



# Cambridge O Level

CANDIDATE  
NAME

CENTRE  
NUMBER

--	--	--	--	--

CANDIDATE  
NUMBER

--	--	--	--



**MATHEMATICS (SYLLABUS D)**

**4024/12**

Paper 1

**May/June 2020**

**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. Blank pages are indicated.

**ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER**

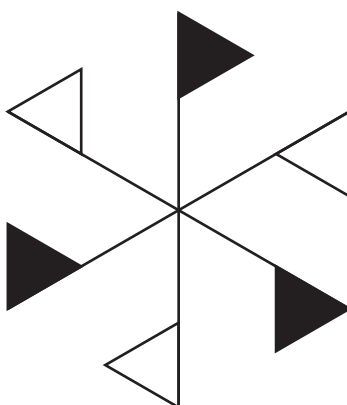
1 (a) Work out  $0.05 \times 0.3$ .

..... [1]

(b) Work out  $2\frac{2}{3} - \frac{1}{5}$ .

..... [2]

2 (a)



Write down the order of rotational symmetry of this shape.

..... [1]

(b) Samuel describes a special quadrilateral.

It has only one line of symmetry.  
Its diagonals cross at right angles.

Write down the name of this special quadrilateral.

..... [1]

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

$$4^3 \quad 9^2 \quad \sqrt{196} \quad \sqrt[3]{125}$$

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

4 (a) Write 68% as a fraction in its lowest terms.

..... [1]

(b) A bag contains red balls and blue balls.  
 The balls are in the ratio red : blue = 3 : 5.

Write down the fraction of the balls that are red.

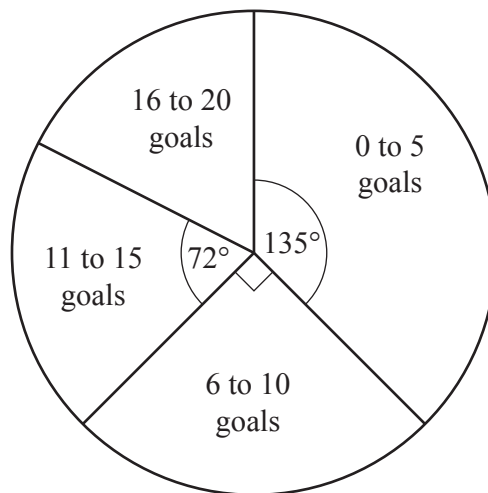
..... [1]

5 By writing each number correct to one significant figure, estimate the value of

$$\frac{2.78^3}{61.4 \times 0.893}$$

..... [2]

6



The pie chart shows information about the number of goals scored by each player in a football club.

(a) Write down the modal class.

..... [1]

(b) 8 of the players each scored 11 to 15 goals.

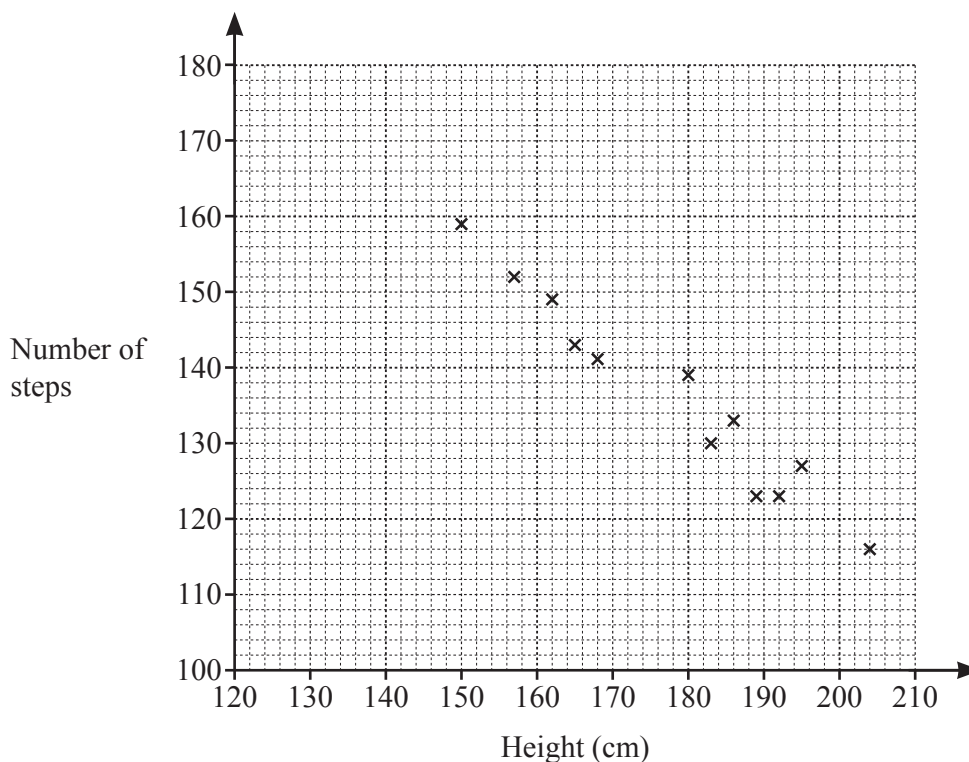
Work out the total number of players in the club.

