



Cambridge O Level

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NAME

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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 $^{\circ}\text{C}$, at midnight every day for 12 days.
Here are the results in order, starting with the coldest.

−6 −5 −3 −2 −1 −1 T 5 5 6 6 7

- (a) Find the range of the temperatures.

..... $^{\circ}\text{C}$ [1]

- (b) The median temperature is 1°C .

Find the value of T .

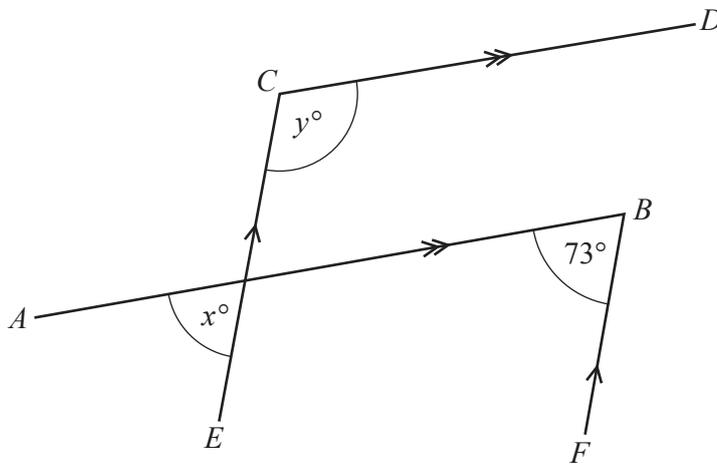
$T =$ [1]

- 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° .

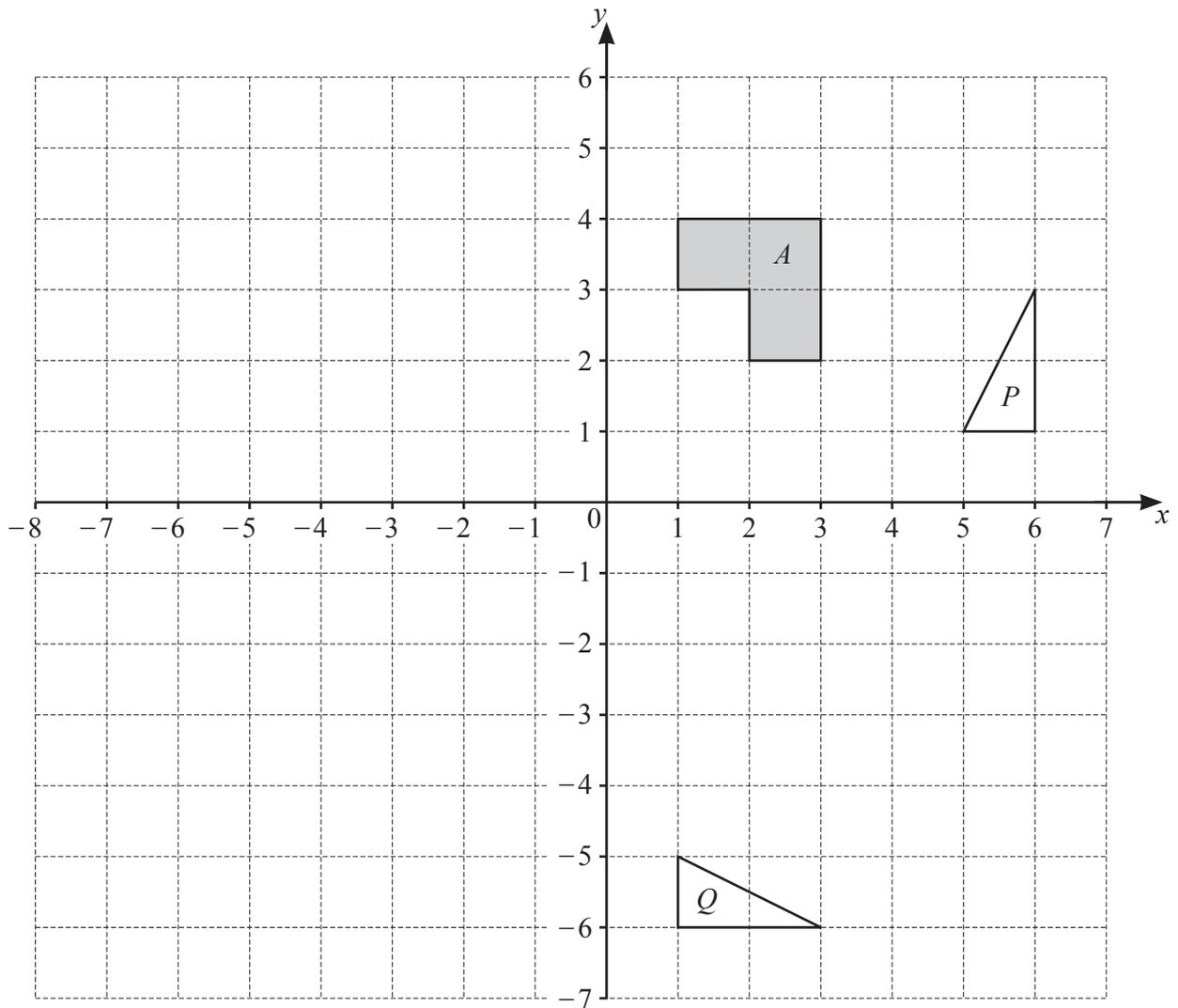
- (a) Find the value of *x*.

