



Cambridge O Level

CANDIDATE
NAME

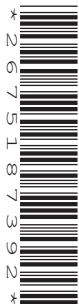
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MATHEMATICS (SYLLABUS D)

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.

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER

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

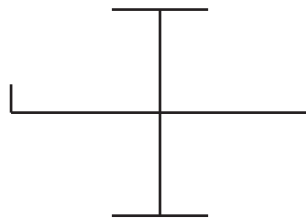
..... [1]

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

Write this number correct to the nearest ten.

..... [1]

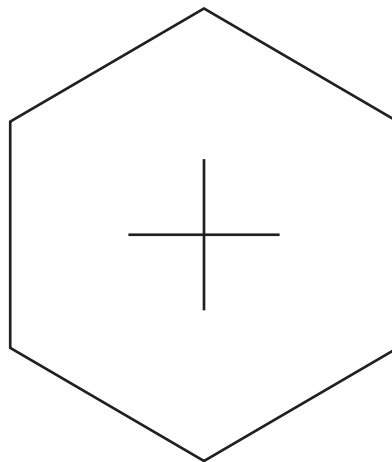
2 (a)



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

..... [1]

(b)



Write down the order of rotational symmetry of this diagram.

..... [1]

- 3 The table shows the average monthly temperatures, in $^{\circ}\text{C}$, 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.

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

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

Find the average temperature in Yakutsk in February.

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

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

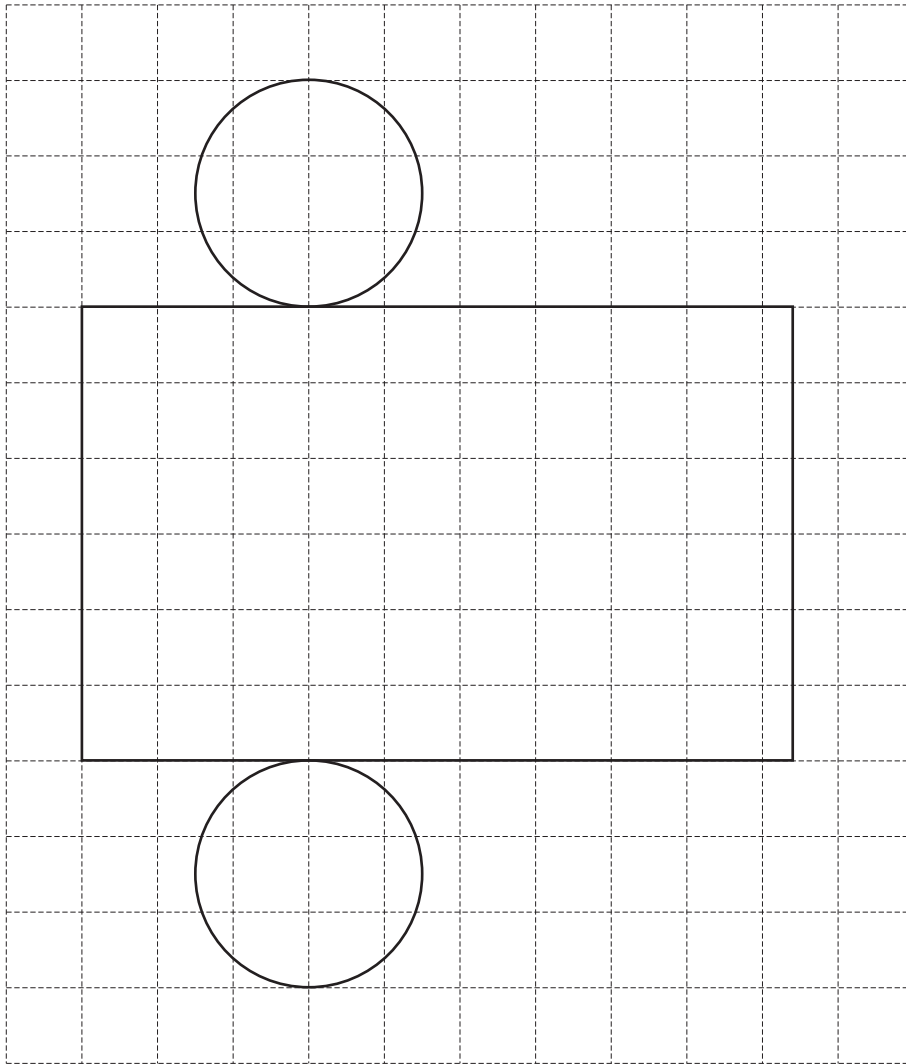
- (a) Calculate the length of the edge of the other cube.

