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Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

5931335852

MATHEMATICS (SYLLABUS D) **4024/12**

Paper 1 **May/June 2024**

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 80.
- 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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ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER

1 **(a)** Here are five temperatures in °C.

4 1 −6 0 −2

Write these temperatures in order, starting with the lowest.

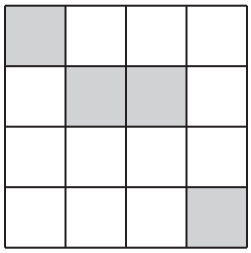
..... , ... , ... , ... , ... [1]
lowest

(b) Write these numbers in order of size, starting with the smallest.

0.45 $\frac{3}{8}$ 40%

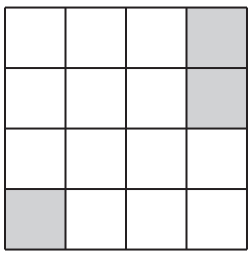
..... , ... , ... [1]
smallest

2 **(a)** Shade **one** more small square so the diagram has one line of symmetry.



[1]

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



[1]

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3 Olga writes a list of five numbers.

The median of the numbers is 12.
The mode of the numbers is 11.
The range of the numbers is 10.

The sum of the numbers is 75.

Find the five numbers in Olga's list.

..... , ... , ... , ... , ... [3]

4 **(a)** Convert 4 kilograms to grams.

..... g [1]

(b) Convert $250\,\text{cm}^3$ to litres.

..... litres [1]

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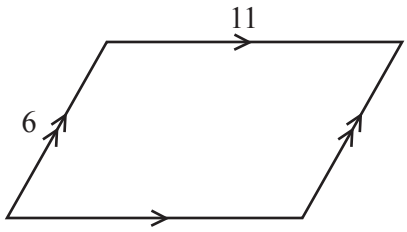
5 In this question all dimensions are given in centimetres.

(a)



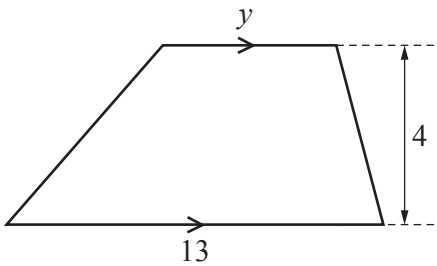
NOT TO SCALE

The diagram shows a parallelogram.

Find the perimeter of the parallelogram.

..... cm [1]

(b)



NOT TO SCALE

The diagram shows a trapezium.
The area of the trapezium is $36\,\text{cm}^2$.

Find the value of y.

y = ... [2]

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6 **(a)** Jack uses number cards to make a 2-digit number.

Complete the missing card to give a 2-digit number that is **not** a prime number.

.....	3

[1]

(b) Mei says:

When I add two multiples of 3, the answer is always a multiple of 6.

Give an example to show that Mei is wrong.

..... [1]

7 **(a)** Work out $\frac{2}{7} \div \frac{1}{3}$.

..... [1]

(b) Work out $\frac{5}{6} + \frac{3}{4}$.
Give your answer as a mixed number.

..... [2]

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8 **(a)** A train leaves station A at 07 43.
The train arrives at station B at 10 27.

Work out the time the train takes to travel from station A to station B.

..... hours ..... minutes [1]

(b) A bus leaves the bus station at 06 25.
It arrives at the airport at 07 05.
The distance from the bus station to the airport is 24 km.

Calculate the average speed of the bus for this journey.
Give your answer in km/h.

..... km/h [3]

9 There are red pens, blue pens and black pens in a box.

There are x red pens.
The number of blue pens is 5 more than the number of red pens.
The number of black pens is 2 times the number of blue pens.

(a) Write an expression, in terms of x, for the total number of pens in the box.
Give your expression in its simplest form.

..... [2]

(b) The total number of pens in the box is 27.

Find the number of red pens in the box.

