Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

2675187392

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

Paper 1 **May/June 2022**

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.

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ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER

1 **(a)** Write down the value of the 5 in the number 253 624.

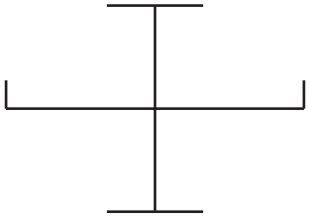
..... [1]

(b) The crowd at a sports event is exactly 35 687.

Write this number correct to the nearest ten.

..... [1]

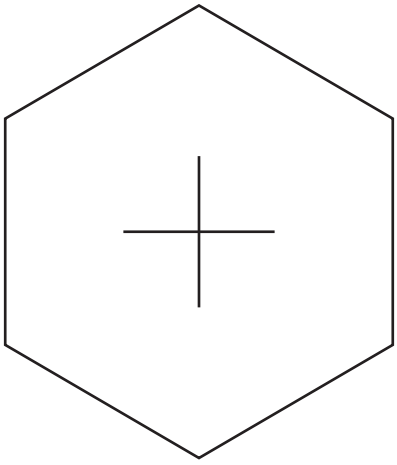
2 **(a)**



Write down the number of lines of symmetry of this diagram.

..... [1]

(b)



Write down the order of rotational symmetry of this diagram.

..... [1]

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3 The table shows the average monthly temperatures, in °C, in Vladivostok.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
−12	−8	−2	5	10	14	18	20	16	9	−1	−9

(a) Find the difference between the highest and lowest of these temperatures.

..... °C [1]

(b) In February, the average temperature in Yakutsk is 37 °C below that in Vladivostok.

Find the average temperature in Yakutsk in February.

..... °C [1]

4 Two cubes have a total volume of 152 cm^3.
One cube has an edge of length 5 cm.

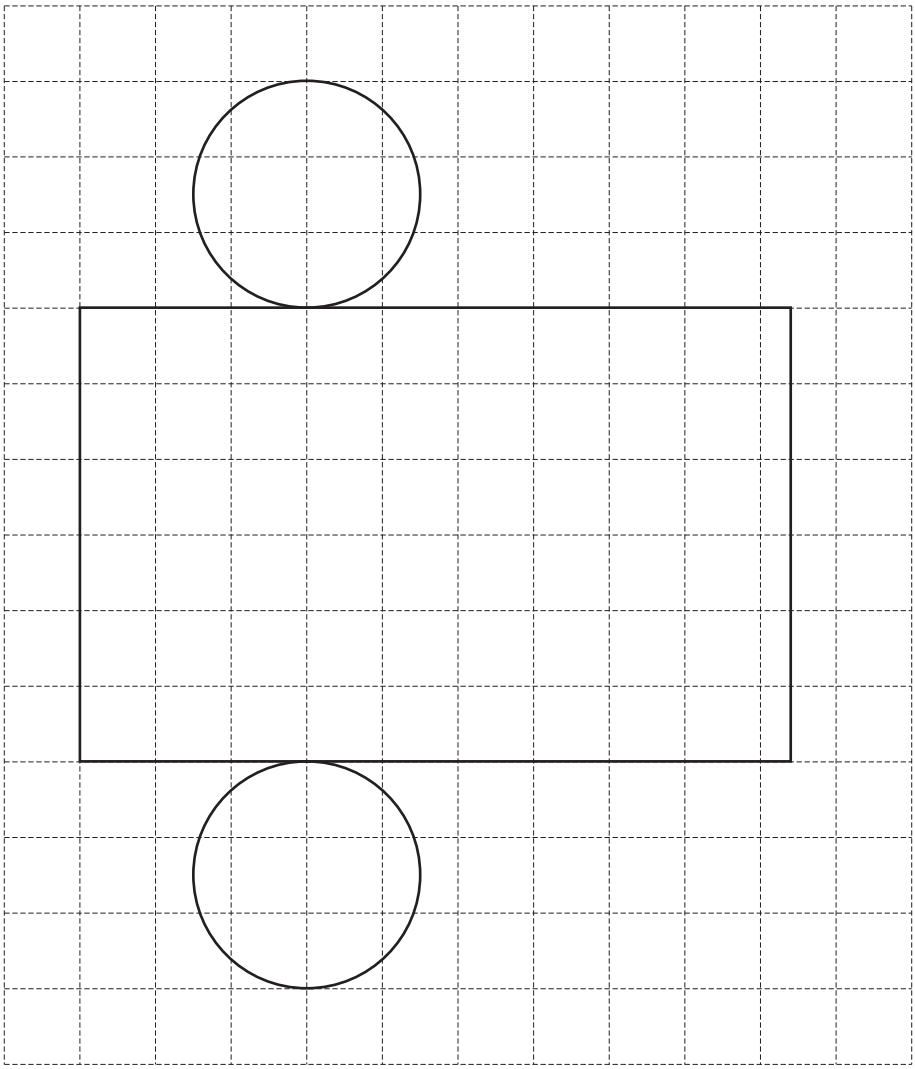
(a) Calculate the length of the edge of the other cube.

