Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

MATHEMATICS (SYLLABUS D) **4024/11**

Paper 1 **October/November 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.

[Turn over

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER

1   At midday the temperature is $-2\,°C$.
    At 6 pm the temperature is $4\,°C$.

   (a) Find the difference between these temperatures.

   ....°C [1]

   (b) The temperature at midnight is $9\,°C$ lower than the temperature at midday.

   Find the temperature at midnight.

   ....°C [1]

2   Amber and Pablo share $280 in the ratio 2 : 5.

   Work out Pablo's share.

   $ .... [2]

3   Here are eight integers.

   $$-1 \qquad -5 \qquad -1 \qquad -3 \qquad -3 \qquad 2 \qquad -1 \qquad -7$$

   Find

   (a) the mode

   .... [1]

   (b) the median.

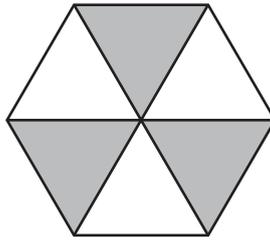   .... [2]

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4 **(a)** Shade **one** more small square so the diagram has one line of symmetry.
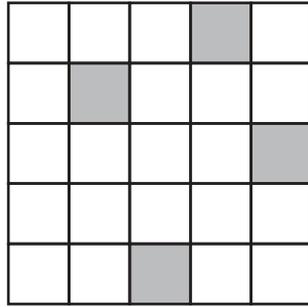
[1]

(b) Here is a regular polygon.

Complete the description of the rotational symmetry of this polygon.

The polygon has rotational symmetry of order .... [1]

5 **(a)** Simplify.

$$2a - 3b + 4b - 5a$$

.... [2]

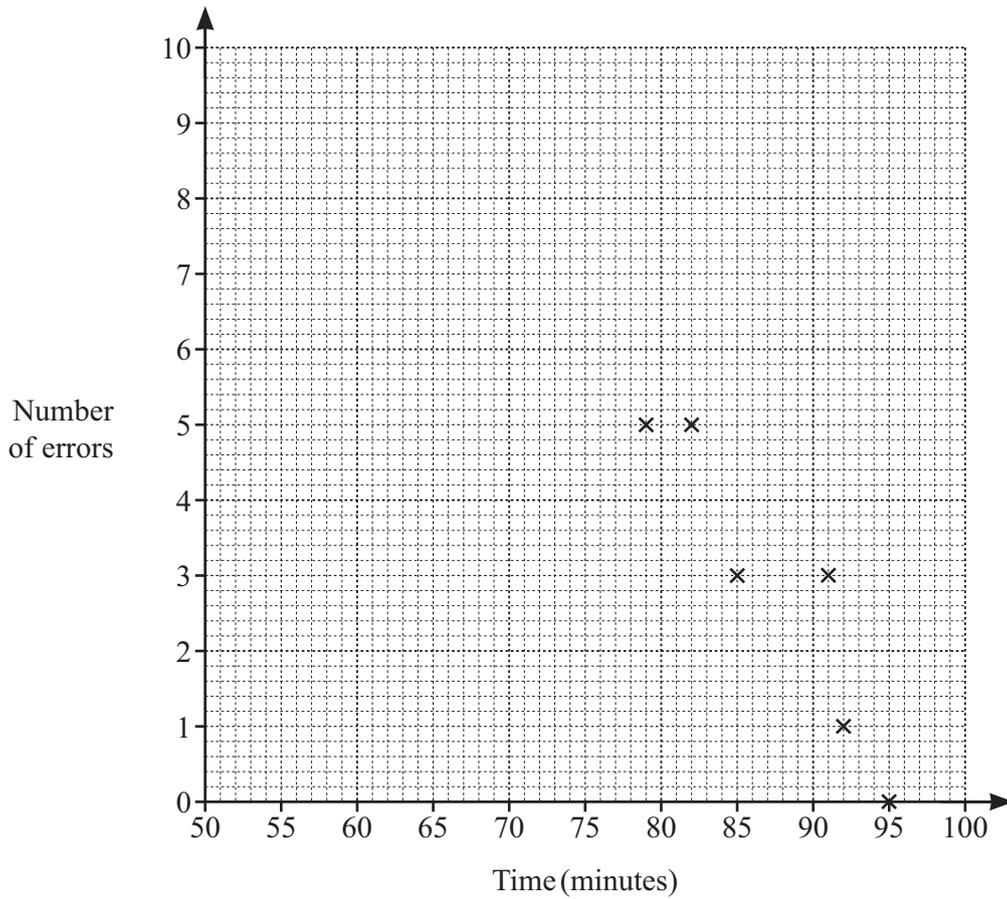**(b)** Expand.

$$5(3x - 2)$$

.... [1]

6   The table shows the time spent on a homework task and the number of errors made for some students in a class.

Time (minutes)	79	92	91	85	82	95	60	65	63	70
Number of errors	5	1	3	3	5	0	9	7	8	7

(a) Complete the scatter diagram.
The first 6 points have been plotted for you.   [2]

(b) On the scatter diagram, draw a line of best fit.   [1]

(c) Another of the students in the class made 6 errors.

