Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER | | | | | |

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MATHEMATICS (SYLLABUS D) **4024/23**

Paper 2 Calculator **May/June 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 [ ].

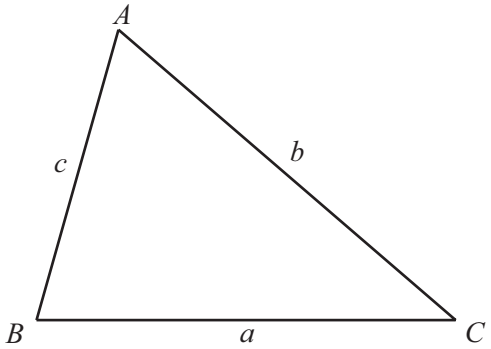
This document has **20** pages.

[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,



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

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

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

1 **(a)** Write 4.2358 correct to 2 decimal places.

..... [1]

(b) Write 34 159 correct to 2 significant figures.

..... [1]

2 A rectangle has dimensions 2.4 cm by 5.6 cm.
The rectangle is enlarged by a scale factor of 3.25 .

Work out the dimensions of the enlarged rectangle.

..... cm by ..... cm [2]

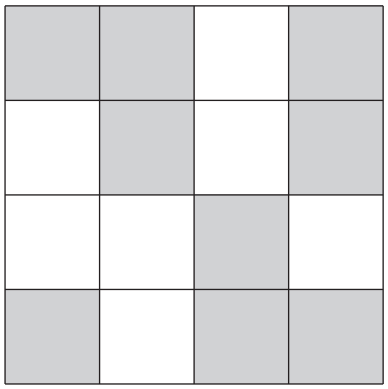
3 Ang and Bou share \$104 in the ratio 7 : 6 .

Calculate the amount they each receive.

Ang \$ .....

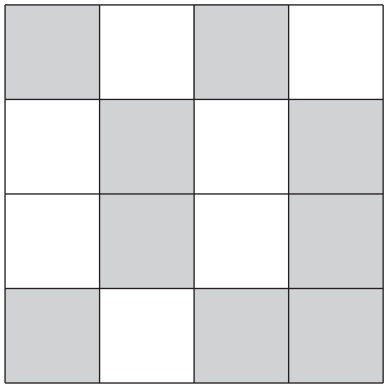
Bou \$ .....
[2]

4 **(a)** Shade **one** small square so the diagram has rotational symmetry of order 2.



[1]

(b) Shade **one** small square so the diagram has 1 line of symmetry.



[1]

5 **(a)** Write 6300 cm in metres.

..... m [1]

(b) Write 450 cm^3 in litres.

..... litres [1]

6 Simplify.

(a) $5a+3b+2a-7b$

..... [2]

(b) $c^{12} \div c^4$

..... [1]

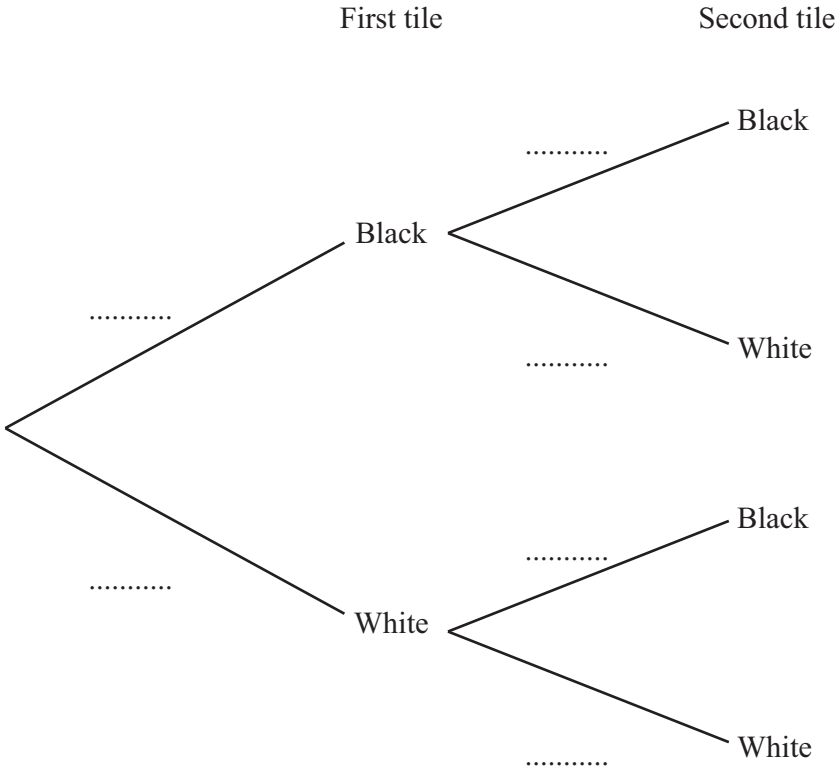
7 Write down all the integer values of x that satisfy the inequality.

$$-3 \leqslant x < 1$$

..... [2]

8 A bag contains 4 black tiles and 6 white tiles.
A tile is chosen at random from the bag and is then replaced.
A second tile is then chosen at random.