..... cm [2]

(b) Work out the **total** length of all of the edges of the larger cube.

..... cm [1]

5 The diagram shows the net of a solid drawn on a 1 cm grid.



Name the solid formed by this net and describe fully the dimensions of this solid.

Name of solid .....

Dimensions ..... [3]

6 Write down

(a) a prime number between 10 and 15,

..... [1]

(b) an irrational number between 10 and 15.

..... [1]

7 20 students were asked how many pets they owned.
The responses are shown in the table.

Number of pets	0	1	2	3	4	5
Frequency	3	8	3	4	0	2

(a) Find the median number of pets.

..... [1]

(b) Calculate the mean number of pets.

..... [2]

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[Turn over

8 Work out.

(a) $\frac{2}{3} - \frac{3}{5}$

..... [1]

(b) $\frac{3}{5} \div \frac{2}{3}$

..... [1]

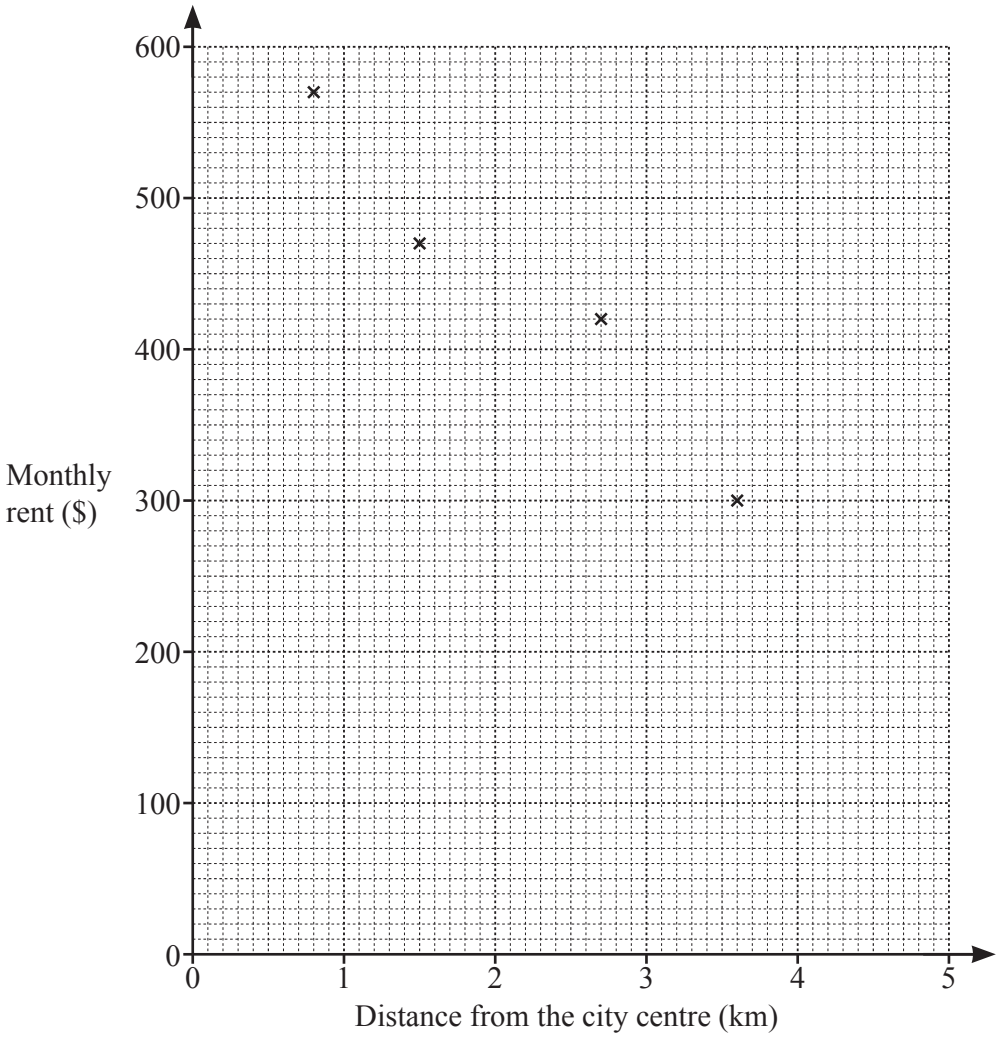
9 Write these lengths in order of size, starting with the smallest.