..... [2]

7 Factorise  $15a - 5x - 2xy + 6ay$ .

..... [2]

- 8 The number of steps taken by 12 people to walk 100m was recorded.  
The scatter diagram shows the heights of these people and the number of steps they took.



- (a) What type of correlation is shown in the scatter diagram?

..... [1]

- (b) Draw a line of best fit.

[1]

- (c) The height of another person is 175 cm.

Use your line of best fit to estimate the number of steps they would take to walk 100m.

..... [1]



**Scale: 1 cm to 10 km**

The scale drawing shows the positions of town *A* and town *B*.

**(a)** Find the actual distance, in kilometres, of town *A* from town *B*.

..... km [1]

**(b)** Town *C* is on a bearing of  $140^\circ$  from town *A* and on a bearing of  $235^\circ$  from town *B*.

Mark the position of town *C* on the scale drawing. [2]

- 10 (a) Bilal goes for a cycle ride.  
He starts at 3 pm.  
He finishes at 5.38 pm.  
He has a total of 25 minutes rest during the ride.

Work out how long, in hours and minutes, he spends cycling.

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

- (b) Sonia walks to her aunt's house.  
She leaves home at 10.25.  
She walks a total of 12 km at an average speed of 5 km/h.

Work out the time Sonia arrives at her aunt's house.

..... [3]

11 (a)  $c = \frac{7-a}{b}$

Find  $c$  when  $a = -4$  and  $b = 2$ .

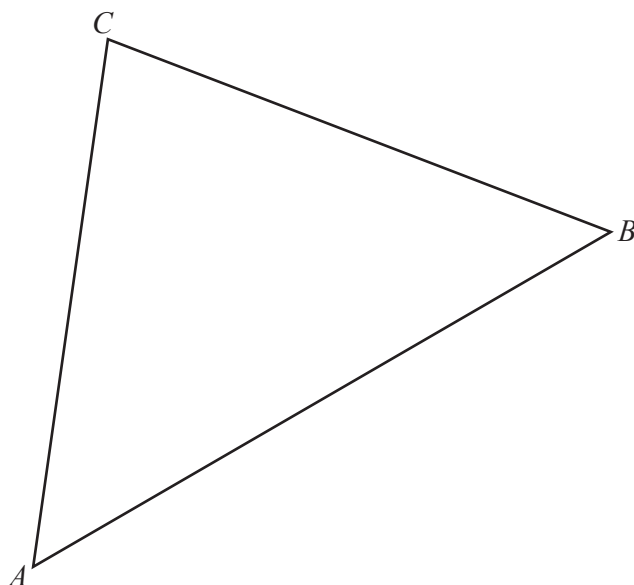
$c =$  ..... [1]

(b)  $y = 5^x + 1$

Find  $y$  when  $x = -2$ .

$y =$  ..... [1]

12 Use a straight edge and compasses only in this question.



(a) Construct the locus of points inside triangle  $ABC$  that are

(i) 5 cm from  $B$ , [1]

(ii) equidistant from  $A$  and  $C$ . [2]

(b) Shade the region inside triangle  $ABC$  containing the points that are

- less than 5 cm from  $B$
- and
- closer to  $A$  than to  $C$ . [1]



13 (a) Write 108 as the product of its prime factors.

..... [2]

(b) Find the lowest common multiple (LCM) of 108 and 180.

