Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

2989647625

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.

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ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER

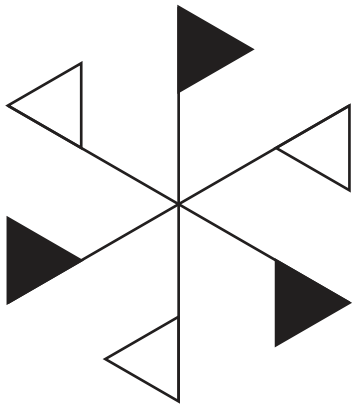
1 **(a)** Work out 0.05×0.3.

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

..... , ... , ... , ... [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.

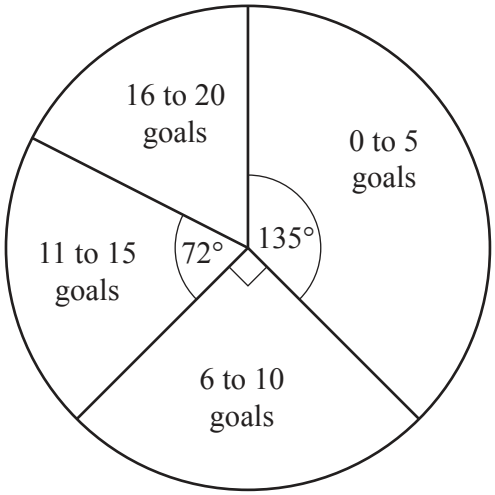
..... [1]

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.

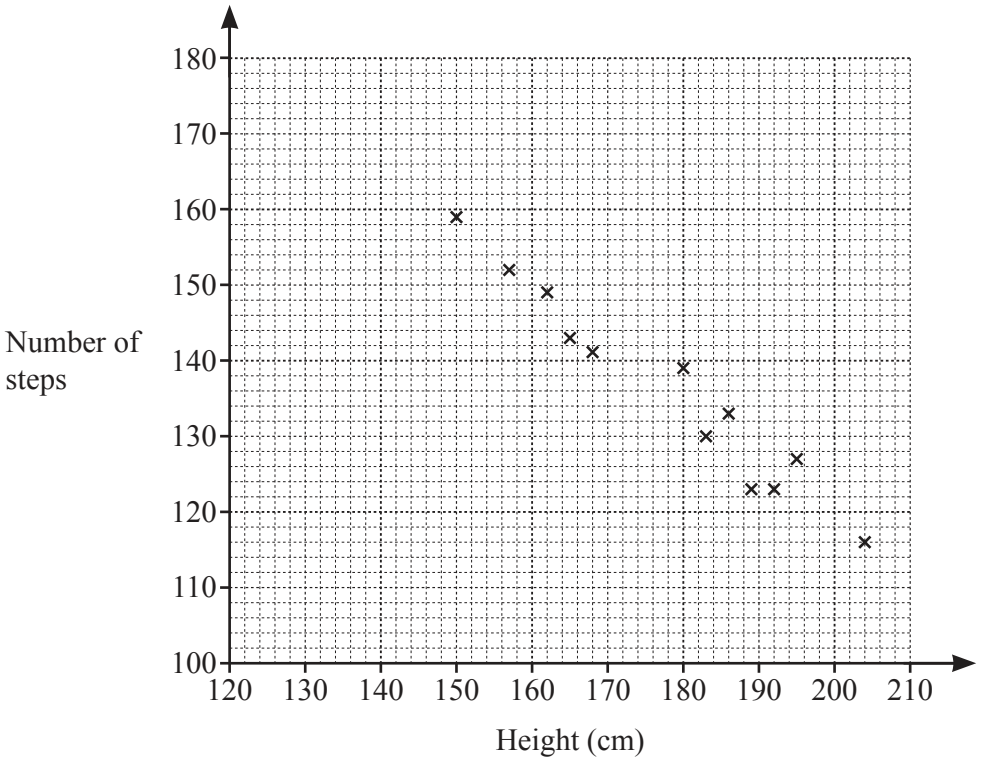
Work out the total number of players in the club.

..... [2]

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

..... [2]

8 The number of steps taken by 12 people to walk 100 m 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 100 m.

..... [1]

9

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° from town *A* and on a bearing of 235° 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)** $c = \dfrac{7-a}{b}$

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

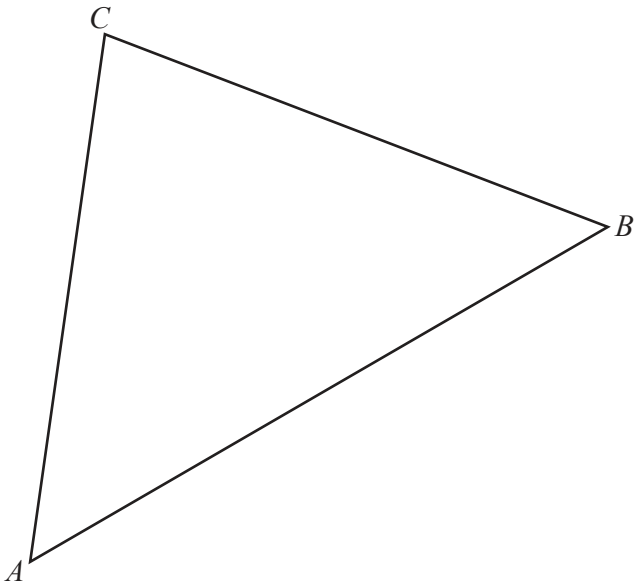
$c =$ ..... [1]

(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 2.62×10^8, 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/km^2 [2]

