Cambridge O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

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

Paper 1 **October/November 2014**

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 a 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.

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ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER

1 **(a)** Write the number forty one thousand and six in figures.

Answer ..... [1]

(b) Write 237 400 correct to two significant figures.

Answer ..... [1]

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2 **(a)** Evaluate $10 + 2n^2$ when $n = -1$.

Answer ..... [1]

(b) Evaluate 0.4×0.2.

Answer ..... [1]

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3 **(a)** Write 3% as a fraction.

Answer ..... [1]

(b) Work out $90 - 16 \div 2$.

Answer ..... [1]

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4 x is an integer between 50 and 70 .

Write down the value of x when

(a) x is a cube number,

Answer ..... [1]

(b) x is a prime factor of 268 .

Answer ..... [1]

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5 Factorise $2ac - 3bc - 6bd + 4ad$.

Answer ..... [2]

[Turn over

6 **(a)** Express as a single fraction $\frac{2}{3} \div \frac{3}{4}$.

Answer ..... [1]

(b) A bag of sweets contains mints and toffees only.
There are 21 mints in the bag.
One quarter of the sweets are toffees.

Calculate the total number of sweets in the bag.

Answer ..... [1]

(c) \$360 is shared in the ratio 3 : 5.

Calculate the difference between the larger share and the smaller share.

Answer \$ ..... [1]

7 Solve the simultaneous equations.

$$2x - 3y = 11$$
$$5x - 4y = 24$$

Answer $x =$ .....

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

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8 **(a)** Find n when $3^3 \times 3 \times 3^5 = 3^n$.

Answer $n =$ ..... [1]

(b) Find the value of $32^{\frac{3}{5}}$.

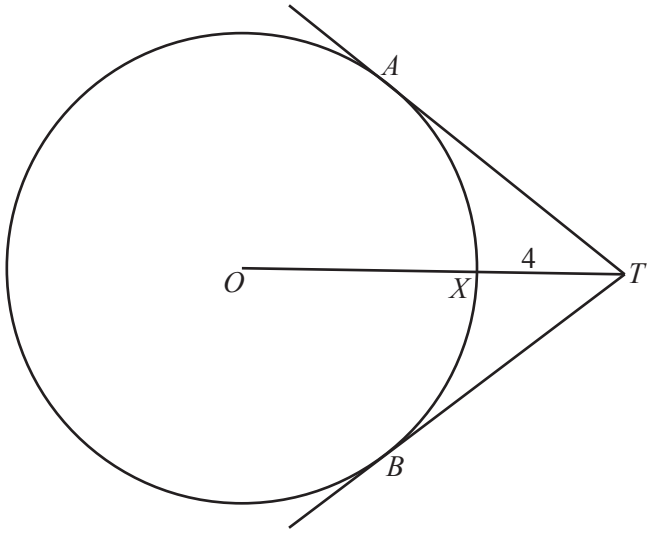
Answer ..... [1]

(c) Find the value of $\left(\frac{1}{5}\right)^{-2}$.

Answer ..... [1]

[Turn over

9

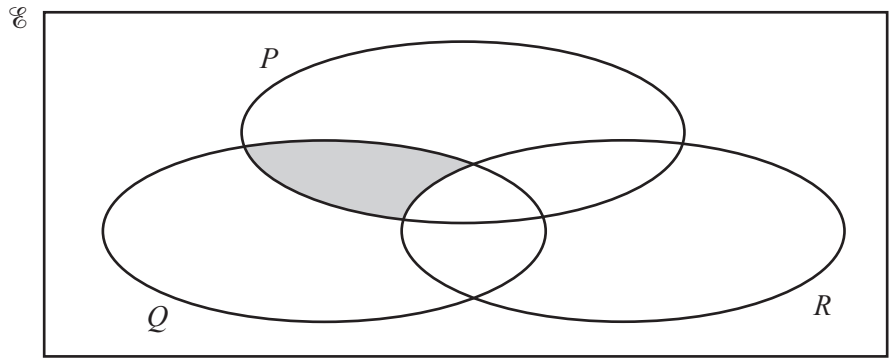


The diagram shows a circle, centre O, with radius 6 cm.
Tangents are drawn from T to touch the circle at A and B.
OXT is a straight line intersecting the circle at X with $XT = 4$ cm.