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 0.00493 in standard form.

..... [1]

(b) Evaluate $(4 \times 10^9) \times (2 \times 10^{-2})$.
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,

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

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 $7m - 13 \leq 8$.

..... [2]

12 Solve the simultaneous equations.
Show all your working.

$$\begin{aligned} 5x + 4y &= 14 \\ 3x - 2y &= 15 \end{aligned}$$

$x =$

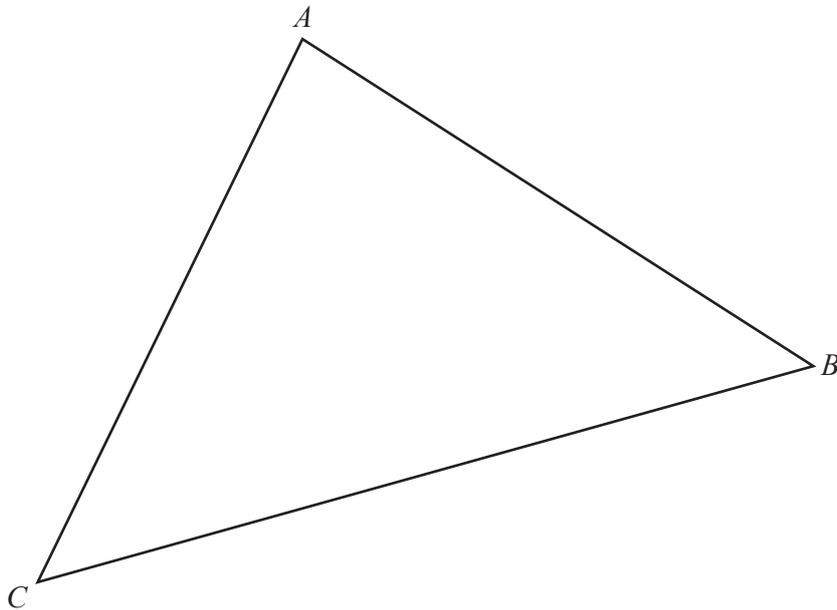
$y =$ [3]

- 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 n th term of this sequence.

..... [2]

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

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

$T =$ [1]

