Cambridge O Level

CANDIDATE
NAME

CENTRE
NUMBER

CANDIDATE
NUMBER

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

Paper 1 **May/June 2024**

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 [ ].

[Turn over

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER

1

G	R	A	N	T

From this word write down the letters which have

(a) a line of symmetry

.... [1]

(b) rotational symmetry.

.... [1]

2 At the start of the day the mass of a bird is $4.628\,$kg.
Later in the day the mass of this bird is $4.693\,$kg.

Calculate the increase in the mass of the bird.
Give your answer in grams.

.... g [2]

3 Work out.

(a) 0.3×0.02

.... [1]

(b) 15% of 40

.... [1]

(c) $7 - (-25)$

.... [1]

4 (a) *ABC* is a triangle with *AC* = 5 cm and *BC* = 10 cm.

   Using a ruler and compasses only, construct triangle *ABC*.
   AB has been drawn for you.

A ————————————————————————————— *B*

[2]

(b) Measure angle *BAC*.

Angle *BAC* = ... [1]

5 The table shows information about a class of 28 students and the distances they live from their school.

	Boys	Girls
Distance of 1 km or less	11	
Distance of more than 1 km	3	6

(a) Complete the table. [1]

(b) A student is chosen at random from the class.

   Write down the probability that the student lives more than 1 km from the school.

.... [1]

6 **(a)** Simplify $6r + 7s - r + 3s$.
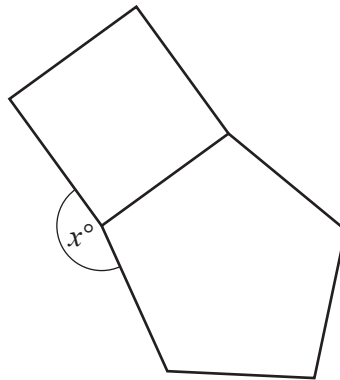
.... [2]

(b) Bananas cost x cents each.
Apples cost y cents each.

Write an expression for the total cost of 7 bananas and 5 apples.

.... cents [1]

7

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A square and a regular pentagon are joined along one edge as shown in the diagram.
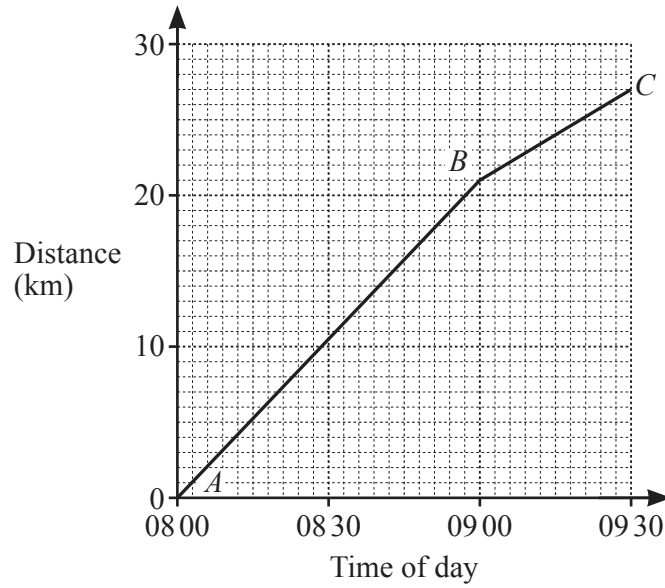
Calculate the value of x.

$x =$ .... [3]

8 Ahmed invests \$4000 at a rate of 1.5% per year simple interest.

Calculate the value of the investment after 2 years.

\$ .... [2]

9 (a)

The diagram shows the distance–time graph of a cyclist for the first two stages of a race, *AB* and *BC*.

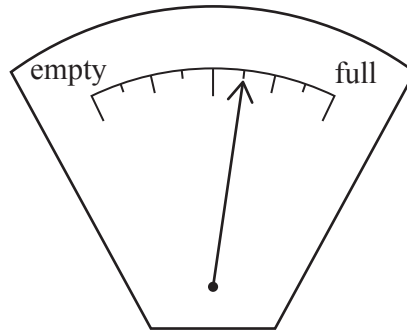Work out the average speed of the cyclist for the second stage, *BC*.