Calculate AT.

Answer ..... cm [3]

10 **(a)** Use set notation to describe the shaded subset in the Venn diagram.



Answer ..... [1]

(b) In a group of students

30 play cricket,
38 play football and
9 play neither cricket nor football.

Find the lowest possible number of students in the group.

Answer ..... [2]

[Turn over

11 John works in a shop.
The matrix below shows the number of hours he worked on Monday to Friday, Saturday, and Sunday during two different weeks.

	Monday to Friday	Saturday	Sunday
Week 1	30	5	0
Week 2	35	6	2

The matrix below shows the pay that he received per hour on Monday to Friday, Saturday, and Sunday.

$/hr

$$\begin{pmatrix} 9 \\ 12 \\ 15 \end{pmatrix}$$ Monday to Friday
Saturday
Sunday

(a) $\mathbf{P} = \begin{pmatrix} 30 & 5 & 0 \\ 35 & 6 & 2 \end{pmatrix} \begin{pmatrix} 9 \\ 12 \\ 15 \end{pmatrix}$

Find **P**.

Answer **P** = [2]

(b) Explain the meaning of the information given by matrix **P**.

.....

..... [1]

12 $s = \frac{n}{2}(a + b)$

(a) Evaluate s when $n = 200$, $a = 3.6$ and $b = 5.7$.

Answer $s =$ ..... [1]

(b) Rearrange the formula to make b the subject.

Answer $b =$ ..... [2]

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13 When the speed of a car is v m/s, its braking distance is d m.
d is directly proportional to the **square** of v.
When the speed of the car is 8 m/s the braking distance is 5 m.

Find the formula for d in terms of v and hence find the braking distance when the speed of the car is 40 m/s.

Answer Formula $d =$ .....

Braking distance = ... m [3]

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14 A shopkeeper sells fruit at the prices shown in the table below.

Oranges	35 cents each
Apples	\$2.40 per kg
Melons	\$1.85 each

(a) Sabah buys 750 g of apples and one melon.

Calculate how much she pays.

Answer \$ ..... [1]

(b) The shopkeeper buys

100 oranges for \$25,
50 kg of apples for \$80 and
20 melons for \$15.

He sells all of these oranges, apples and melons at the prices shown in the table.

Calculate his percentage profit.

Answer .....% [3]

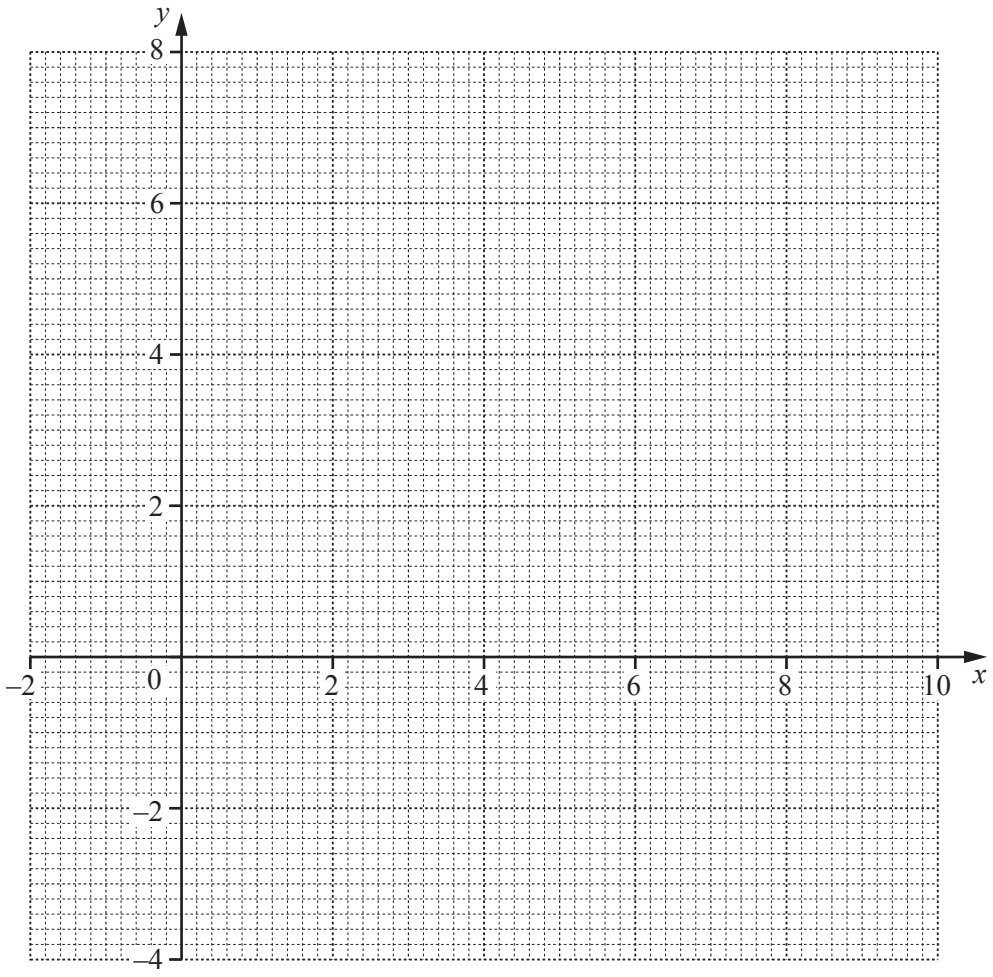
15 **(a)** Draw triangle ABC with $AB = 8$ cm, $AC = 7$ cm and $C\hat{A}B = 130°$.
AB has been drawn for you.