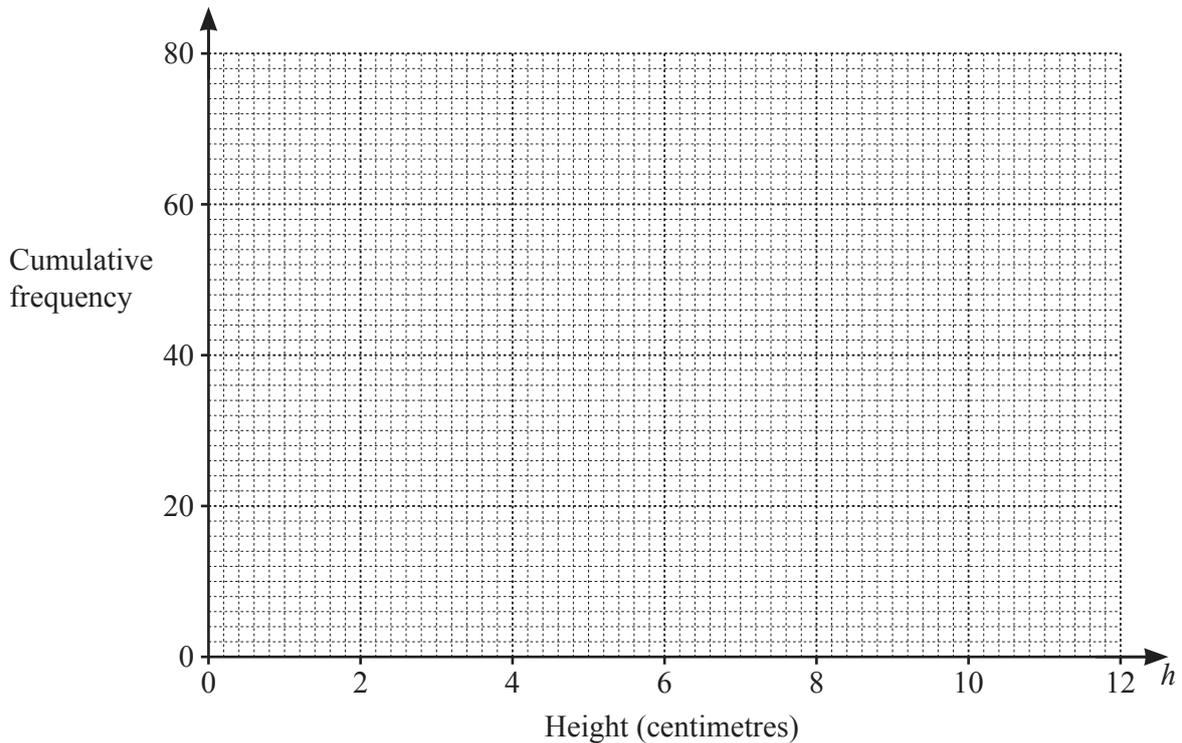
- (b) Rearrange the formula to make P the subject.

$P =$ [2]

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

Height (h centimetres)	$h \leq 2$	$h \leq 4$	$h \leq 6$	$h \leq 8$	$h \leq 10$	$h \leq 12$
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.

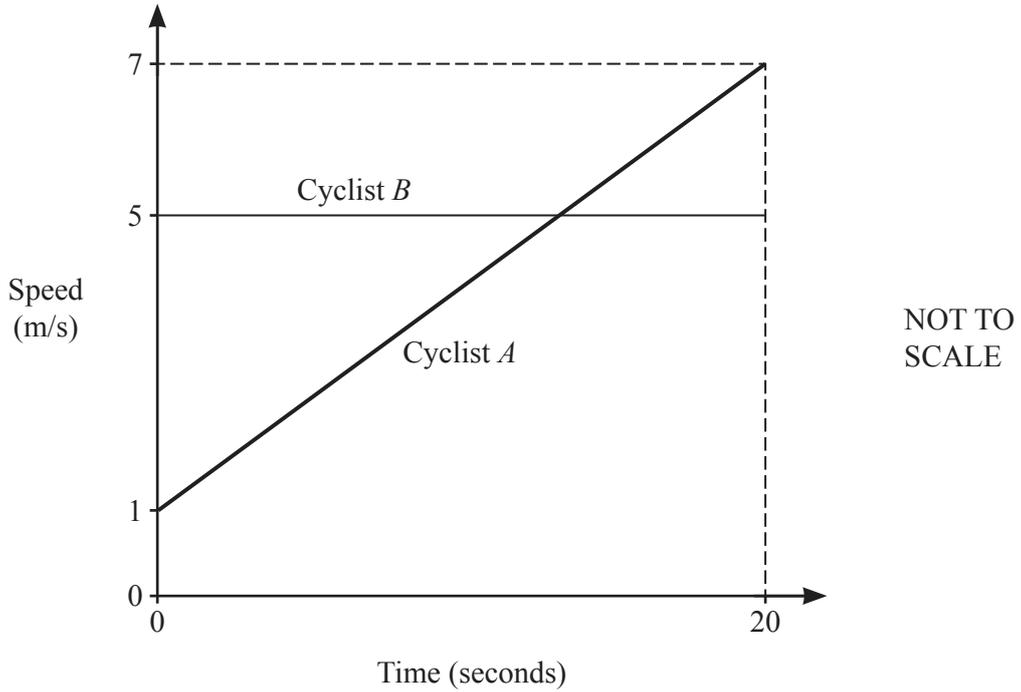
..... cm [2]