32 000 cm 3300 mm 3.1 km 34 m

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

10 The table below shows the monthly rent for nine apartments and the distance of these apartments from the city centre.

Distance from the city centre (km)	0.8	1.5	2.7	3.6	2.0	4.3	2.3	3.0	1.0
Monthly rent ($)	570	470	420	300	480	270	390	360	530



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

(b) What type of correlation is shown on the scatter diagram?

..... [1]

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

(d) Use your line of best fit to estimate the monthly rent for an apartment which is 4 km from the city centre.

$ ..... [1]

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11 **(a)** 100 adults were asked the colour of their car.
The results are shown in the table.

Colour of car	Red	Black	Blue	Silver
Frequency	36	11	23	30

Write down the relative frequency that one of these cars is blue.

..... [1]

(b) A different group of 1200 adults were asked the colour of their car.
The relative frequency of one of these adults owning a white car is 0.3 .

Find the number of these adults who own a white car.

..... [1]

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

$$\frac{0.28 \times 37.4}{77.8}.$$

..... [2]

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13 **(a)** Expand and simplify.

(i) $(x+3)(x-4)$

..... [2]

(ii) $5(x+2)-2(2x-1)$

..... [2]

(b) Write as a single fraction in its simplest form.

$$\frac{4b}{3}+\frac{5b}{9}$$

..... [2]

14 **(a)** Write 0.000 863 in standard form.

..... [1]

(b) The table below shows the approximate area of some deserts.

Desert	Area in km^2
Antarctica	1.4×10^7
Arabian	2.3×10^6
Gobi	1.3×10^6
Kalahari	9.0×10^5
Sahara	9.0×10^6

(i) Write down the name of the desert with the largest area.

..... [1]

(ii) Calculate the **total** area of the Arabian and Kalahari deserts.
Give your answer in standard form.

..... km^2 [2]

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15 **(a)** Evaluate $7^{-3} \div 7^{-4}$.

..... [1]

(b) Find the value of k when $(3^6)^k = 3^2$.

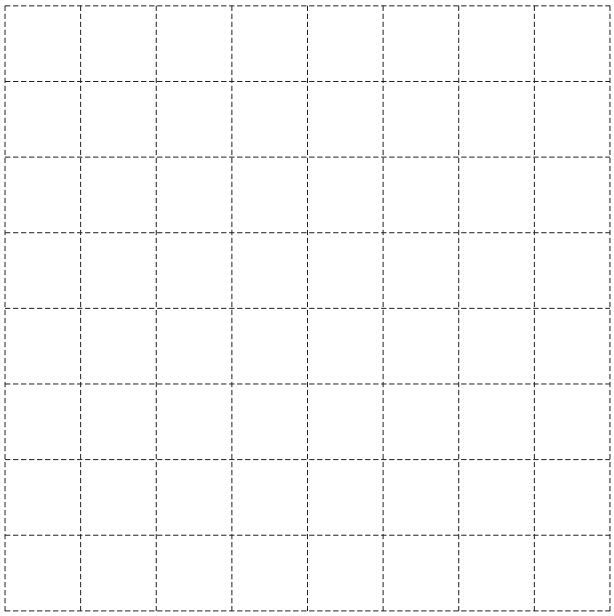
$k =$ ..... [1]

(c) Simplify $3(2^2 \times 3^3 \times 5^4)^2$.
Give your answer in the form $2^a \times 3^b \times 5^c$.