(a) Complete the tree diagram.



[2]

(b) Work out the probability that both tiles are white.

..... [1]

9 **(a)** Ameerah invests \$480 in a savings account.
The account pays **simple interest** at a rate of 3.6% per year.

Calculate the value of the investment at the end of 5 years.

\$ ..... [3]

(b) Ben invests \$600 in a different savings account.
The account pays **compound interest** at a rate of 2.7% per year.

Calculate the total amount of interest paid to Ben at the end of 4 years.

\$ ..... [3]

10 $f(x) = 3x - 5$ $g(x) = 2 - 6x$

(a) Find $f(2)$.

..... [1]

(b) Solve $g(x) = 18$.

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

(c) Find $fg(4)$.

..... [2]

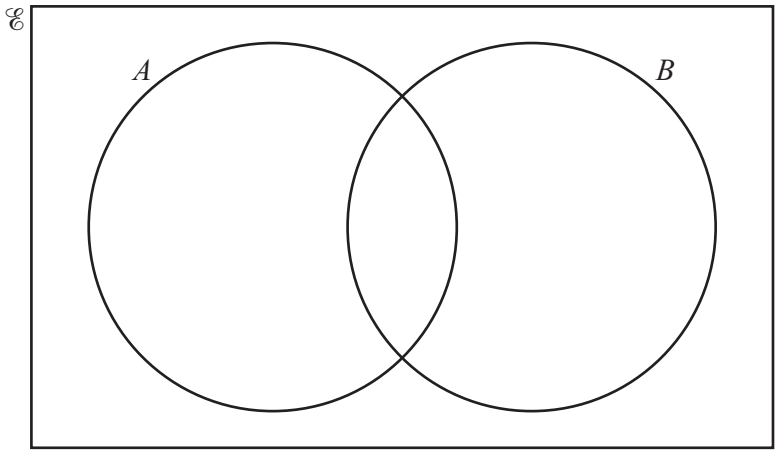
(d) The domain of $g(x)$ is $x > -8$.

Find the range of $g(x)$.

..... [2]

11 $\mathscr{E} = \{2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$
$A = \{x : x \text{ is a prime number}\}$
$B = \{x : x \text{ is a factor of } 36\}$

(a) Complete the Venn diagram.



[2]

(b) List the elements of $A \cup B'$.

..... [1]

(c) Find $\text{n}(A \cap B')$.

..... [1]

12 These are the first four terms of a sequence.

16 13 10 7

(a) Write down the next term of the sequence.

..... [1]

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

..... [2]

13 **(a)** Write 1.23×10^{-4} as an ordinary number.

..... [1]

(b) $(8.2 \times 10^4) + (x \times 10^y) = 9.1 \times 10^5$

Find the value of x and the value of y.

$x =$ .....

$y =$ .....

[2]