..... [2]

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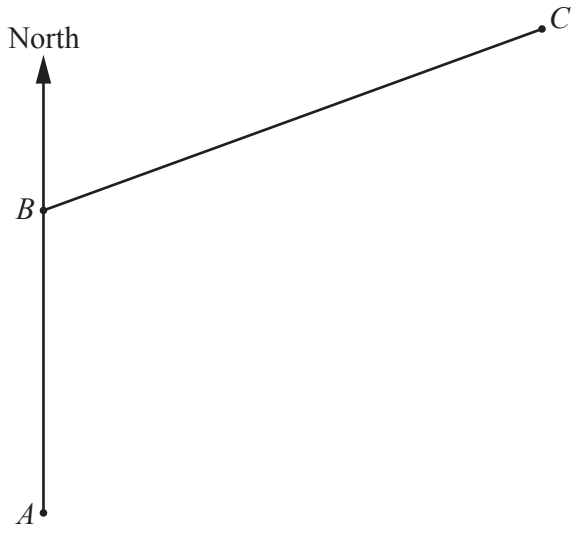
10 The scale drawing shows part of a field, *ABCD*.
The scale is 1 cm to 50 m.



Scale: 1 cm to 50 m

(a) Measure the bearing of *C* from *B*.

..... [1]

(b) *D* is 250 m from *C* and 300 m from *A*.

Use a ruler and compasses only to complete the scale drawing of the field *ABCD*. [2]

(c) There is a path across the field.
The path is equidistant from *AB* and *BC*.

Use a straight edge and compasses only to construct the path. [2]

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11 By writing each number correct to 1 significant figure, estimate the value of

$$\frac{5.32+3.97}{\sqrt{878}}.$$

..... [2]

12 **(a)** $a = 5b + 7$

Find the value of a when $b = -2$.

$a =$ ..... [1]

(b) $c = 4d - 9$

Rearrange the formula to make d the subject.

$d =$ ..... [2]

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13 Kamal records the number of phone calls he receives at work each day for 20 days.
The results are shown in the table.

Number of phone calls	0 to 5	6 to 10	11 to 15	16 or more
Frequency	9	5	4	2

(a) Find the relative frequency of Kamal receiving 0 to 5 phone calls at work in one day.

..... [1]

(b) Kamal works for 160 days.

Find the number of these days Kamal would expect to receive 11 or more phone calls at work.

..... [2]

14 **(a)** Write 42 000 000 in standard form.

..... [1]

(b) Evaluate $\left(1.3 \times 10^{-4}\right) + \left(7.4 \times 10^{-3}\right)$.

Give your answer in standard form.

..... [2]

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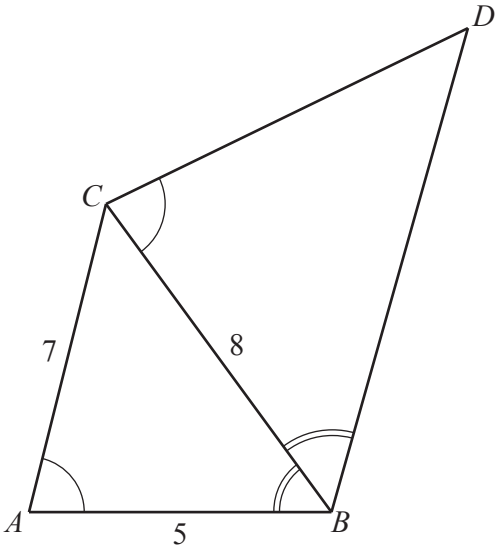
15



NOT TO SCALE

Triangle ABC is mathematically similar to triangle CBD.
$AB = 5\,\text{cm}$, $AC = 7\,\text{cm}$ and $BC = 8\,\text{cm}$.

Calculate BD.

