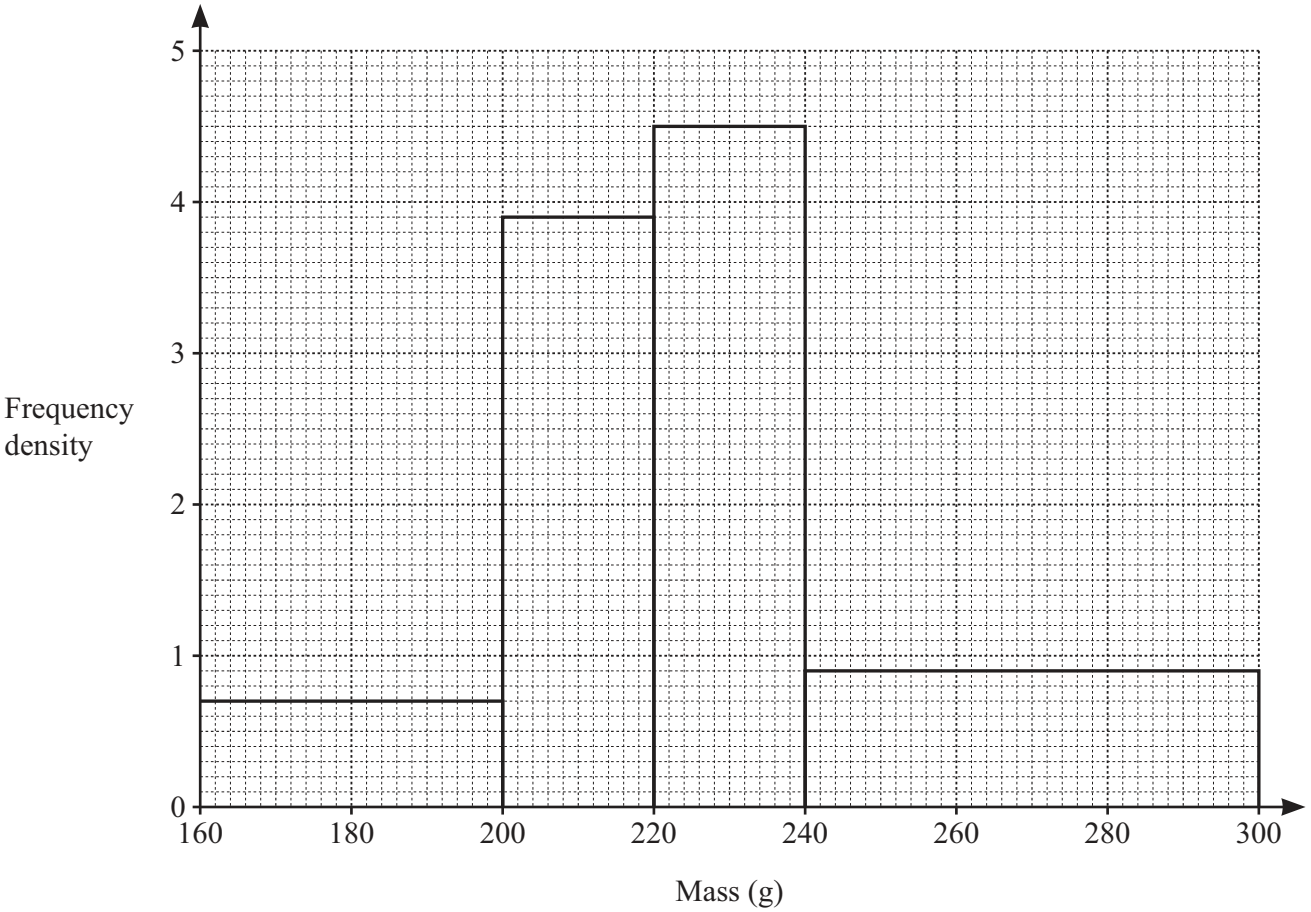
24 Owen records the mass of each of 250 onions.
The histogram shows the results.



(a) Show that there are 28 onions with a mass of 200 g or less.

[1]

(b) Calculate an estimate of the mean mass.
You must show all your working.

..... g [5]

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