14 Factorise.

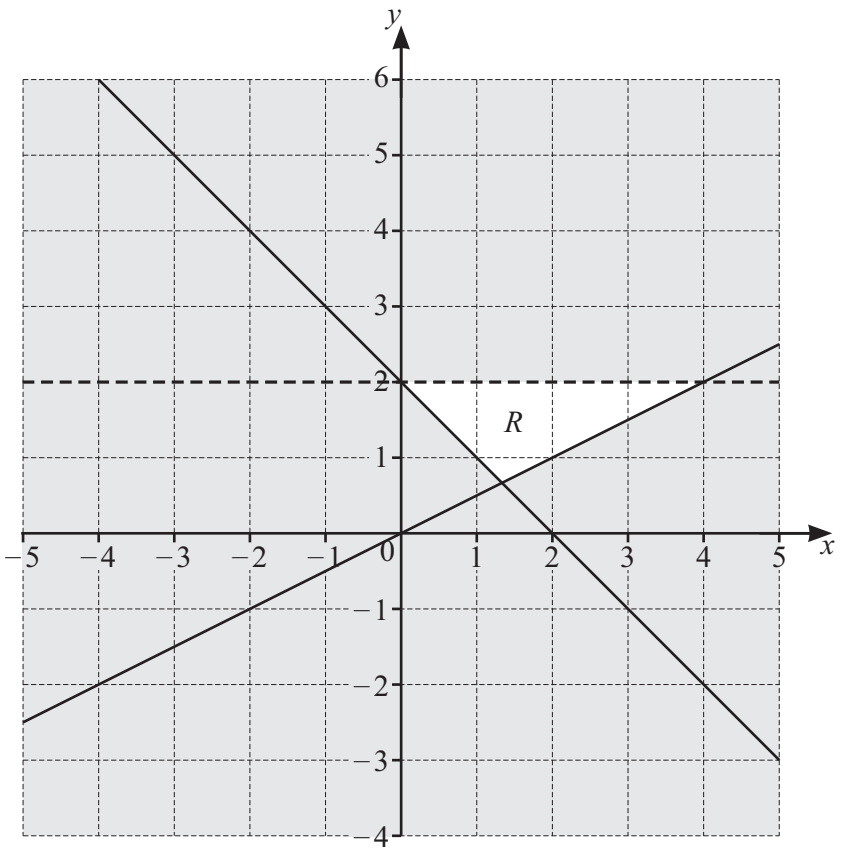
(a) $5x^2 + 15xy$

..... [2]

(b) $2ax + 4bx - 3ay - 6by$

..... [2]

15



Find the three inequalities that define the unshaded region, R.

.....

.....

.....

[4]

16 The table gives information about the ages of the 80 members of a gym.

Age (a years)	$16 < a \leqslant 18$	$18 < a \leqslant 24$	$24 < a \leqslant 40$	$40 < a \leqslant 100$
Frequency	5	31	19	25

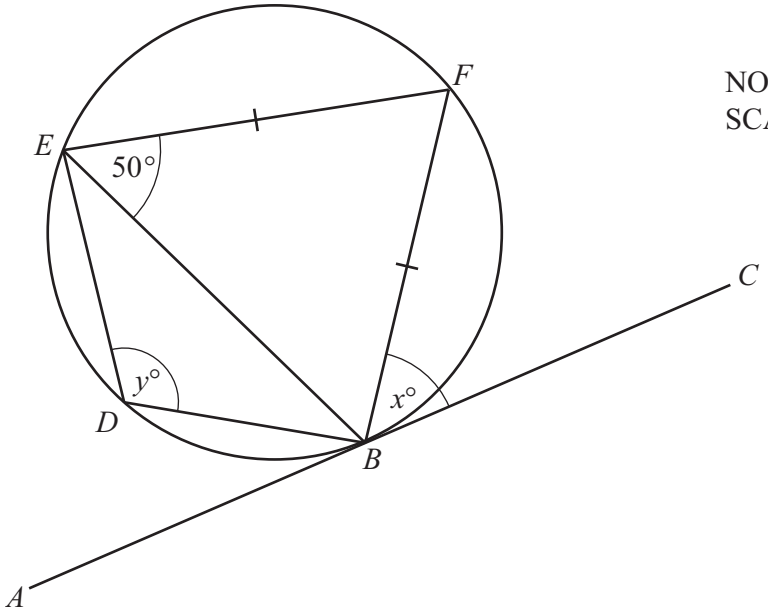
(a) Calculate an estimate of the mean age.

..... years [4]

(b) Work out the percentage of the members of the gym who are more than 24 years old.

..... % [2]

17



NOT TO SCALE

Points B, D, E and F lie on a circle.
AC is a tangent to the circle at B.

Angle $BEF = 50°$ and $EF = BF$.

(a) Find the value of x.
Give a geometrical reason for your answer.

$x =$ ..... because .....

..... [2]

(b) Find the value of y.
Give a geometrical reason for each step of your working.

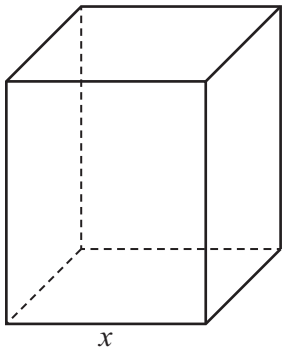
.....

.....

.....

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

18 The diagram shows a cuboid.



NOT TO SCALE

The length of the cuboid is x cm.
The height of the cuboid is 3 times its length.
The width of the cuboid is 4 cm less than its length.

