Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

1788965726

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

Paper 1 **May/June 2023**

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 **16** pages.

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ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER

1 Work out.

(a) $3.25 - 1.73$

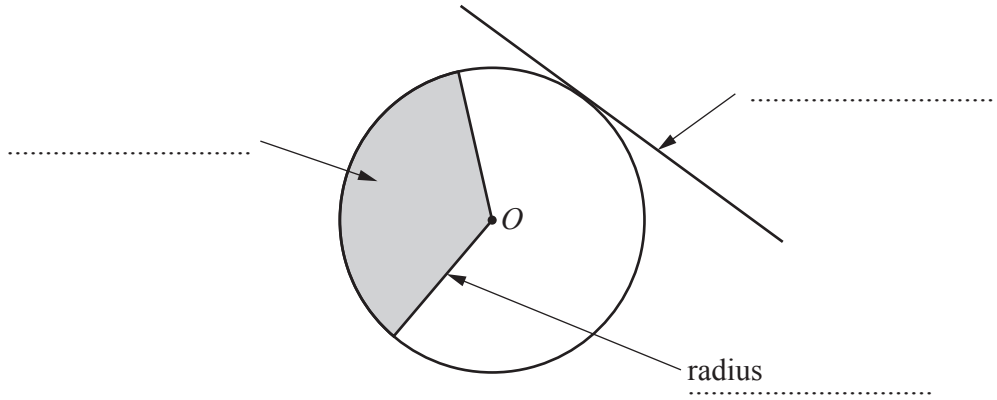
..... [1]

(b) 1.2^2

..... [1]

2 The diagram shows a circle with centre O.
A straight line touches the circle.

Complete each label with the correct mathematical name.
A radius has been labelled for you.



[2]

3 Write these numbers in order of size, starting with the smallest.

0.65 $\frac{5}{8}$ 62% $\frac{11}{20}$ 0.595

..... , ... , ... , ... , ... [2]
smallest

4 **(a)** At midday the temperature is 8 °C.
At midnight the temperature is 12 °C lower.

Find the temperature at midnight.

..... °C [1]

(b) Shazia records the temperature, in °C, at 6 am every day for one week.

5 2 −1 −7 −2 5 −5

(i) Find the median.

..... °C [1]

(ii) Find the range.

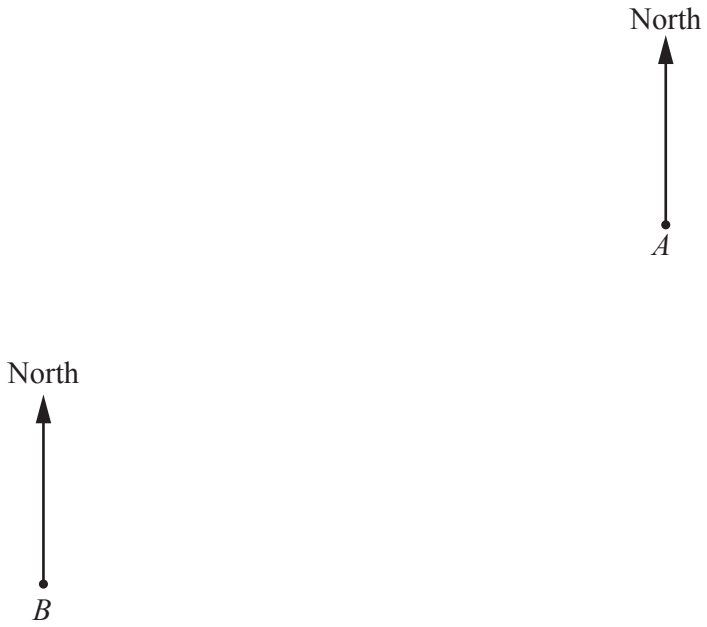
..... °C [1]

5 Maya invests $480 at a rate of 2% per year simple interest.

Calculate the total amount of interest she receives at the end of 5 years.

$ ..... [2]

6 The scale drawing shows the positions of two villages, A and B.
The scale is 1 cm to 2 km.



Scale: 1 cm to 2 km

(a) **(i)** Find the actual distance AB.