..... [2]

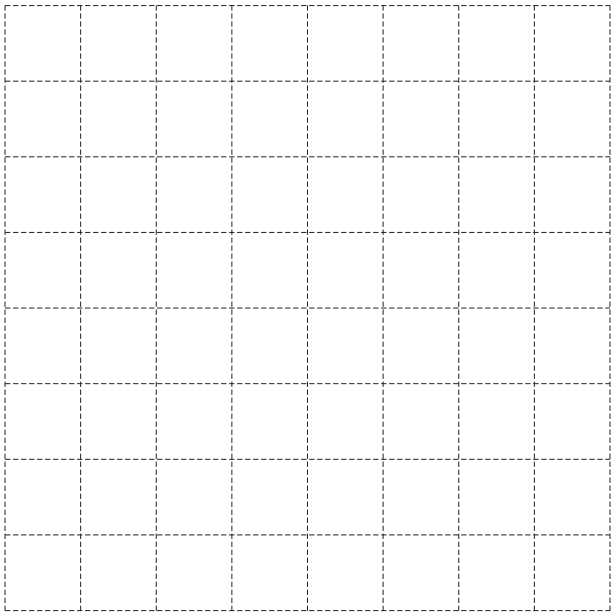
16 $\mathbf{p} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ $\mathbf{q} = \begin{pmatrix} -3 \\ 2 \end{pmatrix}$

(a) On the unit grid below, draw and label vector **p**.



[1]

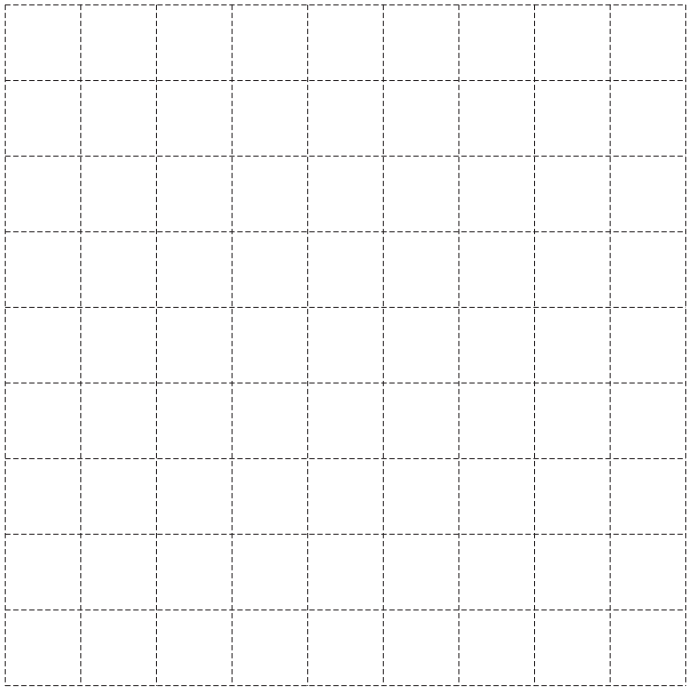
(b) On the unit grid below, draw and label vector 2**q**.



[1]

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(c) On the unit grid below, draw and label vector $\mathbf{p} - \mathbf{q}$.



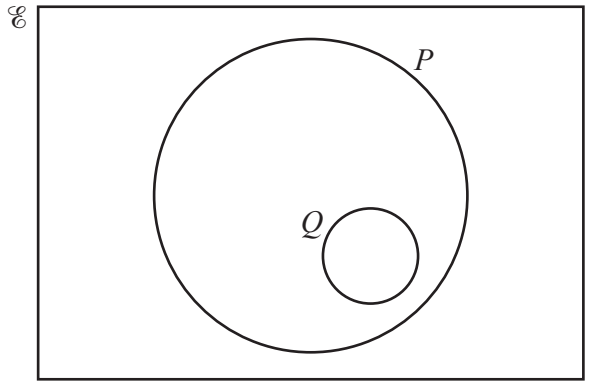
[2]

17 The scale of a map is 2 cm to 1 km.
The area of a wood on the map is $6\,\text{cm}^2$.

Calculate the actual area of the wood in km^2.

..... km^2 [2]

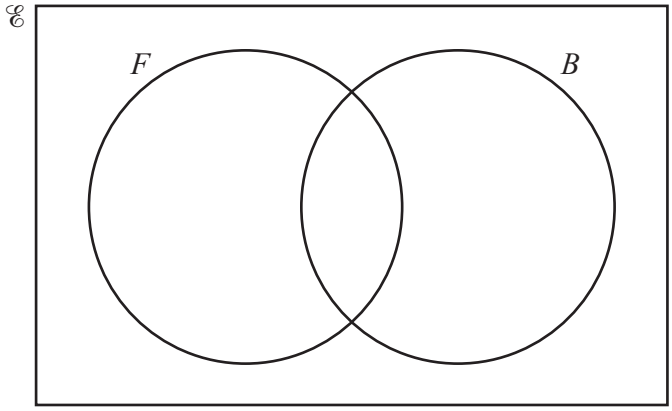
18 **(a)** In the Venn diagram, shade the region represented by $P \cap Q'$.