(a) Write down expressions, in terms of x, for the height of the cuboid and the width of the cuboid.

height = ... cm

width = ... cm
[2]

(b) The surface area of the cuboid is $200\,\text{cm}^2$.

Form an equation in x and show that it simplifies to $7x^2 - 16x - 100 = 0$.

[4]

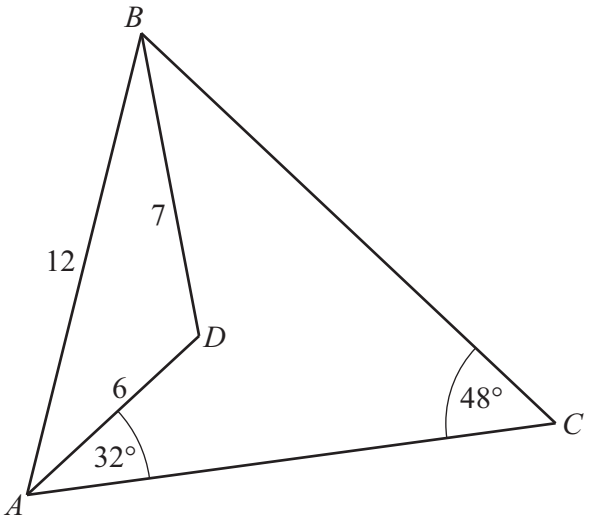
(c) Solve the equation $7x^2 - 16x - 100 = 0$.
You must show all your working and give your answers correct to 2 decimal places.

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

(d) Find the height of the cuboid.

..... cm [1]

19 The diagram shows triangle ABC and triangle ABD.



NOT TO SCALE

$AB = 12\,\text{cm}$, $BD = 7\,\text{cm}$ and $AD = 6\,\text{cm}$.
Angle $DAC = 32°$ and angle $BCA = 48°$.

(a) Calculate angle BAD.

Angle BAD = ... [4]

(b) Calculate AC.

AC = ... cm [4]

20 Solve.

$$\frac{3x}{x-1} + \frac{4}{x+2} = 3$$

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

21 The width of a rectangle is 5.4 cm, correct to the nearest 0.1 cm.

(a) Write down the upper bound of the width of the rectangle.

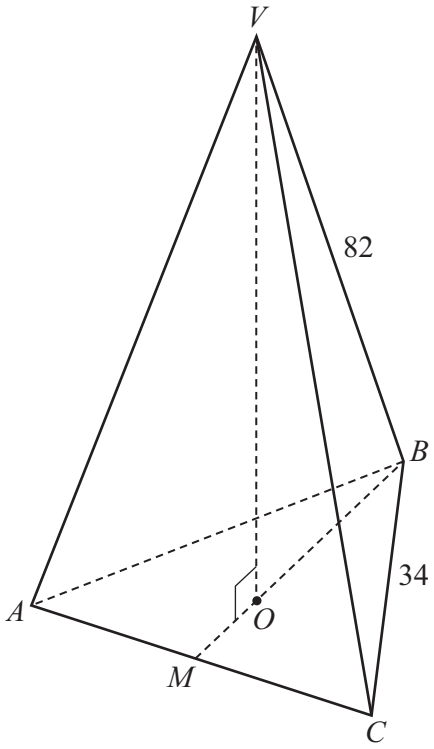
..... cm [1]

(b) The perimeter of the rectangle is 26.4 cm, correct to the nearest 0.1 cm.

Calculate the lower bound of the length of the rectangle.

..... cm [2]

22 The diagram shows a pyramid $ABCV$.



NOT TO SCALE

The base of the pyramid is an equilateral triangle, ABC, with sides of length 34 cm.
The height VO is perpendicular to the base of the pyramid.
$VA = VB = VC = 82$ cm.

(a) Write down the number of planes of symmetry of the pyramid.

..... [1]

(b) M is the midpoint of AC.
The ratio $MO : OB$ is $1 : 2$.

(i) Show that $OB = 19.6$ cm correct to 1 decimal place.

[3]

(ii) Calculate the angle between the edge VB and the base of the pyramid.

..... [2]

(iii) Calculate the volume of the pyramid.

..... cm^3 [5]

Question 23 is printed on the next page.

23 A box contains 13 pencils.
There are 4 red pencils, 7 green pencils and 2 yellow pencils in the box.
Two pencils are chosen at random from the box without replacement.

Work out the probability that the two pencils are different colours.

..... [4]