Use your line of best fit to estimate the time this student spent on the homework task.

.... minutes [1]

7 By writing each number correct to 1 significant figure, calculate an estimate for the value of

$$\frac{3.1 \times 26.7}{6.9 - 2.3}.$$

.... [2]

8 These are the first four terms of a sequence.

<div align="center">2 8 14 20</div>

(a) Find the next number in the sequence.

.... [1]

(b) Find an expression, in terms of n, for the nth term of this sequence.
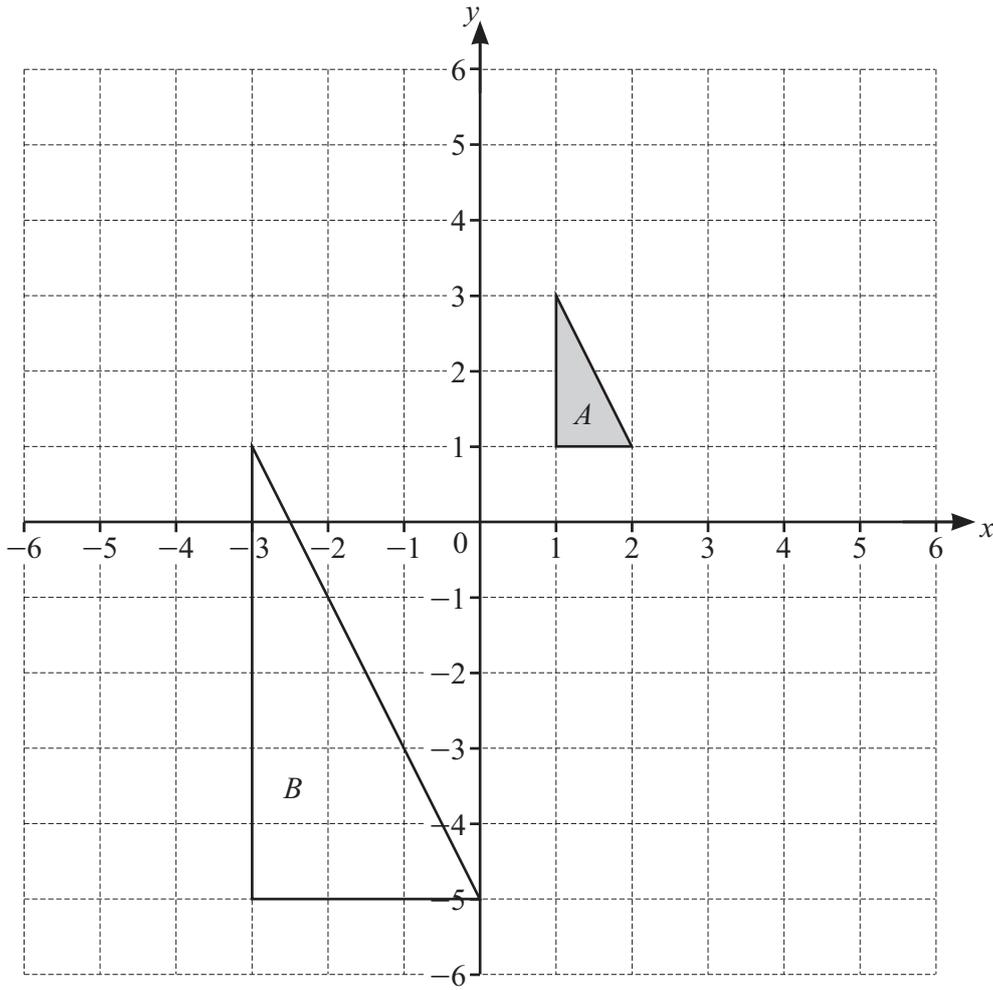
.... [2]

9 The grid shows triangle *A* and triangle *B*.

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

....

.... [3]

(b) Triangle *A* is mapped onto triangle *C* by the translation $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$.

Draw triangle *C*. [2]

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10 Solve the simultaneous equations.
Show your working.

$$3a + b = -4$$
$$2a + 3b = 9$$

$a =$ ....

$b =$ .... [3]

11 Point A $(2, 4)$ is joined to point B $(5, -2)$ by a straight line.

(a) Find the coordinates of the midpoint of AB.

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

(b) Find the gradient of the line AB.

.... [2]

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12 (a) Write 0.000 257 in standard form.

.... [1]

(b) Work out $\dfrac{2 \times 10^4}{4 \times 10^{-5}}$.

