Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

1361753870

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

Paper 1 **October/November 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.

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER

1 Work out.

(a) 0.05×0.3

..... [1]

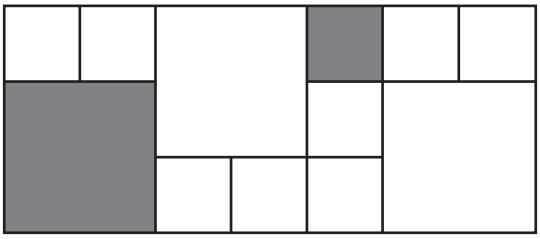
(b) $600 \div 0.2$

..... [1]

(c) $20 - 12 \div (8 - 6)$

..... [1]

2



This rectangle is split into squares of two different sizes.

Find the fraction of the rectangle that is shaded grey.

..... [1]

3 **(a)** Find the decimal which is exactly halfway between $\frac{3}{5}$ and 68% .

..... [1]

(b) Write 4.073 82 correct to 3 decimal places.

..... [1]

(c) Evaluate $\sqrt[3]{64}$.

..... [1]

4 Sonu records the temperature, in °C, at midnight every day for 12 days.
Here are the results in order, starting with the coldest.

$$-6 \quad -5 \quad -3 \quad -2 \quad -1 \quad -1 \quad T \quad 5 \quad 5 \quad 6 \quad 6 \quad 7$$

(a) Find the range of the temperatures.

..... °C [1]

(b) The median temperature is 1 °C.

Find the value of T.

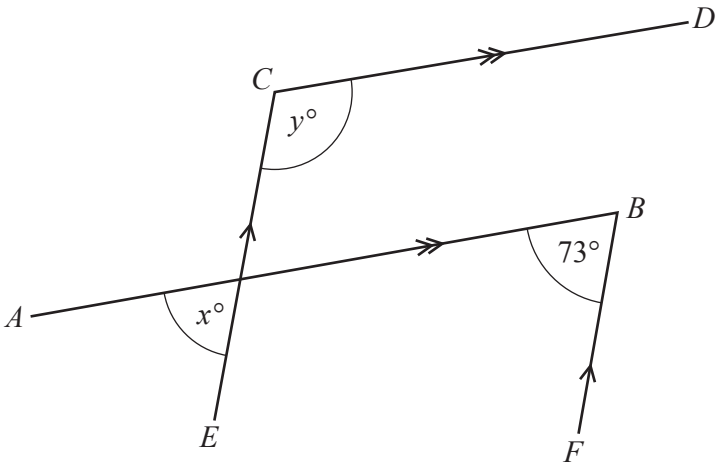
$T =$ ..... [1]

5 Anna and Ria share some money in the ratio 5 : 9.
Ria receives \$8 more than Anna.

Work out the total amount of money that is shared.

\$ ..... [2]

6



NOT TO SCALE

AB and *CD* are parallel lines.
EC and *FB* are parallel lines.
Angle *ABF* = 73°.

