Cambridge O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

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

Paper 1 **October/November 2017**

2 hours

Candidates answer on the Question Paper.

Additional Materials: Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

If working is needed for any question it must be shown in the space below that question.
Omission of essential working will result in loss of marks.

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 80.

This document consists of **20** printed pages.

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ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER

1 **(a)** Evaluate $1\frac{3}{8} - \frac{2}{3}$.

Answer ..... [1]

(b) Evaluate 0.4×1.3 .

Answer ..... [1]

---

2 **(a)** Evaluate $9^2 - 9^0$.

Answer ..... [1]

(b) Evaluate $9^{-\frac{1}{2}}$.

Answer ..... [1]

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3 **(a)** Find the simple interest on \$200 for 3 years at 4% per year.

Answer \$ ..... [1]

(b) Two brothers share \$200 in the ratio 2 : 3.

Calculate the larger share.

Answer \$ ..... [1]

---

4 By writing each number correct to 1 significant figure, calculate an estimate for the value of

$$\frac{987.65}{0.0193}.$$

Answer ..... [2]

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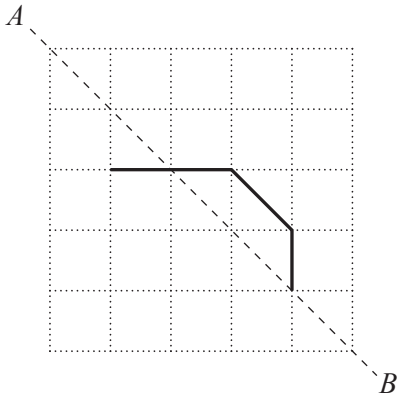
5 **(a)** The diagram shows part of a figure that has AB as its line of symmetry.

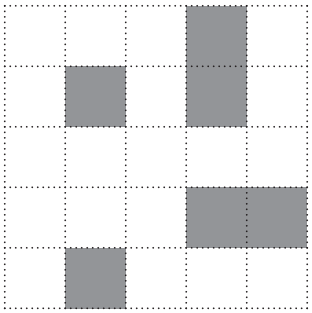
Complete the figure.



[1]

(b) In the diagram, six small squares are shaded.

Shade **two** more small squares so that the completed diagram has rotational symmetry of order 4.



[1]

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6 As part of her training, Samantha runs for 2 hours.
For the first $1\frac{1}{2}$ hours she runs at an average speed of 10 km/h.
She runs 7 km in the remaining $\frac{1}{2}$ hour.

Calculate her average speed for the 2 hours.

Answer ..... km/h [2]

---

7 $f(x) = 3x + 7$

(a) Find f(3.2).

Answer ..... [1]

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

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

---

8 y varies directly as the square of x.
Given that $y = \frac{1}{5}$ when $x = \frac{1}{2}$, find y when $x = 10$.

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

---

9 **(a)** Solve the inequality $12 - 2x < x$.

Answer x ..... [1]

(b) Find the integer values of n that satisfy $-8 < 2n \leqslant -4$.

Answer ..... [1]

---

10 One week the temperatures, in degrees Celsius, at midnight were recorded.
The results are given below.

$$-1 \qquad -3 \qquad 2 \qquad 5 \qquad -2 \qquad 1 \qquad -2$$

Use these results to find

(a) the mode,

Answer ..... [1]

(b) the median,

Answer ..... [1]

(c) the mean.

Answer ..... [1]

---

11 **(a)** Write the number 0.000 12 in standard form.

Answer ..... [1]

(b) Giving your answer in standard form, evaluate $5.5 \times 10^7 - 2.1 \times 10^6$.

Answer ..... [2]