- (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]

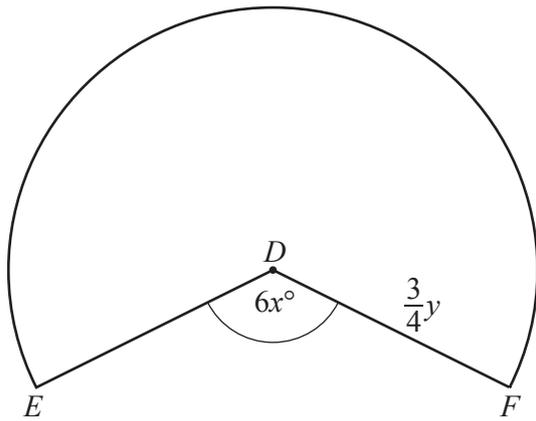


Diagram A

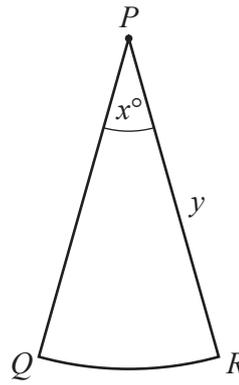


Diagram B

NOT TO SCALE

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

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 $2\pi \text{ cm}^2$.

$y = \dots\dots\dots$ [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]

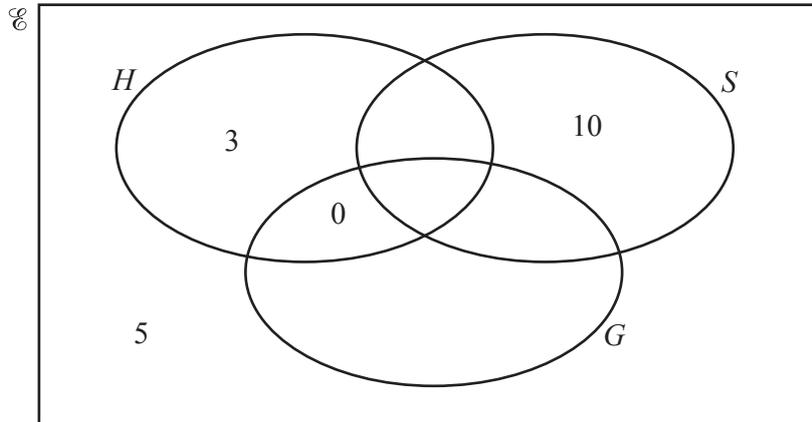
(b) (i) Solve $x^2 - 3x = 0$.

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

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

$y = \dots\dots\dots$ [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.

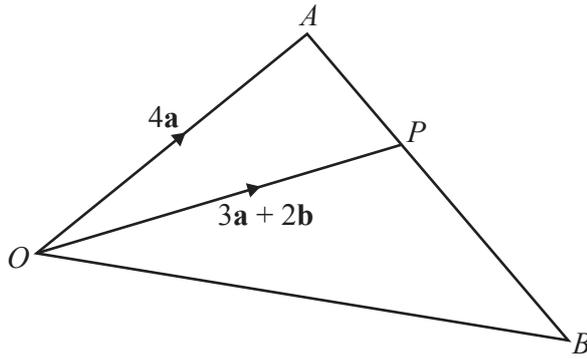
Use this information to complete the Venn diagram.

[2]

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

..... [1]

Question 24 is printed on the next page.



NOT TO SCALE

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

(a) Find, in terms of \mathbf{a} and \mathbf{b} , giving your answer in its simplest form

(i) \vec{AP}

$\vec{AP} = \dots\dots\dots$ [1]

(ii) \vec{OB} .

$\vec{OB} = \dots\dots\dots$ [3]

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

Find \vec{QP} .

$\vec{QP} = \dots\dots\dots$ [1]

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