..... km [2]

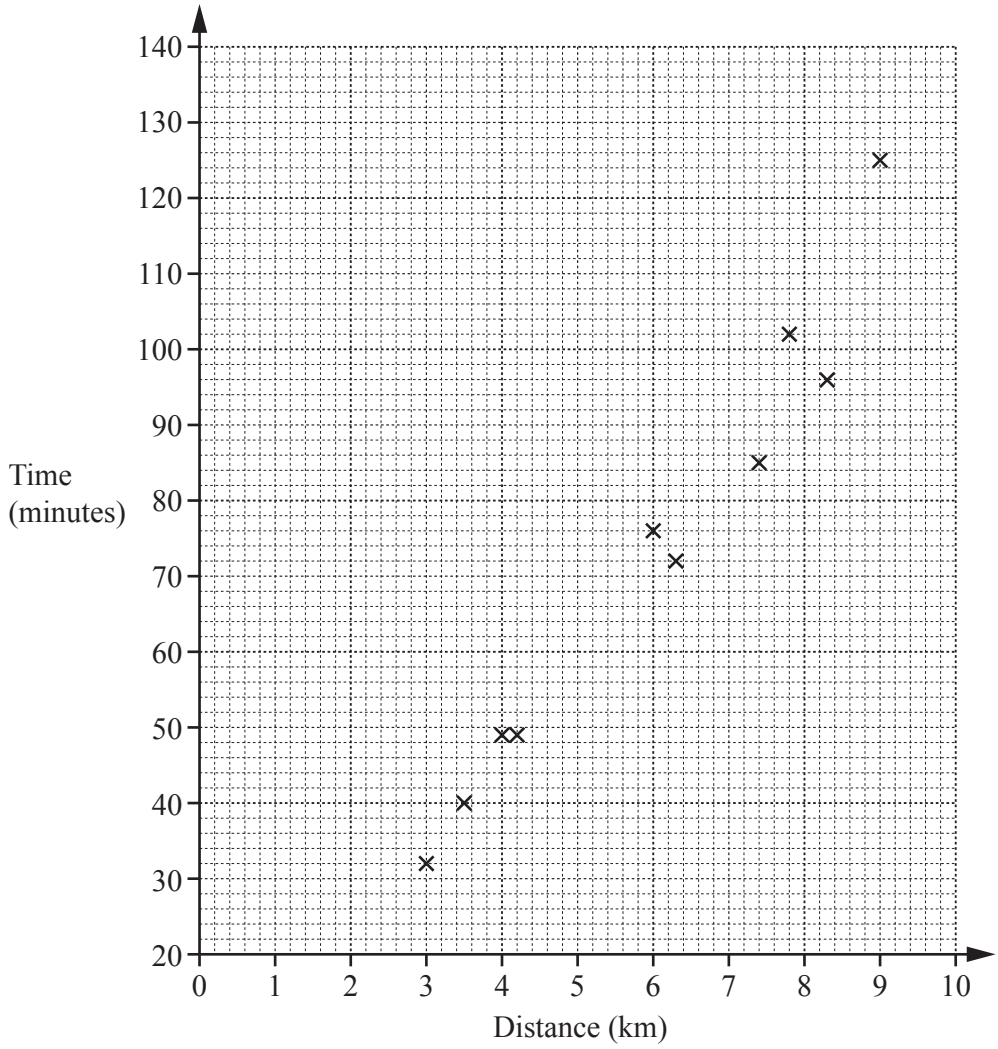
(ii) Find the bearing of B from A.

..... [1]

(b) A plane flies so that it is always equidistant from A and B.

Using a straight edge and compasses only, construct the path of the plane. [2]

7 Ben walks for exercise.
The scatter diagram shows the distance for 10 walks and the time each walk takes.



(a) Write down the type of correlation that the scatter diagram shows.

..... [1]

(b) Draw a line of best fit. [1]

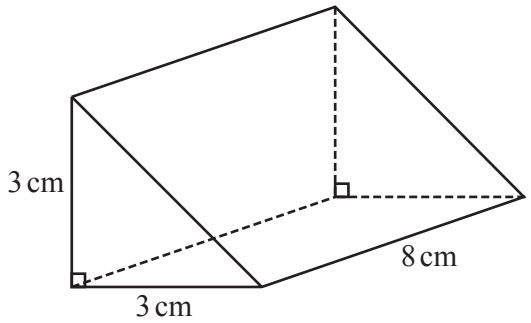
(c) Use your line of best fit to estimate the time Ben takes for a 5 km walk.