---

12 Solve the simultaneous equations.

$$2y = x + 12$$
$$3y = 11 - 2x$$

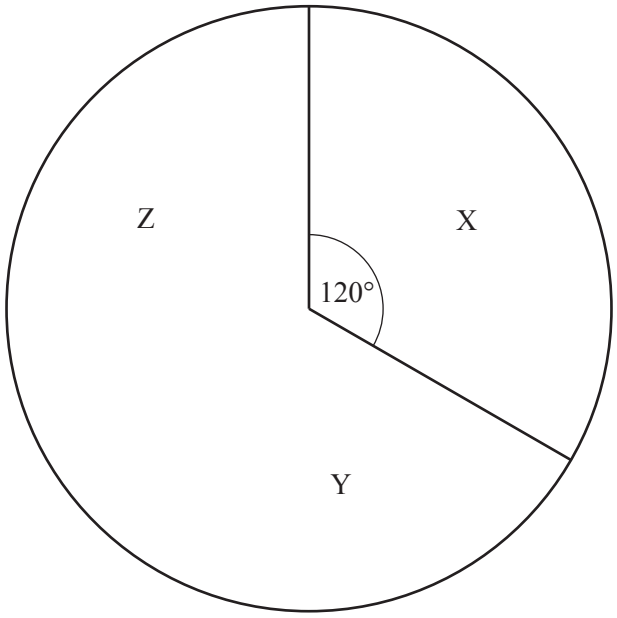
Answer $x =$ .....

$y =$ ..... [3]

---

13 In a survey, some people were asked which of three types of tea, labelled X, Y and Z, they preferred.
The diagram shows part of a pie chart that illustrates the results.
The angle of the sector that represents the people who preferred Y is 168°.

(a) Complete the pie chart.



[1]

(b) Find the fraction of people who preferred Y.
Express your answer in its simplest form.

Answer ..... [1]

(c) Given that 80 people preferred X, calculate the number of people in the survey.

Answer ..... [1]

14 The table shows the square roots, given correct to 4 significant figures, of some numbers from 31.0 to 32.9.

	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
31	5.568	5.577	5.586	5.595	5.604	5.612	5.621	5.630	5.639	5.648
32	5.657	5.666	5.675	5.683	5.692	5.701	5.710	5.718	5.727	5.736

For example, the square root of 32.5 is 5.701.

Use the table to find

(a) the difference between the square root of 32.5 and the square root of 31.3,

Answer ..... [1]

(b) an estimate of the square root of 32.25,

Answer ..... [1]

(c) the number which has a square root of 56.39.

Answer ..... [1]

---

15 **(a)** Simplify $8 - 3(2t + 1)$.

Answer ..... [1]

(b) Simplify $\dfrac{(2x^2y)^3}{6x^4y^4}$.

Answer ..... [2]

---

16 The coordinates of P and Q are (0, 7) and (10, −1).

(a) Find the coordinates of the midpoint of PQ.

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

(b) The length of PQ is $\sqrt{N}$ units, where N is an integer.

Find N.

Answer $N =$ ..... [2]

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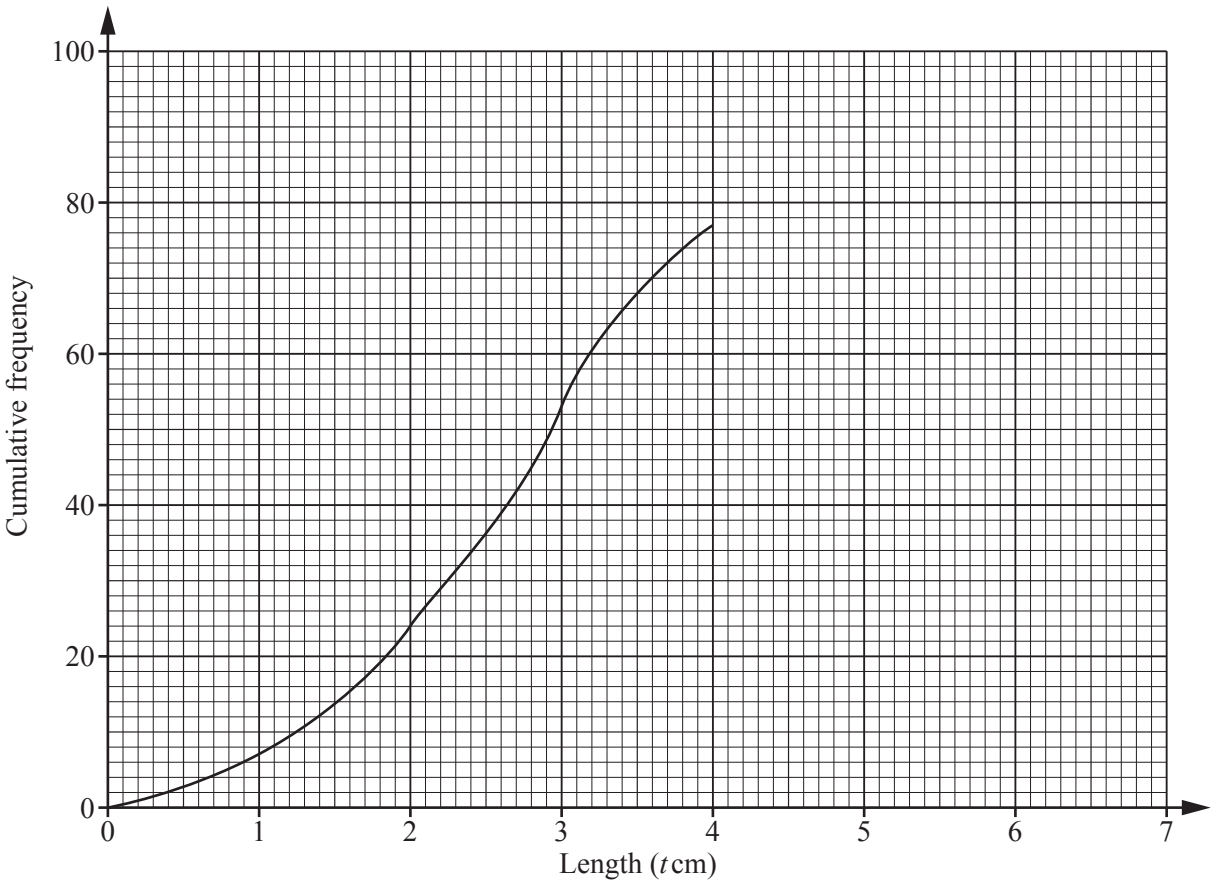
17 The lengths of 90 leaves of a plant were measured.
The results are given in the table.
The diagram shows part of the cumulative frequency curve.