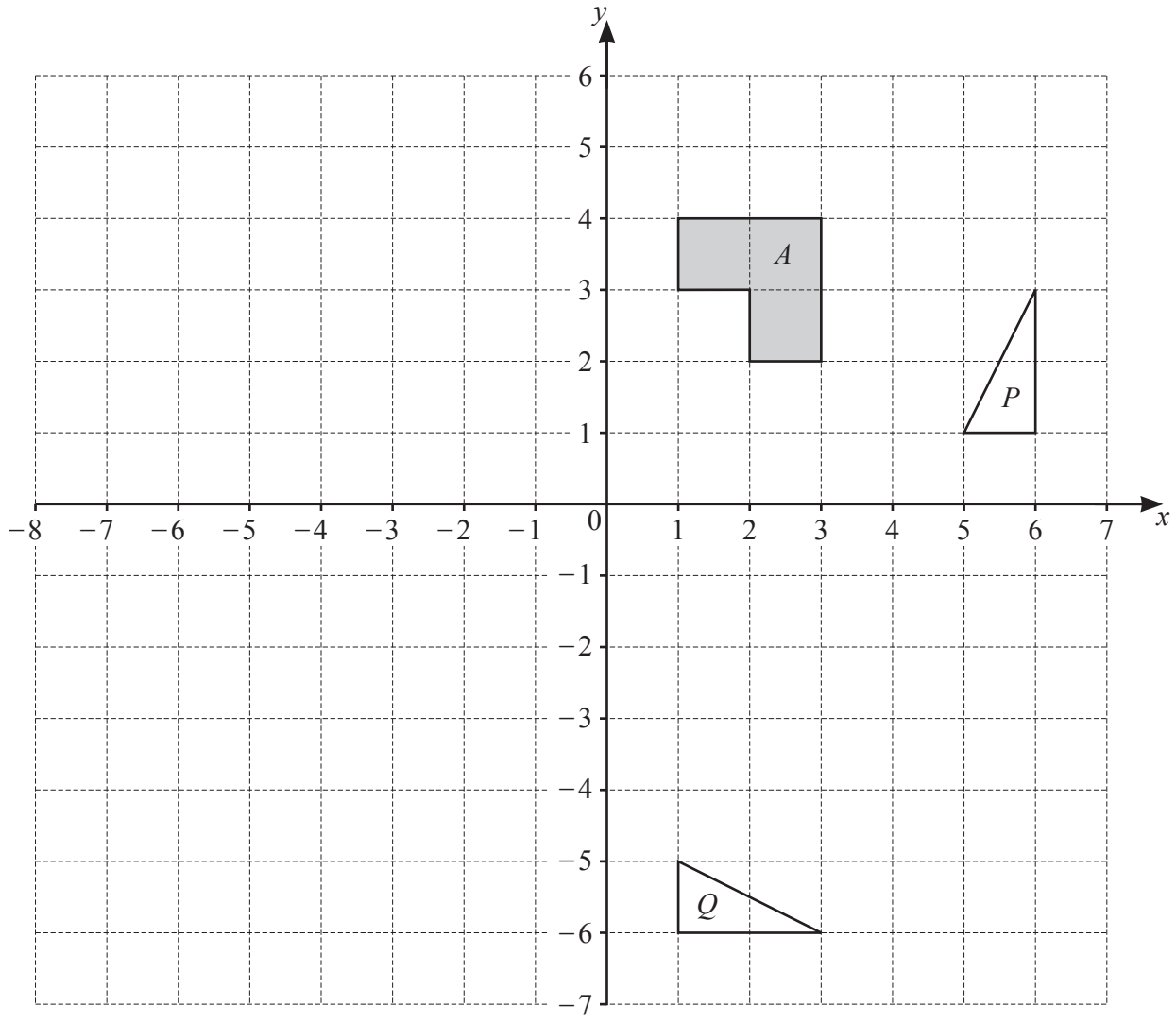
(a) Find the value of *x*.

x = ... [1]

(b) Find the value of *y*.

y = ... [1]

7 Shape A and triangles P and Q are drawn on a centimetre square grid.



(a) Describe fully the **single** transformation that maps triangle P onto triangle Q.

.....

..... [3]

(b) Shape B is an enlargement of shape A.
The centre of enlargement is (5, 5).
The area of shape B is $27\,cm^2$.

Draw shape B on the grid.

[3]

8 **(a)** Write the number $0.004\,93$ in standard form.

..... [1]

(b) Evaluate $(4\times10^{9})\times(2\times10^{-2})$.
Give your answer in standard form.

..... [1]

9 **(a)** Write 180 as the product of its prime factors.

..... [2]

(b) Expressed as the product of their prime factors,

$$36 = 2^2\times3^2 \qquad \text{and} \qquad N = 2^2\times3\times k, \text{ where } k > 3.$$

180 is the lowest common multiple (LCM) of 36 and N.

Find the value of k.

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

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

$$\sqrt{\frac{1240 \times 3.8}{11.2}}.$$

..... [2]

11 Solve $7m - 13 \leqslant 8$.

..... [2]

12 Solve the simultaneous equations.
Show all your working.

$$5x + 4y = 14$$
$$3x - 2y = 15$$

$x =$ .....