..... [2]

14 (a) In 2017, the population of Egypt was 97 500 000.

Write this population in standard form.

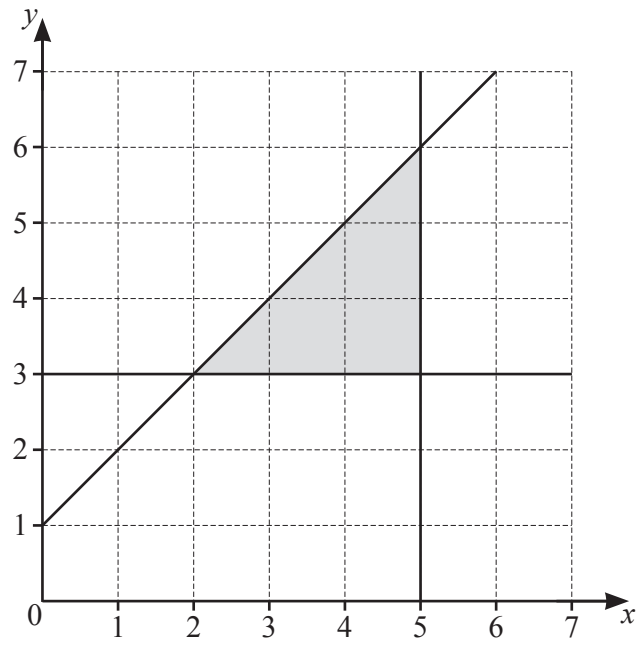
..... [1]

(b) The population density of a country is the number of people per square kilometre.

In 2017, the population of Indonesia was  $2.62 \times 10^8$ , correct to 3 significant figures.  
The area of Indonesia is  $2 \times 10^6 \text{ km}^2$ , correct to 1 significant figure.

Calculate an estimate for the population density of Indonesia.

..... people/ $\text{km}^2$  [2]



The shaded region is defined by three inequalities.

Find these three inequalities.

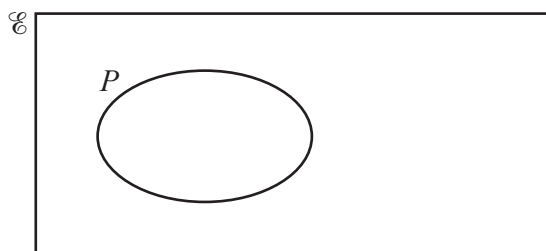
.....

.....

..... [3]

- 16  $Q \subset P$   
 $P \cap R = \emptyset$

Complete the Venn diagram to show sets  $Q$  and  $R$ .



[2]

- 17 Here are the first four terms of a number sequence.

$$T_1 = 1^2 + 3 = 4$$

$$T_2 = 2^2 + 8 = 12$$

$$T_3 = 3^2 + 13 = 22$$

$$T_4 = 4^2 + 18 = 34$$

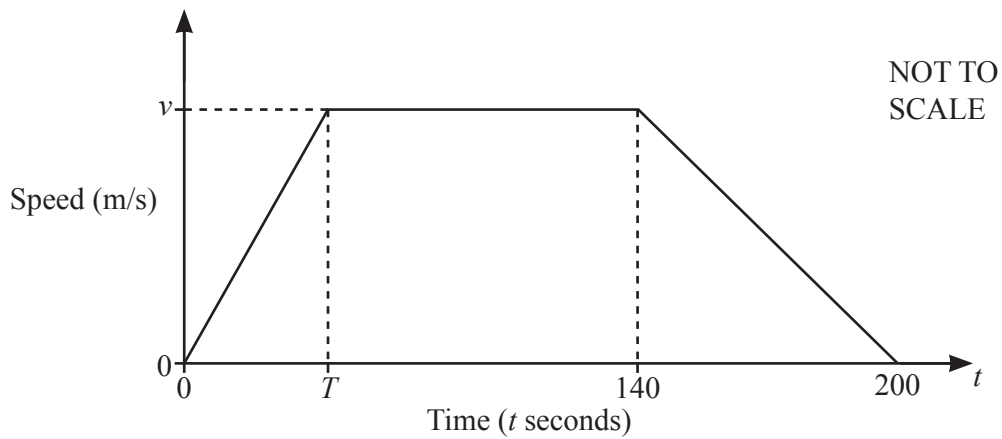
- (a) Find  $T_5$ .

$$T_5 = \dots\dots\dots [1]$$

- (b) Find an expression, in terms of  $n$ , for  $T_n$ .

$$T_n = \dots\dots\dots [3]$$

18 The diagram is the speed–time graph for part of a car’s journey.



(a) The deceleration of the car between  $t = 140$  and  $t = 200$  is  $0.2 \text{ m/s}^2$ .