Length (t cm)	$0 < t \leqslant 1$	$1 < t \leqslant 2$	$2 < t \leqslant 3$	$3 < t \leqslant 4$	$4 < t \leqslant 5$	$5 < t \leqslant 6$
Frequency	7	17	29	24	10	3



(a) Complete the cumulative frequency curve. [1]

(b) Use the curve to estimate

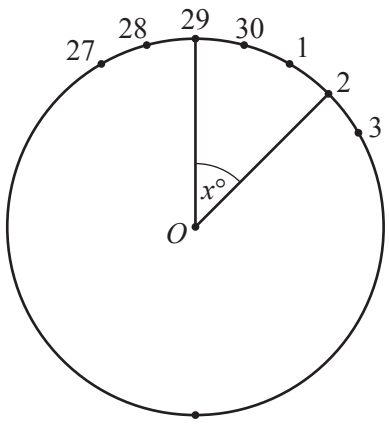
(i) the median,

Answer ..... cm [1]

(ii) the number of leaves with a length less than 3.5 cm.

Answer ..... [1]

18



The diagram represents a vertical, circular fairground wheel which turns about its centre O. The wheel has 30 seats, equally spaced around the circumference, numbered consecutively from 1 to 30.

The diagram, which is not drawn to scale, shows seven of the seats, labelled with the seat number.

The seat number 29 is at the top of the wheel.

(a) What is the number of the seat which is at the bottom of the wheel?

Answer ..... [1]

(b) Calculate the angle $x°$, as shown on the diagram.

Answer ..... [1]

(c) Work out the angle of elevation of seat 2 from the bottom of the wheel.

Answer ..... [2]

19 **(a)** Factorise $25a^2 - 5a$.

Answer ..... [1]

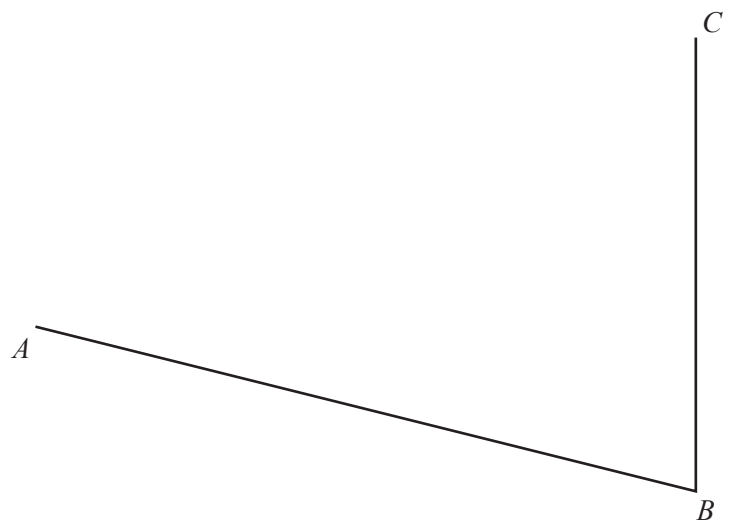
(b) Factorise $9b^2 - 16$.