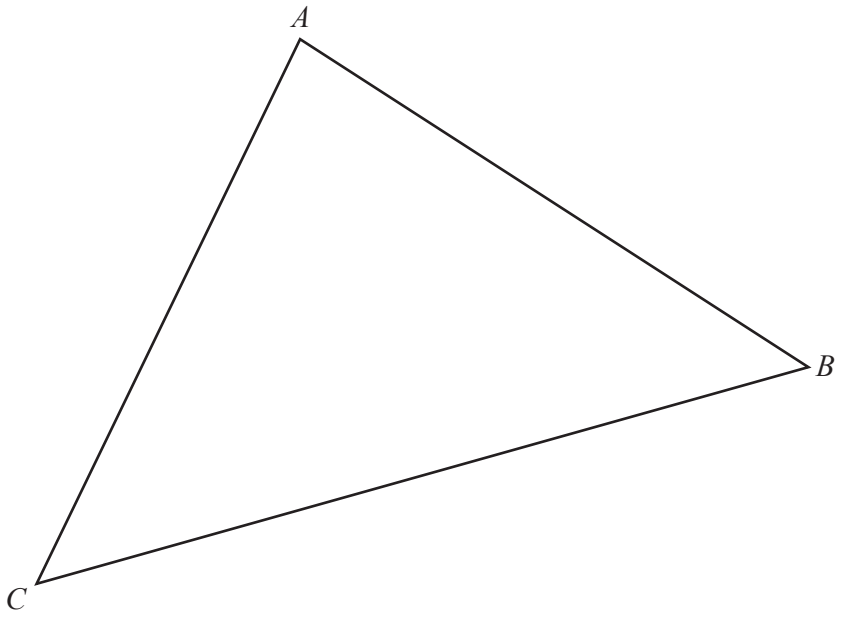
$y =$ ..... [3]

13 A list of eight numbers has a mean of 12.
The first five numbers have a mean of 9.

Find the sum of the three remaining numbers.

..... [2]

14



(a) Measure angle *ABC*.

Angle *ABC* = ... [1]

(b) **Using compasses and a straight edge only**, construct the perpendicular bisector of *AC*. [2]

(c) On the diagram, shade the region inside triangle *ABC* that is

- nearer to *A* than to *C*

and

- more than 6 cm from *B*. [2]

15 **(a)** The second term of a linear sequence is 28.
The fifth term of the sequence is 16.

Find the first term, the third term and the fourth term of this sequence.

First term = ...

Third term = ...

Fourth term = ... [2]

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

3 9 19 33 51

Find an expression for the nth term of this sequence.

..... [2]

16 $T = \sqrt{P-4}$

(a) Work out the value of T when $P = 40$.

$T =$ ..... [1]

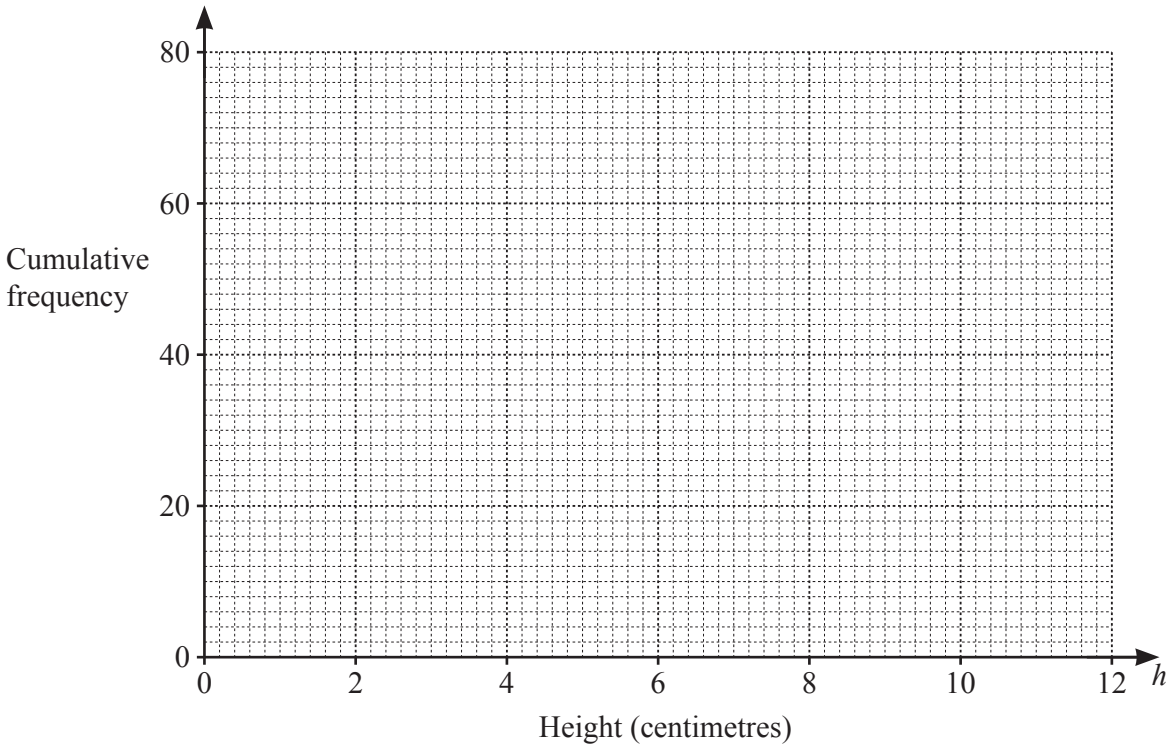
(b) Rearrange the formula to make P the subject.