..... minutes [1]

8 Work out $1\frac{3}{4} + \frac{5}{6}$.
Give your answer as a mixed number in its simplest form.

..... [2]

9



The diagram shows a triangular prism.
The cross-section is a right-angled isosceles triangle.

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

..... [1]

(b) Work out the volume of the prism.

..... cm^3 [2]

10 Solve the simultaneous equations.
Show your working.

$$x + 2y = 7$$
$$3x + 4y = 11$$

$x =$ .....

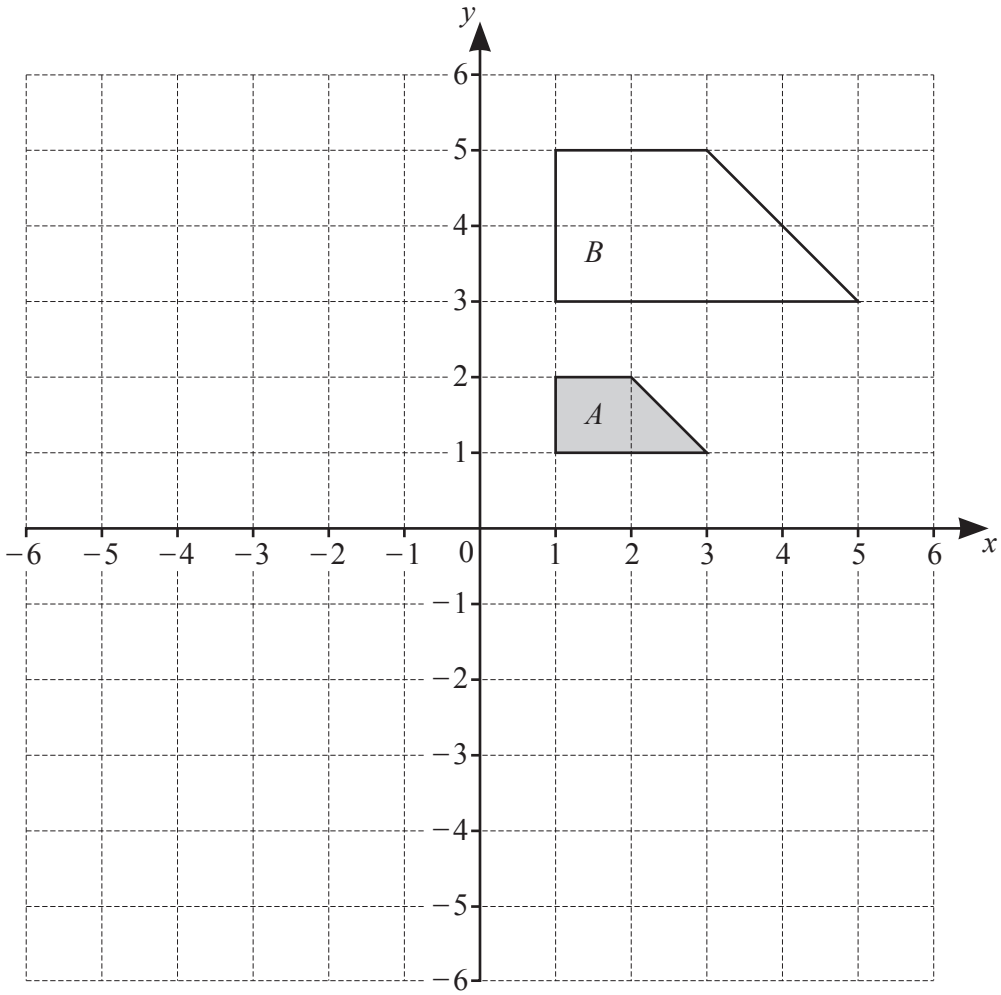
$y =$ ..... [3]

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

$$\frac{18.2^3}{0.395}.$$

..... [2]

12



Shape *A* and shape *B* are drawn on the grid.