..... 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]

8 Work out.

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

..... [1]

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

..... [1]

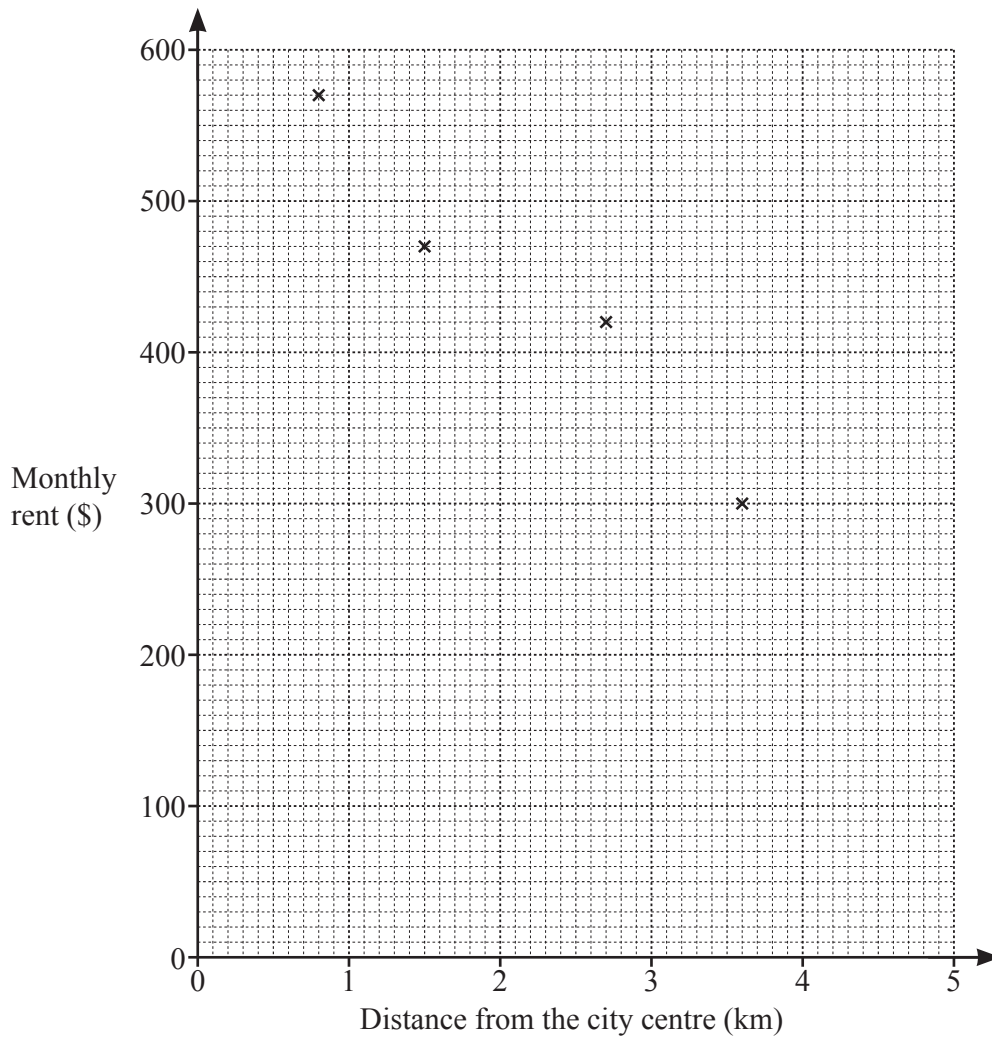
9 Write these lengths in order of size, starting with the smallest.

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]

- 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]

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.