$BD =$ ..... cm [2]

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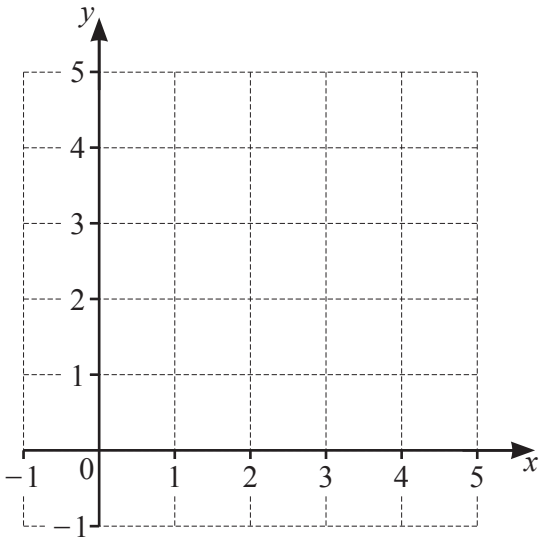
16



The region R is defined by these inequalities.

$$y \geqslant 2x$$

$$x + y \leqslant 4$$

$$x \geqslant 0$$

Find and label region R. [3]

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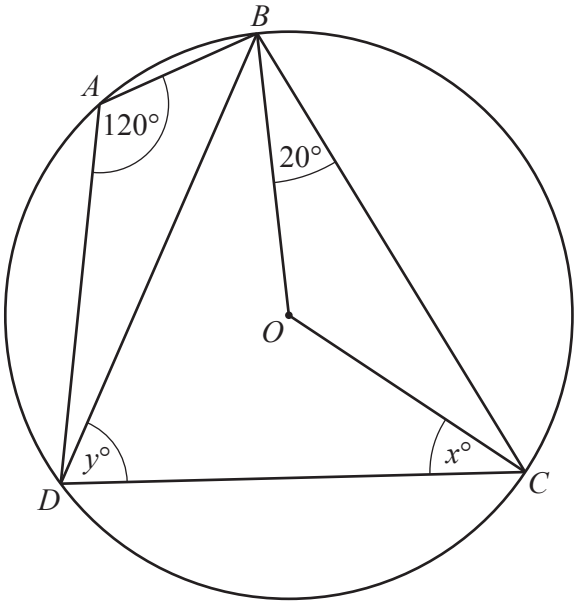
17



NOT TO SCALE

A, B, C and D are points on a circle, centre O.
Angle $BAD = 120°$ and angle $OBC = 20°$.

(a) Find the value of x.

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

(b) Find the value of y.

$y =$ ..... [2]

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18 **(a)** Evaluate $125^{-\frac{1}{3}}$.

..... [1]

(b) Simplify $\left(\frac{a^3}{4a}\right)^{\frac{3}{2}}$.

..... [2]

19 **(a)** The mass of a bag of almonds is 125 g, correct to the nearest gram.

Write down the lower bound of the mass of the bag of almonds.

..... g [1]

(b) The mass of a large box is 500 g, correct to the nearest 10 grams.
The mass of a small box is 250 g, correct to the nearest 10 grams.

Calculate the upper bound of the difference between the mass of a large box and the mass of a small box.

..... g [2]

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20 $\mathrm{f}(x) = \dfrac{2-4x}{5}$

(a) Find $\mathrm{f}^{-1}(x)$.

$\mathrm{f}^{-1}(x) =$ ..... [3]

(b) Simplify $\mathrm{f}(x) - \mathrm{f}(2x)$.

..... [2]