(a) Describe fully the **single** transformation that maps shape *A* onto shape *B*.

.....

..... [3]

(b) Draw the image of shape *A* after a rotation of 180° about (0, 0) . [2]

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

1 3 9 27

Find the next term of the sequence.

..... [1]

(b) These are the first five terms of a different sequence.

35 31 27 23 19

Find an expression, in terms of n, for the nth term of this sequence.

..... [2]

14 **(a)** Write 325 as a product of its prime factors.

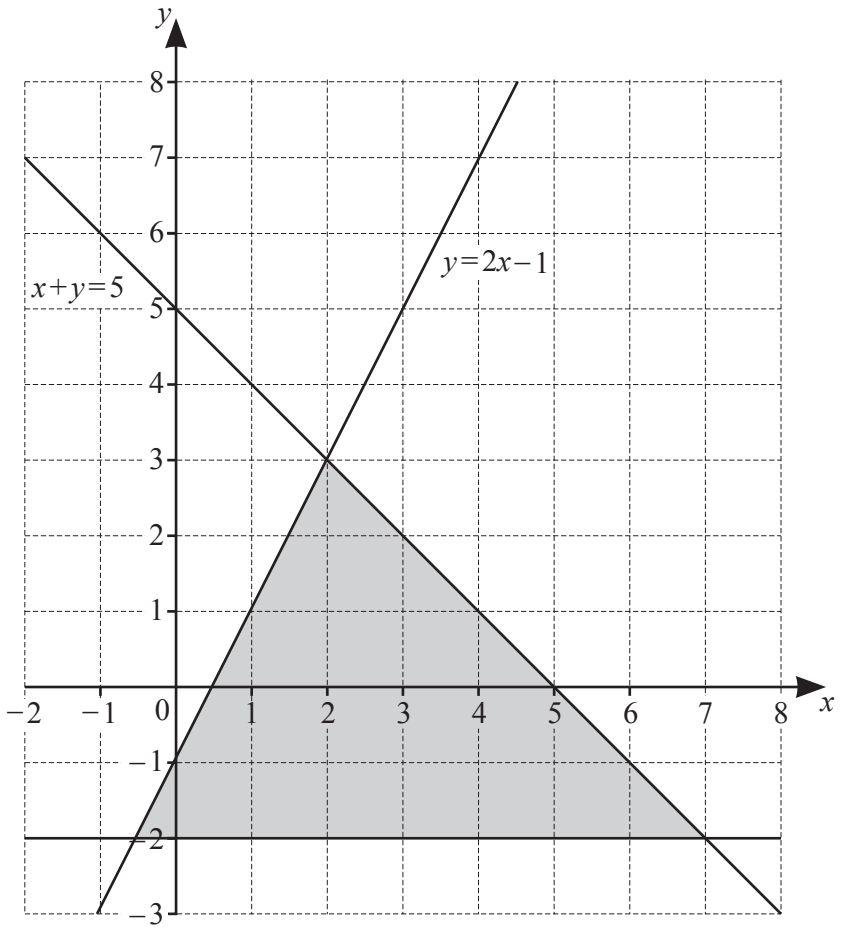
..... [2]

(b) $P = x^n y^2$ and $Q = x^{n-1} y^4$, where x and y are prime.

Find the highest common factor (HCF) of P and Q.
Give your answer in terms of x, y and n.

..... [2]

15 Three lines and a shaded region are shown on a 1 cm square grid.



(a) Find the three inequalities that define the shaded region.

.....

.....