..... km² [2]

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

..... [1]

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

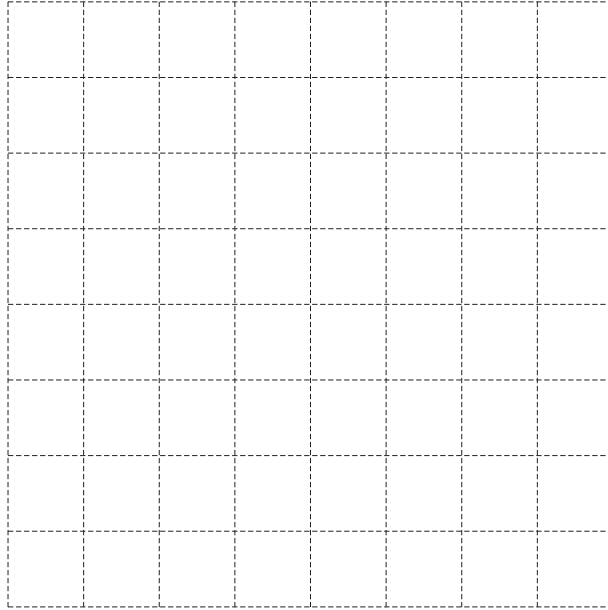
$k =$ [1]

(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]

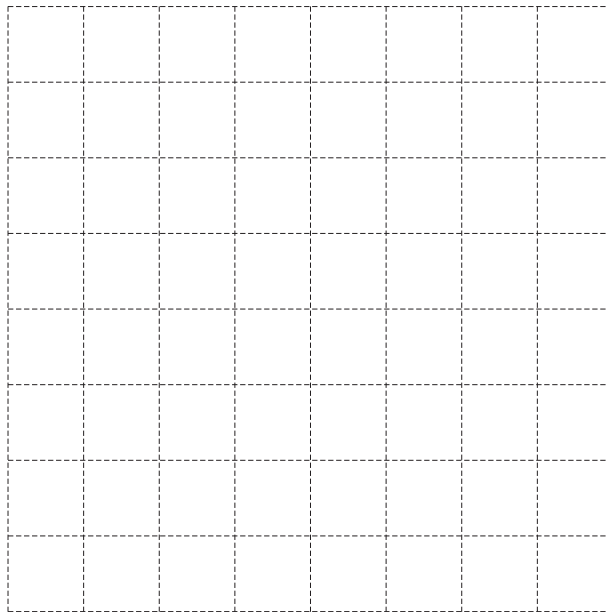
$$16 \quad \mathbf{p} = \begin{pmatrix} 2 \\ 3 \end{pmatrix} \quad \mathbf{q} = \begin{pmatrix} -3 \\ 2 \end{pmatrix}$$

(a) On the unit grid below, draw and label vector \mathbf{p} .



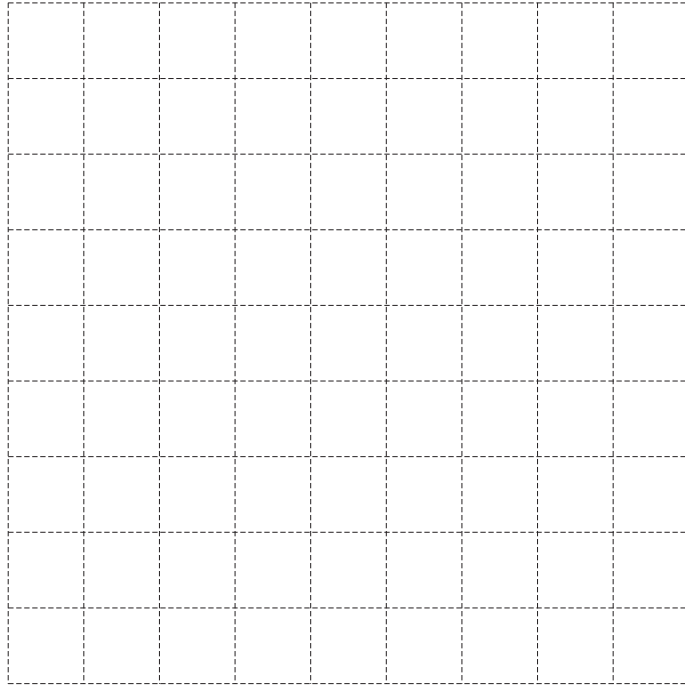
[1]

(b) On the unit grid below, draw and label vector $2\mathbf{q}$.



[1]

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



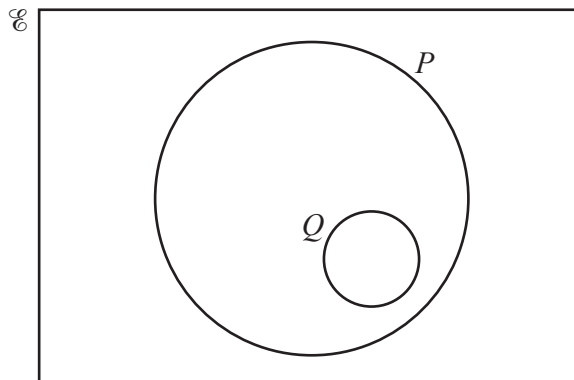
[2]

- 17 The scale of a map is 2 cm to 1 km.
The area of a wood on the map is 6 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 $P \cap Q'$.