.... km/h [2]

(b) A bus travels at an average speed of 20 km/h.

Work out the time the bus takes to travel 50 km.

.... hours [1]

10 (a)

The diagram shows the fuel gauge of a car.
This car has 40 litres of fuel in the tank.

Calculate the amount of fuel that the tank contains when it is full.

.... litres [2]

(b) The car uses 5.4 litres of fuel for every 100 km travelled.

Calculate the amount of fuel that the car will use on a journey of 300 km.

.... litres [1]

11 Tom's pet eats $\frac{3}{5}$ of a tin of food each day.
Tom needs food for his pet for 12 days.

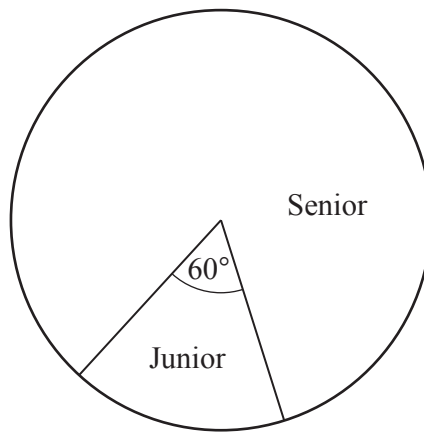Calculate the number of tins of food Tom needs to buy.

.... [2]

12 Solve.
$$4(2x-3)+5(x+5)=20$$

$x =$ .... [3]

13

The pie chart shows the proportion of junior members and senior members at a gym.
There are 120 more senior members than junior members.

Calculate the total number of junior and senior members at the gym.

.... [2]

14 Solve the simultaneous equations.
Show all your working.

$$2x + 3y = 7$$
$$x - 6y = 6$$

$x =$ ....

$y =$ .... [3]

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

$$\frac{2.87 \times \sqrt{396.5}}{1.92^2}.$$

.... [2]

16
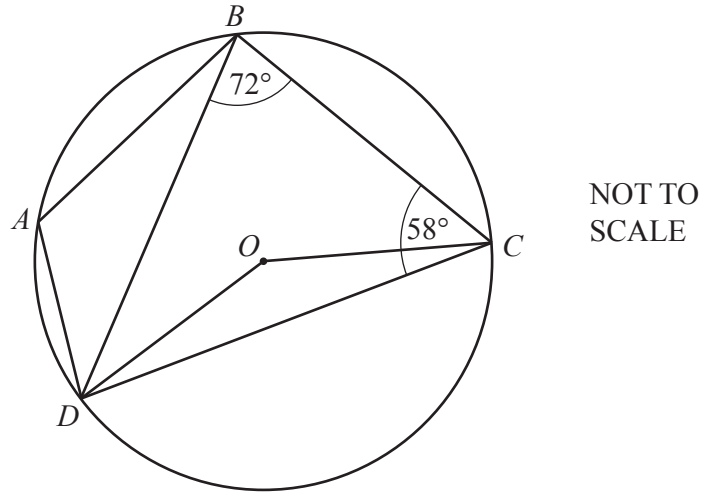
A, *B*, *C* and *D* are points on the circumference of a circle centre *O*.
Angle *BCD* = 58° and angle *DBC* = 72°.

(a) Complete the statement below.

Angle *DAB* = ... because ....

.... [2]

(b) (i) Find angle *DOC*.

Angle *DOC* = ... [1]

(ii) Find angle *BCO*.