..... [2]

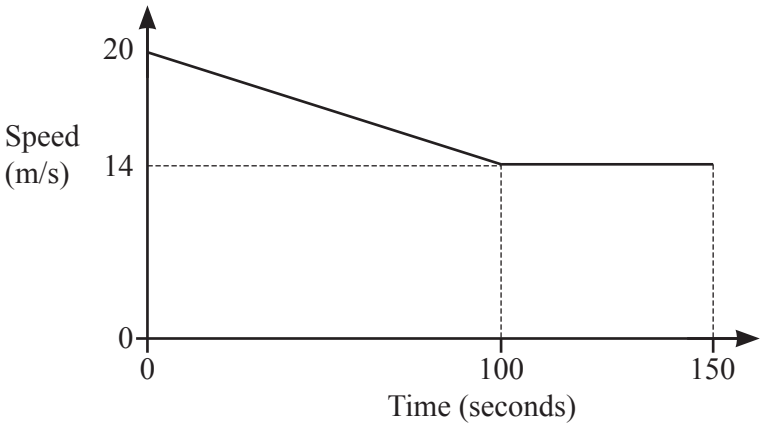
(b) Another region, R, is defined by these three inequalities.

$$x+y \leqslant 5 \qquad y \geqslant 2x-1 \qquad x \geqslant 1$$

Find the area of region R.

..... cm^2 [1]

16 The diagram shows the speed–time graph for part of a car's journey.



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Calculate the distance travelled by the car in the 150 seconds.

..... m [2]

17 $f(x) = 2 - 3x$ $\quad g(x) = x - 4$

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

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

(b) Solve $f(x+5) = 3g(x)$.

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

18 Juan sells gift bags containing soaps and candles.
Matrix **C** shows the contents of a large gift bag and a small gift bag.

$$\mathbf{C} = \begin{array}{c} \begin{array}{cc} \text{soaps} & \text{candles} \end{array} \\ \begin{pmatrix} 6 & 4 \\ 2 & 1 \end{pmatrix} \end{array} \begin{array}{l} \\ \text{large} \\ \text{small} \end{array}$$

(a) Find how many more candles are in a large gift bag than in a small gift bag.

..... [1]

(b) The mass of a soap is 120 g and the mass of a candle is 60 g.
Matrix **M** represents this information.

$$\mathbf{M} = \begin{pmatrix} 120 \\ 60 \end{pmatrix}$$

(i) $\mathbf{N} = \mathbf{CM}$

Find matrix **N**.

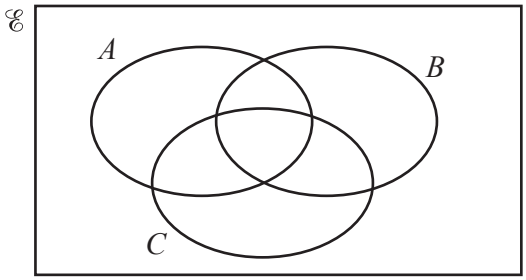
N = [2]

(ii) Explain what each element in matrix **N** represents.

.....

..... [1]

19 **(a)** In the Venn diagram, shade the region represented by $(A \cap B') \cup (B \cap C')$.



[1]

(b) One morning 50 people visit a library.

- 35 of them borrow a book.
- 12 of them use a computer.
- 8 of them do not borrow a book and do not use a computer.

Using a Venn diagram, or otherwise, find the number of people who use a computer but do not borrow a book.

..... [2]

20 **(a)** Expand and simplify.

$$(4x - y)(2x + 5y)$$

..... [2]

(b) Simplify.

$$\left(\frac{x^{12}}{8}\right)^{\frac{2}{3}}$$

..... [2]

21 Solve.

$$\frac{5x}{x-3} = x+4$$

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

22 y is directly proportional to w^2.
x is inversely proportional to w.

When $w = 10$, $y = 5$ and $x = 0.4$.

Find y in terms of x.
Give your answer in its simplest form.

$y =$ ..... [4]

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23 There are 10 cards in a set.
Each card shows either a square or a triangle.
Every shape on each card is either green or red.
The table shows the number of cards of each type.

	Green	Red
Square	3	1
Triangle	4	2

(a) Ken takes a card at random from the set, notes the colour and replaces it.
He then takes a second card at random from the set, notes the colour and replaces it.

Find the probability that both cards show a green shape.

..... [2]

(b) Irina takes two cards at random from the set of 10 without replacement.

Find the probability that both cards show the same shape.

..... [3]

Question 24 is printed on the next page.

24 A is the point (3, 11) and B is the point $(-5, -5)$.
The equation of line L is $2y + x = 5$.

Show that line L is the perpendicular bisector of AB.

[5]

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