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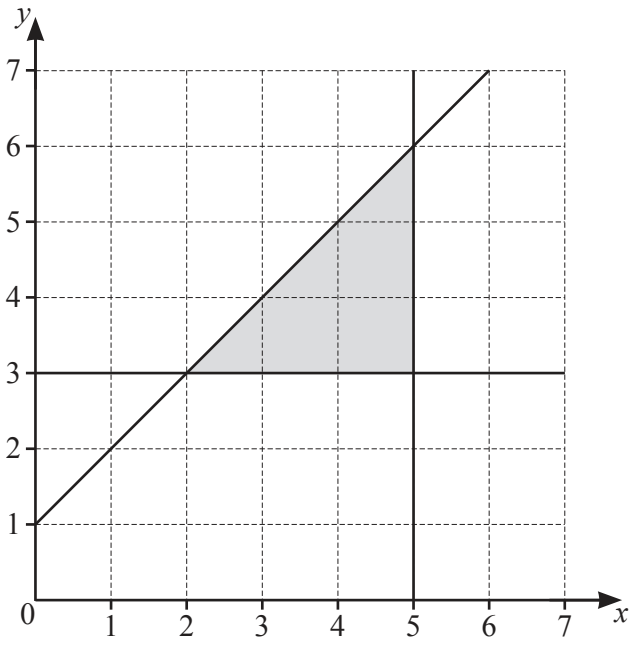
15



The shaded region is defined by three inequalities.

Find these three inequalities.

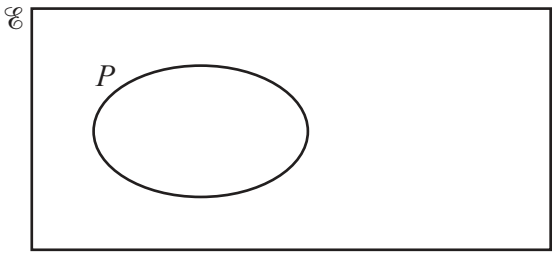
.....

.....

..... [3]

16 $Q \subset P$
$P \cap R = \varnothing$

Complete the Venn diagram to show sets Q and R.



[2]

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

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

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

$T_3 = 3^2 + 13 = 22$

$T_4 = 4^2 + 18 = 34$

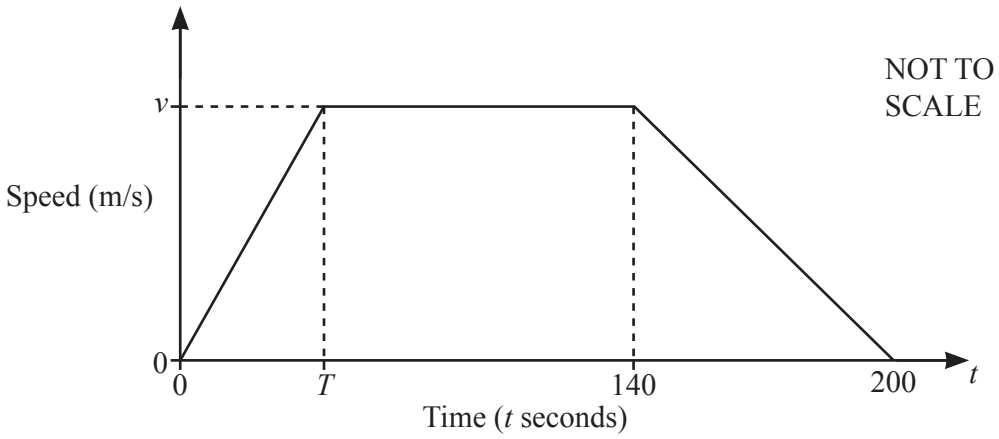
(a) Find T_5.

$T_5 =$ ..... [1]

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

$T_n =$ ..... [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.

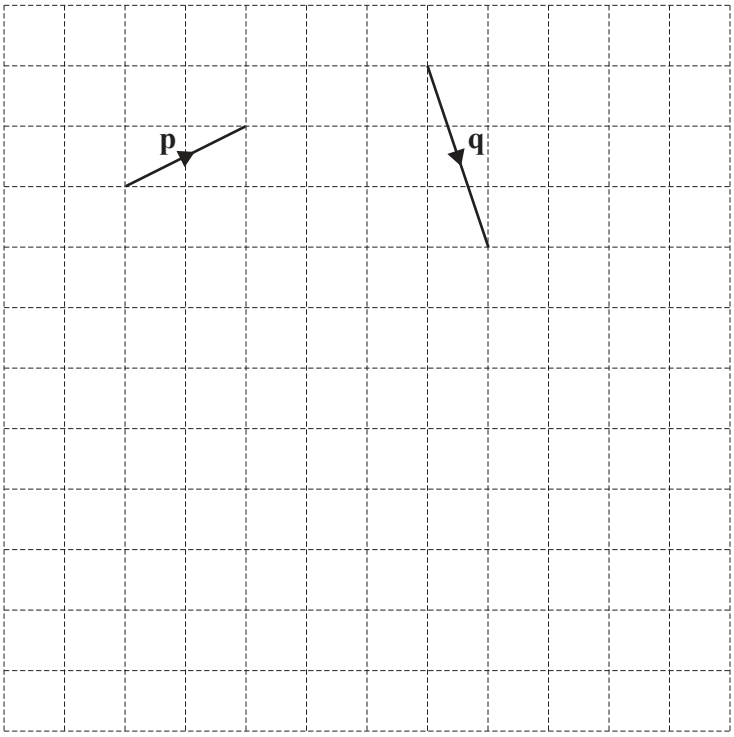
$v =$ ..... [2]

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

Find the value of T.

$T =$ ..... [3]

19



Vectors **p** and **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.

..... 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]