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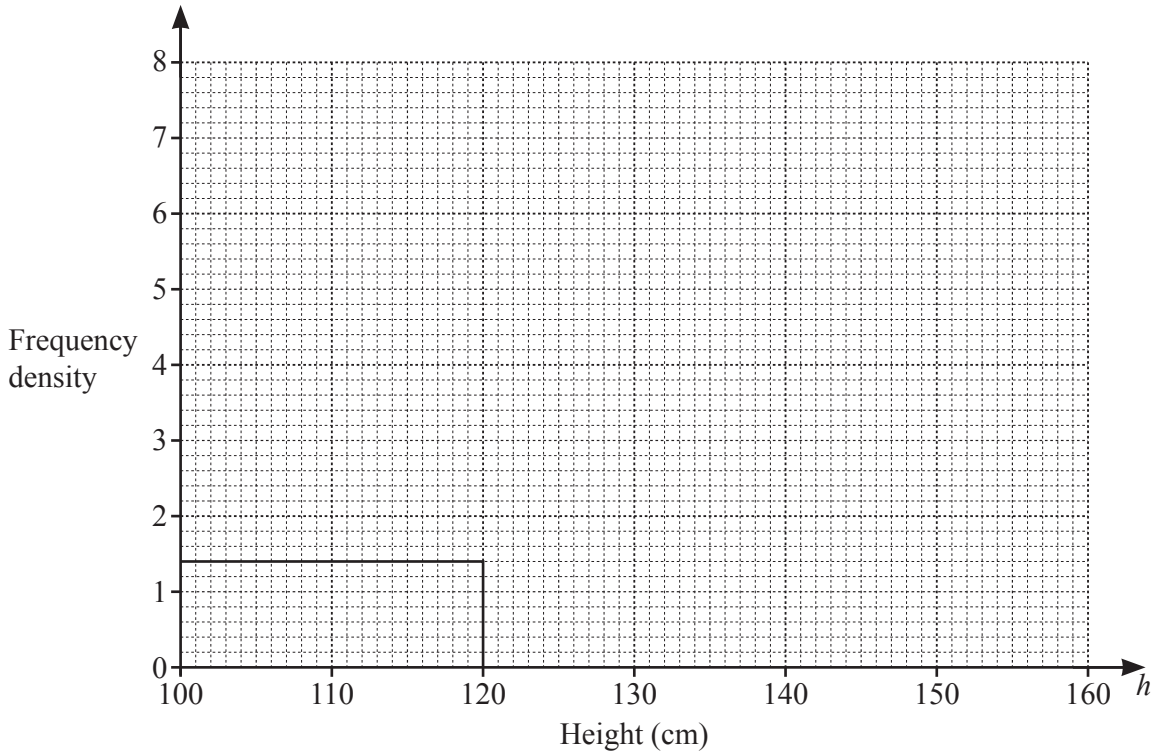
21 The table shows the heights of 180 sunflowers.

Height (h cm)	$100 < h \leqslant 120$	$120 < h \leqslant 140$	$140 < h \leqslant 150$	$150 < h \leqslant 160$
Frequency	28	60	68	24

Complete the histogram.



[3]

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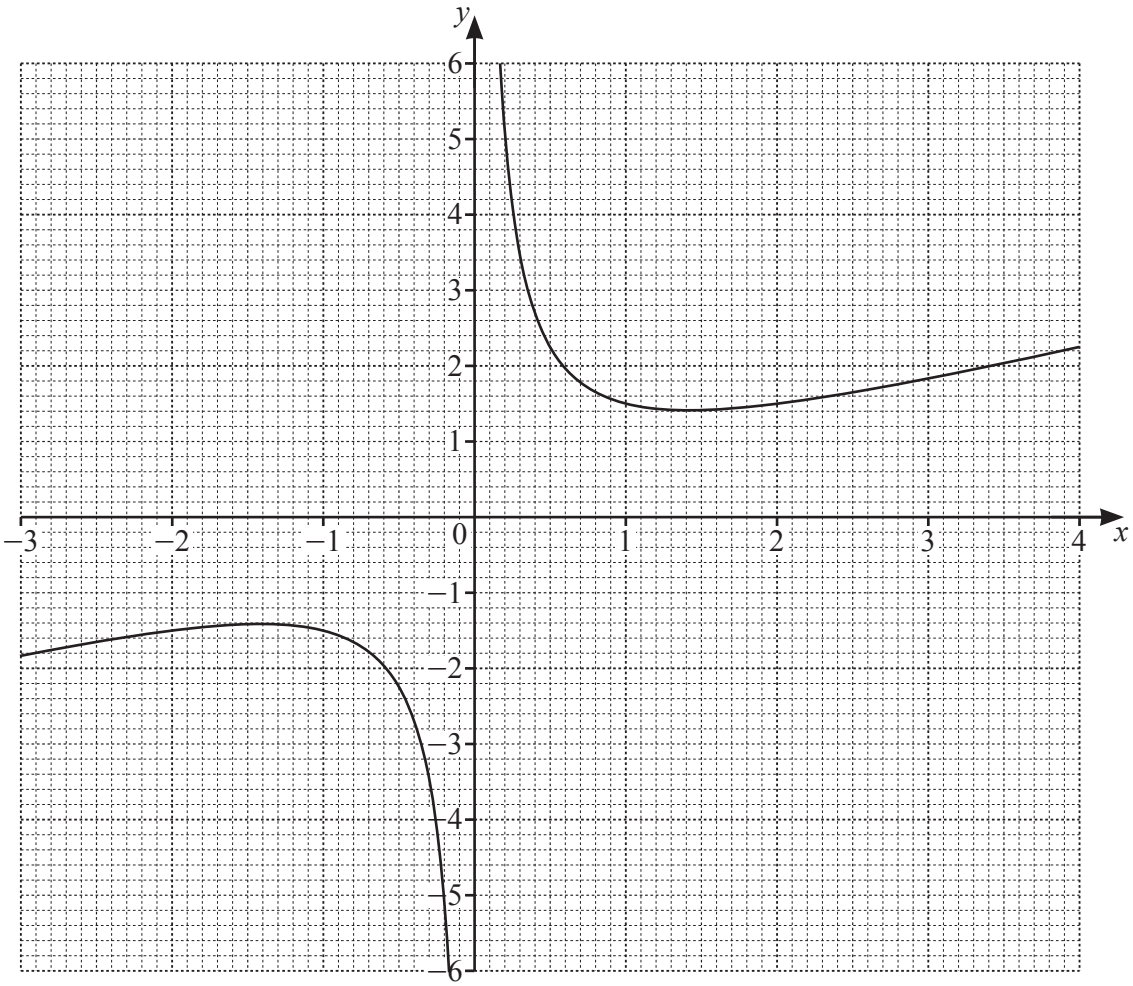