[1]

(b) A club has 32 members.
14 of the members are female and 18 of the members are male.
5 of the females have black hair.
6 of the males have black hair.

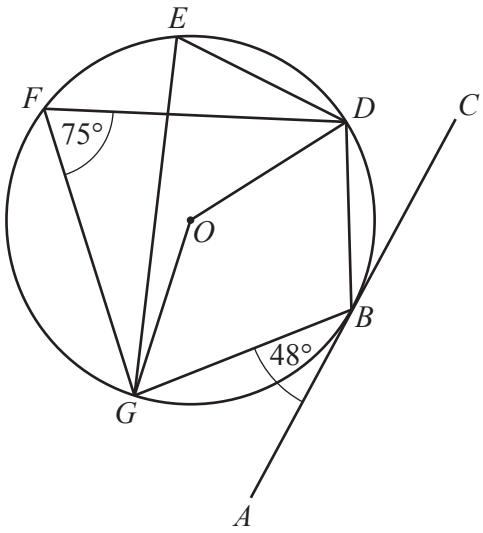
$\mathscr{E}$ = {members of the club}
F = {females}
B = {members with black hair}



Complete the Venn diagram to show this information. [2]

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19



NOT TO SCALE

B, D, E, F and G are points on the circumference of a circle centre O.
AC is a tangent to the circle at B.
Angle $DFG = 75°$ and angle $ABG = 48°$.

(a) Find angle DEG.

Angle $DEG =$ ..... [1]

(b) Find angle DOG.

Angle $DOG =$ ..... [1]

(c) Find angle DBC.

Angle $DBC =$ ..... [2]

20 $f(x) = \frac{6x+2}{5}$

(a) Find $f(3)$.

..... [1]

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

$f^{-1}(x) =$ ..... [3]

21 y is inversely proportional to $(x+1)^2$.

Given that $y = 2$ when $x = 3$, find y when $x = 9$.

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

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22 Factorise.

(a) $5ax - 3ay - 10cx + 6cy$

..... [2]

(b) $15x^2 - 7x - 4$

..... [2]

23 $$y = \frac{3x+2}{2x-1}$$

Rearrange the formula to make x the subject.

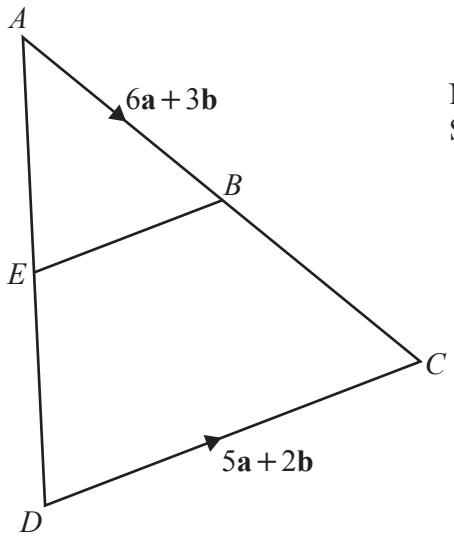
$x =$ ..... [4]

24 $\mathbf{M} = \begin{pmatrix} 1 & 0 \\ 4 & 3 \end{pmatrix}$ $\mathbf{N} = \begin{pmatrix} k & 0 \\ 1 & 4 \end{pmatrix}$

Given that $\mathbf{MN} = \mathbf{NM}$, find the value of k.

$k =$ ..... [3]

25



NOT TO SCALE

In triangle ACD, B is the midpoint of AC and E is the midpoint of AD.
$\overrightarrow{AB} = 6\mathbf{a} + 3\mathbf{b}$ and $\overrightarrow{DC} = 5\mathbf{a} + 2\mathbf{b}$.

(a) Express, as simply as possible, in terms of **a** and **b**.

(i) $\overrightarrow{AC}$

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

(ii) $\overrightarrow{AD}$

$\overrightarrow{AD} =$ ..... [2]

(b) Show that $\overrightarrow{EB}$ is parallel to $\overrightarrow{DC}$.

.....

.....

.....

.....

.....

..... [3]

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