Angle *BCO* = ... [2]

17 The table shows the time that each of 60 children spends in a play area.

Time (t mins)	$0 < t \leqslant 10$	$10 < t \leqslant 40$	$40 < t \leqslant 60$	$60 < t \leqslant 90$	$90 < t \leqslant 120$
Frequency	4	7	8	24	17

(a) Draw a cumulative frequency diagram to show this information.
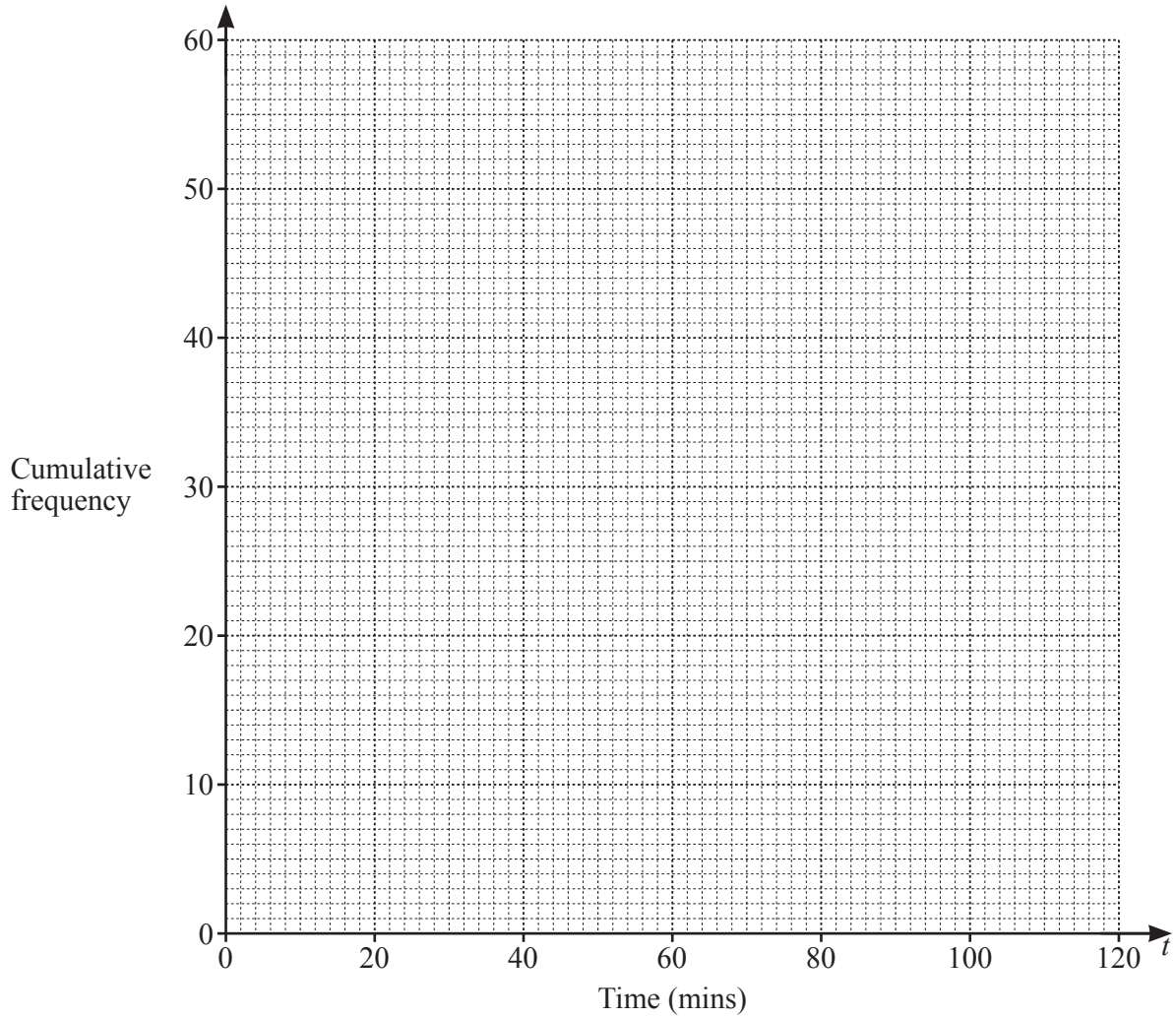
[3]

(b) Use your diagram to estimate

    (i) the median

.... minutes [1]

    (ii) the interquartile range

.... minutes [2]

    (iii) the number of children who spend more than 80 minutes in the play area.