The diagram shows the graph of $y = \frac{1}{x} + \frac{x}{2}$.

(a) By drawing a tangent, estimate the gradient of the curve when $x = 2$.

..... [2]

(b) By drawing a suitable line on the grid, find the solutions of $\frac{1}{x} - \frac{5x}{2} + 1 = 0$.

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

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23 $\mathbf{A} = \begin{pmatrix} 3 & -1 \\ 2 & 0 \end{pmatrix}$

(a) Find $\mathbf{A}^{-1}$.

$\mathbf{A}^{-1} = \begin{pmatrix} \quad & \quad \\ \quad & \quad \end{pmatrix}$ [2]

(b) $\mathbf{AX} = \begin{pmatrix} 7 \\ 4 \end{pmatrix}$

Find $\mathbf{X}$.

$\mathbf{X} =$ [2]

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24 Solve $\frac{x}{x-1} - \frac{5}{x-3} = 1$.

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

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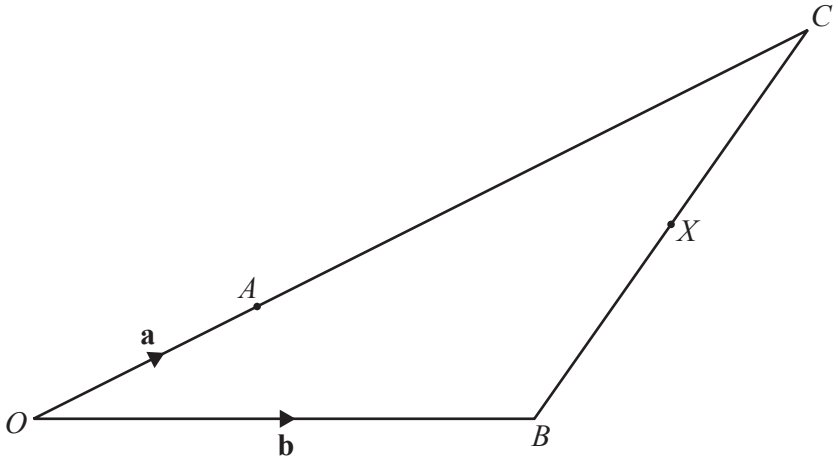
25



NOT TO SCALE

OCB is a triangle.

A is a point on OC such that $OA : AC = 1 : 3$.
X is the midpoint of BC.
$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.

Find the position vector of X.
Give your answer as simply as possible in terms of **a** and **b**.

..... [3]

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