Give your answer in standard form.

.... [2]

13 Work out $2\dfrac{1}{5} \div \dfrac{3}{4}$.

Give your answer as a mixed number in its simplest form.

.... [2]

14 (a) Write 360 as a product of its prime factors.

.... [2]

(b) Find the smallest positive integer n such that $360n$ is a cube number.

$n =$ .... [1]

15 A sector of a circle with angle 60° has arc length 4π cm.

Find the area of the sector.
Give your answer, as simply as possible, in terms of π.

.... cm^2 [4]

16 (a) Express as a single matrix.

$$2\begin{pmatrix} 3 & -1 \\ 2 & 4 \end{pmatrix} - \begin{pmatrix} 1 & 3 \\ -2 & 5 \end{pmatrix}$$

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

(b) $\mathbf{A} = \begin{pmatrix} 4 & k \\ 2 & 1 \end{pmatrix}.$

The determinant of **A** is 10.

(i) Find the value of k.

$k =$ .... [1]

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

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

17 The diagram shows the lines $y = 2x + 1$ and $x + y = 2$.
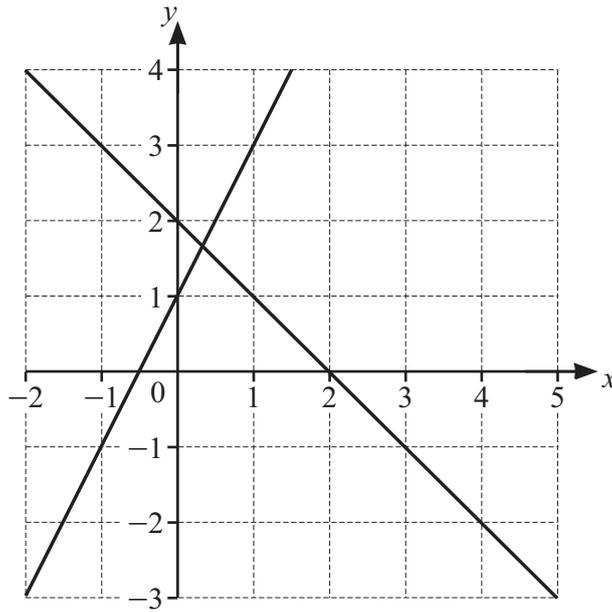
(a) The region R is defined by these three inequalities.

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

On the diagram, shade and label the region R. [2]

(b) The point $(k, k - 2)$ lies in the region R where k is an integer.

List the possible values of k.

.... [2]

18 50 adults each take part in a quiz.
The cumulative frequency diagram shows their scores.
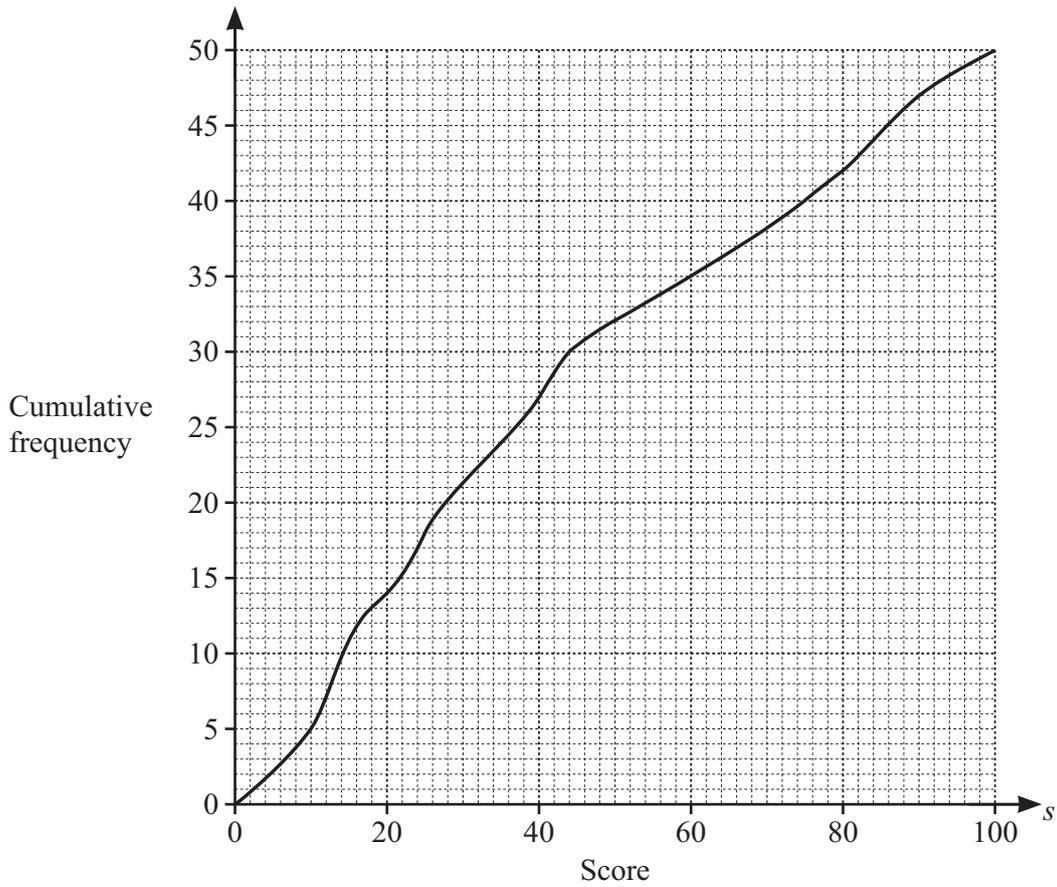
Score