.... [2]

18 In this table, p is directly proportional to q^2.

p	12	a	48
q	2	7	b

Calculate the value of a and the value of b.

$a =$ ....

$b =$ .... [3]

19 $f(x) = 2x - 5$

(a) Find f(11).

.... [1]

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

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

(c) Solve $f(x) = x^2 + x - 11$.

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

20 The matrix **N** satisfies the equation

$$3\mathbf{N} = \mathbf{N} + 5\begin{pmatrix} 4 & 0 \\ 6 & -2 \end{pmatrix}.$$
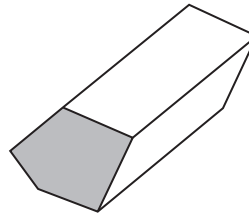
Find **N**.

$\mathbf{N} = \begin{pmatrix} & \\ & \end{pmatrix}$ [2]

21
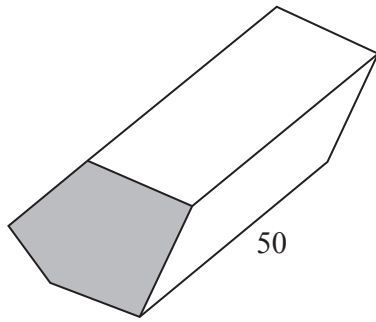
Prism *A*　　　　　　　　　　Prism *B*

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Prism *A* and prism *B* are mathematically similar.
In the diagram, the cross-sections of the prisms are shaded.

The volume of prism *A* is 5000 cm^3.
The length of prism *A* is 50 cm.

The area of the cross-section of prism *B* is 16 cm^2.

Calculate the length of prism *B*.

.... cm [4]

22 $$a = \frac{5b + 2x}{x - 3}$$

Rearrange the formula to make x the subject.

$x =$ .... [3]

23 *AB* is a line segment joining *A* (−2, 5) and *B* (1, 3).

(a) *B* is the midpoint of the line segment *AC*.

Find the coordinates of *C*.

(........................ , ...) [1]

(b) The length *AB* is $\sqrt{t}$.

Find the value of *t*.

t = ... [2]

(c) Find the equation of the line perpendicular to *AB* that passes through *A*.
Give your answer in the form $y = mx + c$.

y = ... [4]

Question 24 is printed on the next page.

24

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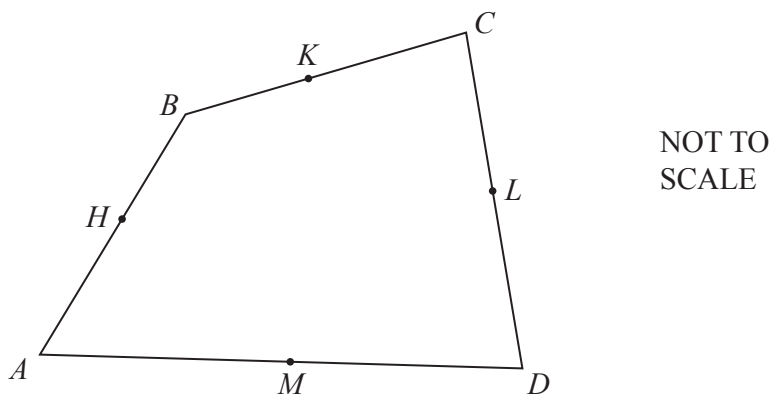
ABCD is a quadrilateral.
H, *K*, *L* and *M* are the midpoints of *AB*, *BC*, *CD* and *AD* respectively.
$\overrightarrow{AB} = 2\mathbf{a}$, $\overrightarrow{BC} = 2\mathbf{b}$ and $\overrightarrow{AD} = 2\mathbf{d}$.

Express, as simply as possible, in terms of **a** and **b** or **a**, **b** and **d**

(a) $\overrightarrow{HK}$

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

(b) $\overrightarrow{CD}$

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

(c) $\overrightarrow{ML}$.

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