$P =$ ..... [2]

17 The heights of 80 plants are measured.
The table shows the results.

Height (h centimetres)	$h \leqslant 2$	$h \leqslant 4$	$h \leqslant 6$	$h \leqslant 8$	$h \leqslant 10$	$h \leqslant 12$
Cumulative frequency	4	18	42	60	72	80

(a) Draw a cumulative frequency diagram to show this information.



[2]

(b) Use your diagram to find an estimate for the interquartile range.

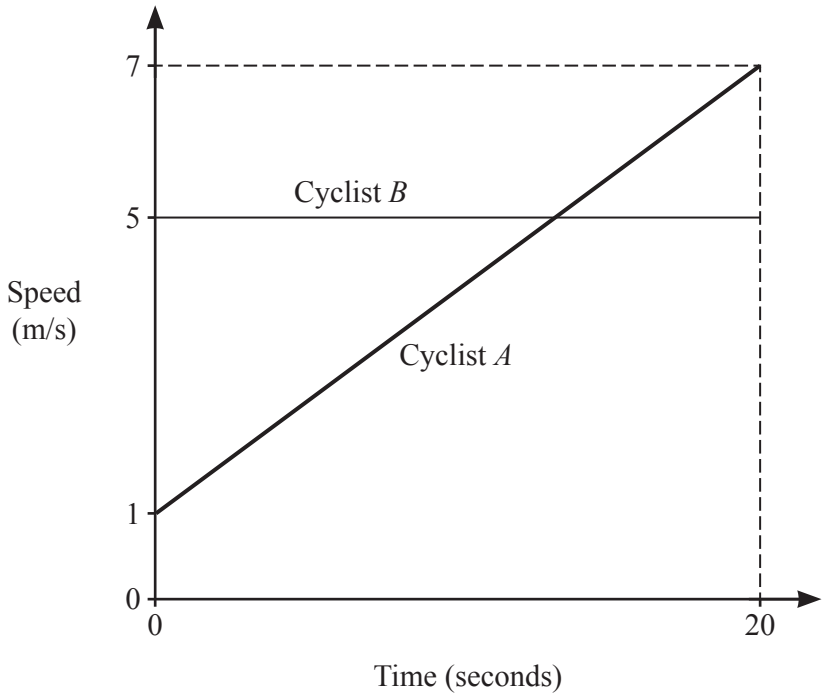
..... cm [2]

(c) Plants are sold when they are taller than H centimetres.
28 of these plants are sold.

Find the value of H.

$H =$ ..... [2]

18 The diagram shows the speed–time graph of part of a journey for two cyclists, *A* and *B*.



(a) Find the acceleration of cyclist *A* during the first 20 seconds.

..... m/s^2 [1]

(b) Find which cyclist travelled further in the first 20 seconds and by how many metres.

Cyclist ..... travelled further by ..... metres [3]

19 Express as a single fraction in its simplest form.

$$\frac{x+1}{8}+\frac{3x}{4}-\frac{5x}{16}$$

..... [2]

20 Factorise.

(a) $2cd+ce-6d-3e$

..... [2]

(b) $3v^2-27t^2$

..... [2]

21

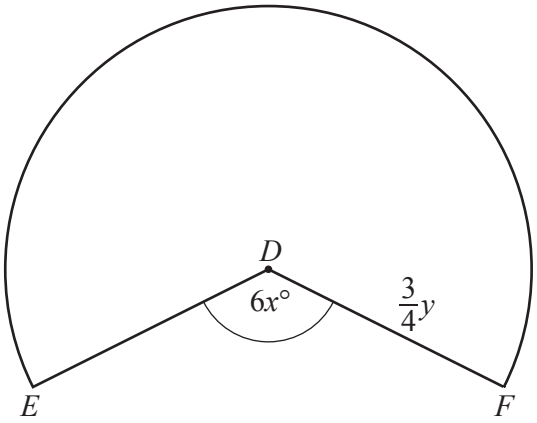


Diagram *A*

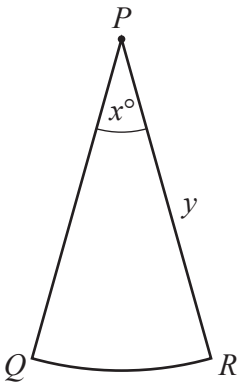


Diagram *B*

NOT TO SCALE

Diagram *A* shows a sector of a circle, centre *D* and radius $\frac{3}{4}y$ cm.
The obtuse angle $EDF = 6x°$.