(a) Use the diagram to find an estimate of the interquartile range.

.... [2]

(b) 20% of the adults win a prize for getting a high score in the quiz.

Use the diagram to work out the minimum score needed to win a prize.

.... [2]

(c) Use the diagram to complete the frequency table.

Score (s)	$0 < s \leqslant 20$	$20 < s \leqslant 40$	$40 < s \leqslant 60$	$60 < s \leqslant 80$	$80 < s \leqslant 100$
Frequency					8

[2]

19 x is inversely proportional to the square root of y.
When $x = 2$, $y = 16$.

Find y when $x = 32$.

$y =$ .... [2]

20 $\left(ax^n\right)^{\frac{2}{3}} = 4x^{10}$

Work out the value of a and the value of n.

$a =$ ....

$n =$ .... [2]

21 The diagram shows the speed–time graph for a journey.

NOT TO
SCALE
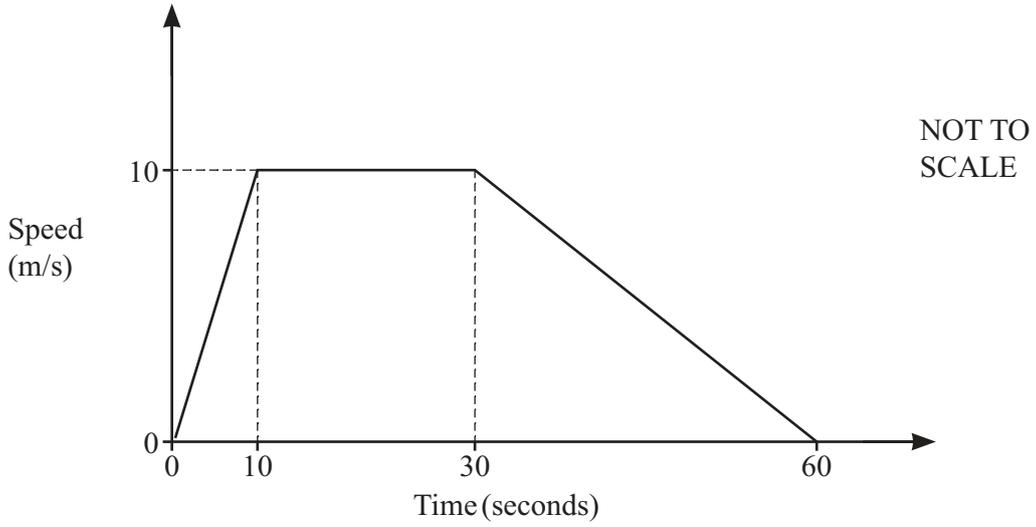
Calculate the total distance travelled.

.... m [2]

22 $f(x) = 3x^2 + 5$

(a) Work out $f(-1)$.

.... [1]

(b) Solve $f(2x) = 17$.

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

23 A rectangle has length 32 cm and width 15 cm.
Each measurement is given correct to the nearest centimetre.

(a) Write down the upper bound for the length.

.... cm [1]

(b) Calculate the upper bound for the difference between the length and the width.

.... cm [1]

24 Simplify.

$$\frac{2x^2 + 5x - 3}{2x^2 + 6x}$$

.... [3]
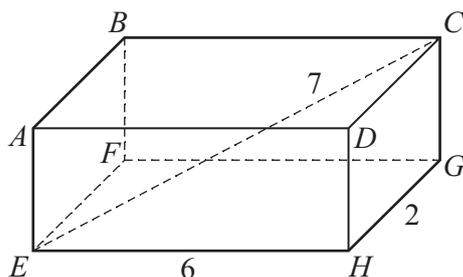
NOT TO SCALE

The diagram shows a cuboid.
$EH = 6$ cm, $HG = 2$ cm and $EC = 7$ cm.

Calculate CG.

$CG =$ .... cm [3]

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26 Solve.

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

$x = $ .... [4]

19

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