Answer ..... [1]

(c) Factorise $4xy + 3t + 6y + 2tx$.

Answer ..... [2]

20



The diagram shows the lines AB and BC.

The point D is on the opposite side of AC to B.
$AD = 5$ cm and $CD = 6.5$ cm.

(a) Construct quadrilateral $ABCD$. [1]

(b) On the diagram, construct the locus of points, **inside** the quadrilateral, that are

(i) equidistant from AB and BC, [1]

(ii) equidistant from B and C. [1]

(c) The line PQ consists of the points, inside the quadrilateral, which are

equidistant from AB and BC,
and nearer to C than to B.

Mark and label the line PQ on the diagram. [1]

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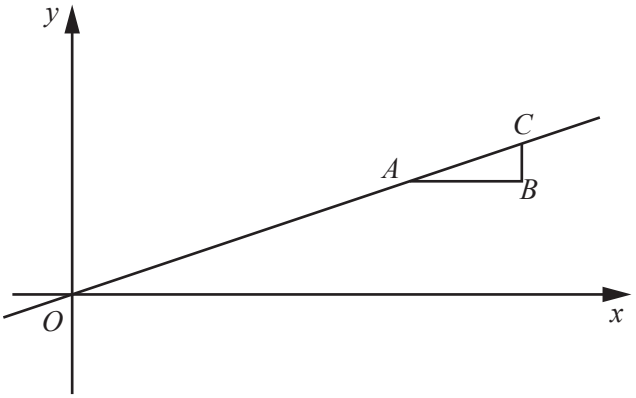
21



The diagram shows the triangle ABC formed by the lines

$$y = 6,\ x = 23 \text{ and } y = \frac{x}{3}.$$

(a) Find the coordinates of A.

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

(b) The region **inside** the triangle is defined by three inequalities.
One of these is $x < 23$.

Write down the other two inequalities.

Answer .....

..... [1]

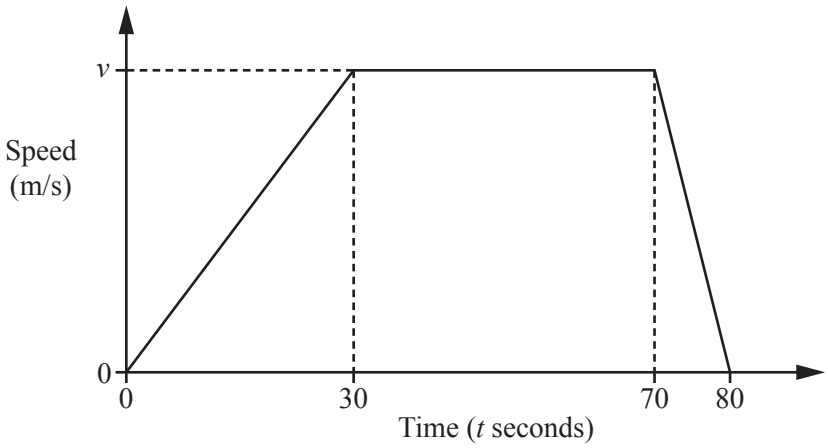
(c) The point P (h, k), where h and k are integers, lies **inside** triangle ABC.

Find the values of h and k.

Answer $h =$ .....

$k =$ ..... [2]

22 The diagram is the speed-time graph of a train which travels between two stations.



(a) Find an expression, in terms of v, for the retardation of the train.