Diagram *B* shows a sector of a circle, centre *P* and radius y cm.
The sector angle is $x°$.

(a) The length of the major arc *EF* is 9 times the length of the arc *QR*.

Show that $x = 20$.

[3]

(b) Find the value of y when the area of sector *QPR* is equal to $2\pi\,\text{cm}^2$.

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

22

$$\begin{pmatrix} x & 3 \\ 2 & x+1 \end{pmatrix}\begin{pmatrix} x-1 \\ 2 \end{pmatrix} = \begin{pmatrix} 2x+6 \\ y \end{pmatrix}$$

(a) Show that $x^2 - 3x = 0$.

[2]

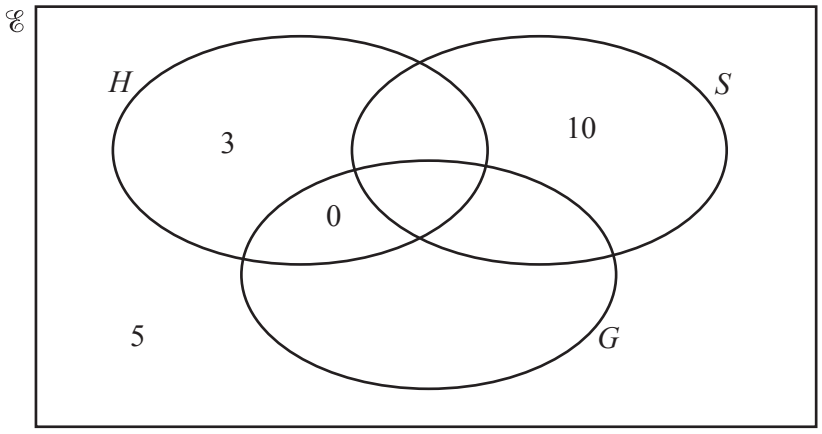
(b) **(i)** Solve $x^2 - 3x = 0$.

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

(ii) Find the value of y when $x > 0$.

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

23 A shop sells hats (H), scarves (S) and gloves (G).
A group of 40 people are asked which items they buy in the shop.
Some of the results are shown in the Venn diagram.



(a) 2 people buy all three items.
Those people that buy both a hat and a scarf also buy gloves.
4 people buy exactly two items.

Use this information to complete the Venn diagram.

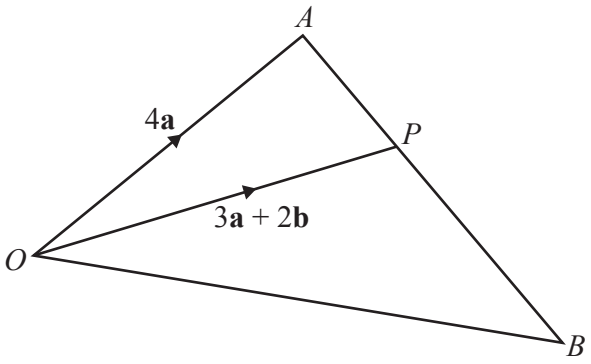
[2]

(b) Work out $n(S \cap (H \cup G)')$.

..... [1]

Question 24 is printed on the next page.

24



NOT TO SCALE

OAB is a triangle.
P lies on AB and $AP : PB = 2 : 3$.
$\overrightarrow{OA} = 4\mathbf{a}$ and $\overrightarrow{OP} = 3\mathbf{a} + 2\mathbf{b}$.

(a) Find, in terms of **a** and **b**, giving your answer in its simplest form

(i) $\overrightarrow{AP}$

$\overrightarrow{AP} =$ ..... [1]

(ii) $\overrightarrow{OB}$.

$\overrightarrow{OB} =$ ..... [3]

(b) Q is a point on OA such that $\overrightarrow{QP}$ is parallel to $\overrightarrow{OB}$.

Find $\overrightarrow{QP}$.

$\overrightarrow{QP} =$ ..... [1]