Find the value of  $v$ .

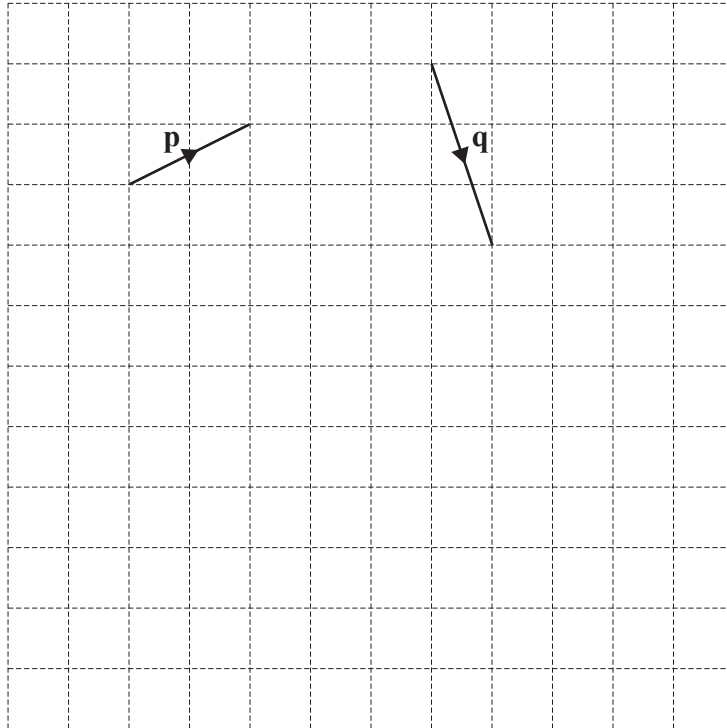
$v = \dots\dots\dots$  [2]

(b) The car travels a total of 1800 m in the 200 seconds.

Find the value of  $T$ .

$T = \dots\dots\dots$  [3]

19



Vectors  $\mathbf{p}$  and  $\mathbf{q}$  are shown on the grid.

On the grid, draw the vector

(a)  $3\mathbf{p}$ , [1]

(b)  $\mathbf{q} - \mathbf{p}$ . [1]

20 A plan of a house is drawn to a scale of 1 : 50.  
On the plan, the floor area of the kitchen is  $30\text{ cm}^2$ .

Calculate the floor area of the real kitchen.  
Give your answer in square metres.

.....  $\text{m}^2$  [3]

21 Simplify  $\left(\frac{2x^2}{x^5}\right)^{-3}$ .

..... [2]

22  $f(x) = 4(3-x)$       $g(x) = \frac{5(3x-2)}{x}$

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

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

(b) Solve  $g(x) = 6$ .

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

23 Express as a single fraction in its simplest form.

$$\frac{5}{2x-1} - \frac{3}{x+4}$$

..... [3]

24  $P$  is the point  $(h, 7)$ .  
 $P$  lies on the line  $3y + 2x = 5$ .

(a) Find the value of  $h$ .

$h =$  ..... [2]

(b) Line  $L$  is perpendicular to the line  $3y + 2x = 5$  and passes through  $P$ .

Find the equation of line  $L$ .

..... [4]

**Question 25 is printed on the next page**

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

(a) Evaluate  $2\mathbf{A} - \begin{pmatrix} -5 & 4 \\ 0 & 3 \end{pmatrix}$ .

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

(b) Find  $|\mathbf{A}|$ .

..... [1]

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

$$\begin{pmatrix} & \\ & \end{pmatrix} [1]$$

(d) Find the matrix  $\mathbf{X}$ , where  $\mathbf{XA} = \begin{pmatrix} 4 & -2 \end{pmatrix}$ .

$\mathbf{X} =$  [2]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at [www.cambridgeinternational.org](http://www.cambridgeinternational.org) after the live examination series.

Cambridge Assessment International Education is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which itself is a department of the University of Cambridge.