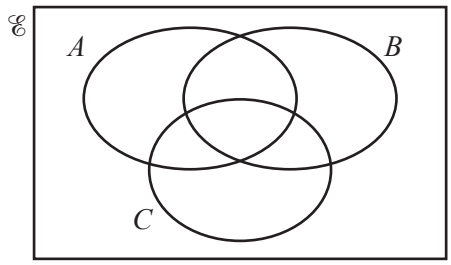
Answer ..... m/s^2 [1]

(b) The distance between the two stations is 1.2 km.

Find v.

Answer $v =$ ..... [3]

23 **(a)** In the Venn diagram, shade the region which represents the subset $A' \cap B \cap C$.



[1]

(b) $P = \{ 1, 4 \}$
$Q = \{ -1, 1, 2 \}$
$R = \left\{ \frac{x}{y} : x \in P, y \in Q \right\}$

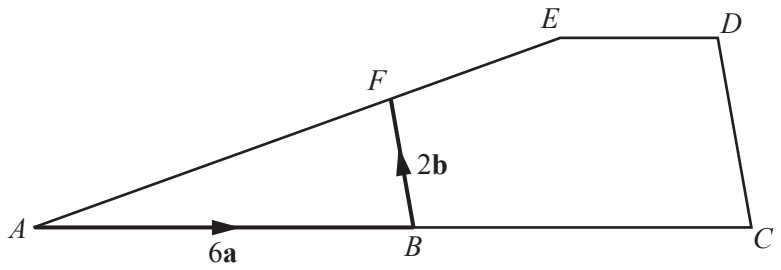
(i) Find $\mathrm{n}(P \cup Q)$.

Answer ..... [1]

(ii) List the members of R.

Answer ..... [2]

24



In the diagram, ABC and AFE are straight lines.

$\overrightarrow{AB} = 6\mathbf{a}$ and $\overrightarrow{BF} = 2\mathbf{b}$.

(a) Express $\overrightarrow{AF}$ in terms of **a** and **b**.

Answer ..... [1]

(b) $\overrightarrow{AE} = 9\mathbf{a} + k\mathbf{b}$.

(i) Find k.

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

(ii) ED is parallel to BC, CD is parallel to BF and $BC = AB$.

Find, in terms of **a** and/or **b**,

(a) $\overrightarrow{CD}$,

Answer ..... [1]

(b) $\overrightarrow{DE}$.

Answer ..... [1]

25 Mary makes pendants, of the same design, from small beads.
The sequence of diagrams shows the pendants she makes.

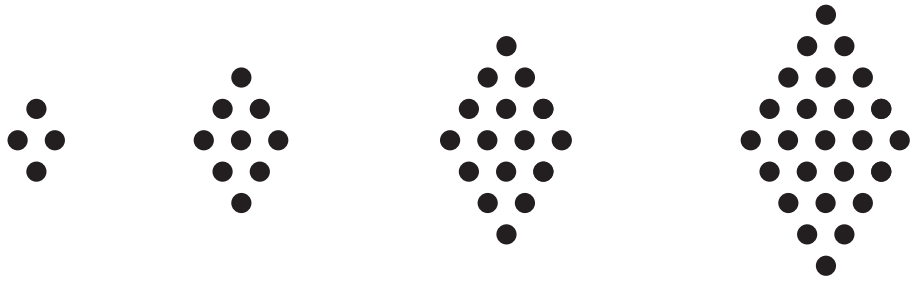


Diagram 1 Diagram 2 Diagram 3 Diagram 4

(a) Complete the table.

Diagram number	1	2	3	4	5
Number of rows	3	5	7	9	
Number of beads	4	9	16	25	

[1]

(b) Find an expression, in terms of N, for

(i) the number of rows in Diagram N,

Answer ..... [1]

(ii) the number of beads in Diagram N.

Answer ..... [1]

(c) Julia asks Mary to make her a pendant with 25 rows.

How many beads are used to make this pendant?

Answer ..... [2]

26 $$\mathbf{A} = \begin{pmatrix} 0 & -2 \\ 1 & 3 \end{pmatrix} \qquad \mathbf{B} = \begin{pmatrix} 3 & 2 \\ -1 & 0 \end{pmatrix}$$

(a) Express $\mathbf{A} - 2\mathbf{B}$ as a single matrix.

Answer [2]

(b) Find $\mathbf{A}^2$.

Answer [2]

(c) $\mathbf{B}^{-1} = k\mathbf{A}$ where k is a rational number.

Find k.

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

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