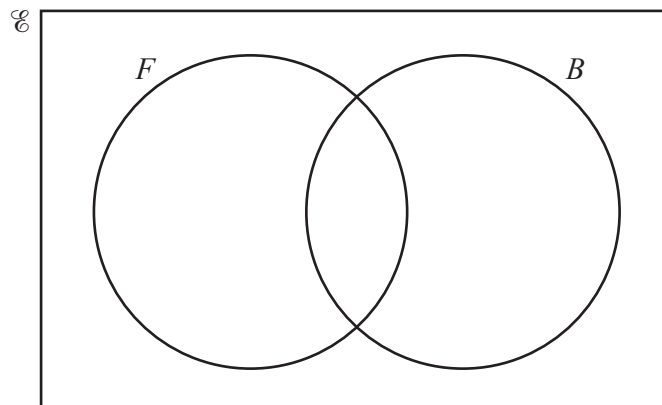
[1]

- (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.

$\mathcal{E} = \{\text{members of the club}\}$

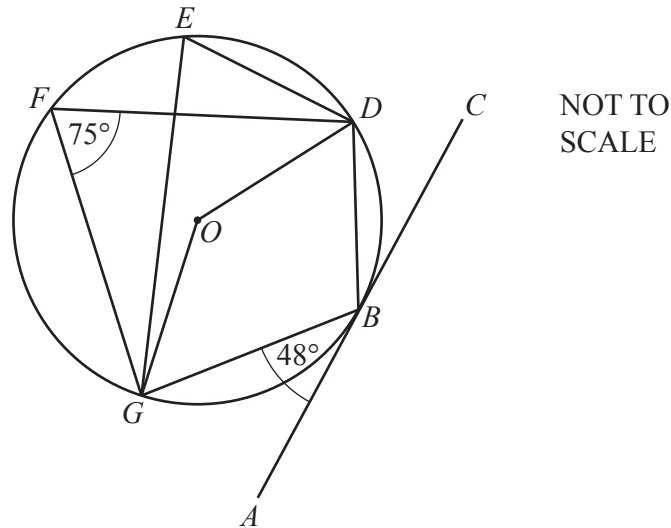
$F = \{\text{females}\}$

$B = \{\text{members with black hair}\}$



Complete the Venn diagram to show this information.

[2]



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 $DFG = 75^\circ$ and angle $ABG = 48^\circ$.

(a) Find angle DEG .

Angle $DEG = \dots\dots\dots$ [1]

(b) Find angle DOG .

Angle $DOG = \dots\dots\dots$ [1]

(c) Find angle DBC .

Angle $DBC = \dots\dots\dots$ [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]

22 Factorise.

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

..... [2]

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

..... [2]

23

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

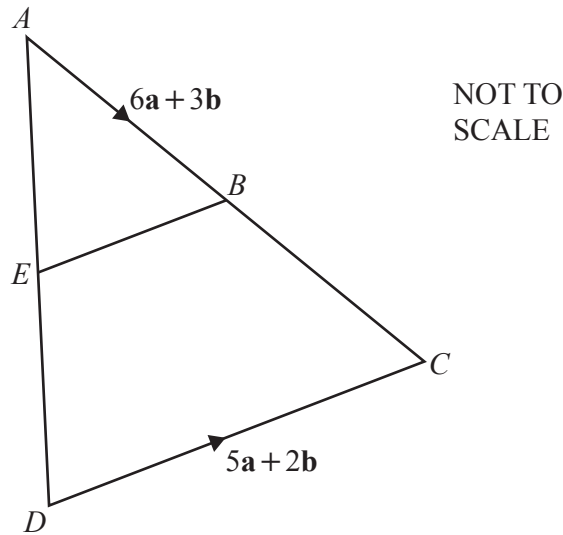
Rearrange the formula to make x the subject.

$x =$ [4]

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

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

$$k = \dots\dots\dots [3]$$



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

(a) Express, as simply as possible, in terms of \mathbf{a} and \mathbf{b} .

(i) \vec{AC}

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

(ii) \vec{AD}

$\vec{AD} = \dots\dots\dots$ [2]

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

.....

 [3]

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