[2]

(b) By making suitable measurements, find the area of triangle ABC.

Answer ..... cm^2 [2]

16



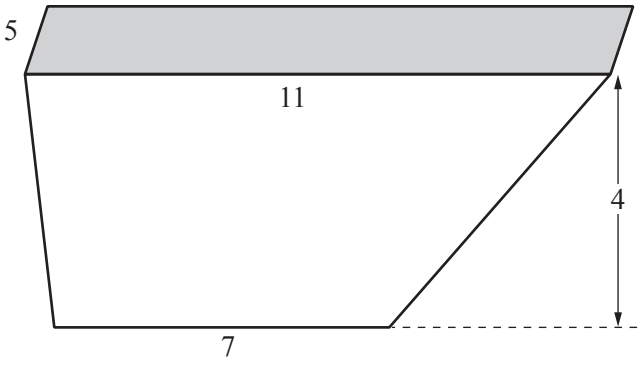
(a) On the grid above, draw the graph of $x + y = 6$. [1]

(b) On the grid above, draw the graph of $2y + x = 4$. [1]

(c) On the grid above, shade and label the region **R**, defined by the following inequalities.

$x + y \leqslant 6$ $2y + x \geqslant 4$ $y \geqslant 2$ $x \geqslant -1$ [2]

17



The diagram shows a scoop used for measuring washing powder.
The scoop is a prism. Its cross-section is a trapezium.
The trapezium has height 4 cm and parallel sides of length 7 cm and 11 cm.
The width of the scoop is 5 cm.

(a) Show that the volume of the scoop is 180 cm^3.

[1]

(b) A scoop used in industry is geometrically similar to the scoop above.
It has a volume of 22.5 litres.

Calculate the height of the industrial scoop.

Answer .....cm [3]

18 **(a)** The term-to-term rule for a sequence is

multiply the previous term by 3 and subtract 1 .

The first three terms in this sequence are 1, 2 and 5 .

Write down the next two terms in this sequence.

Answer ..... , ... [1]

(b) The nth term of a second sequence is given by the expression $4n - 3$.

Find the number in this sequence that is closest to 150 .

Answer ..... [1]

(c) The nth term of a different sequence is given by the expression $n^2 + 1$.

(i) Write down the first four terms of this sequence.

Answer ..... , ... , ... , ... [1]

(ii) Hence write down an expression, in terms of n, for the nth term of the following sequence.

0 3 8 15 .....

Answer ..... [1]

19 **(a)** In 2013 the population of China was approximately $1\,360\,000\,000$.

Write this number in standard form.

Answer ..... [1]

(b) $p = 8 \times 10^5$ $q = 7 \times 10^3$

Giving your answers in standard form, find

(i) pq,

Answer ..... [1]

(ii) $p - q$.

Answer ..... [2]

20

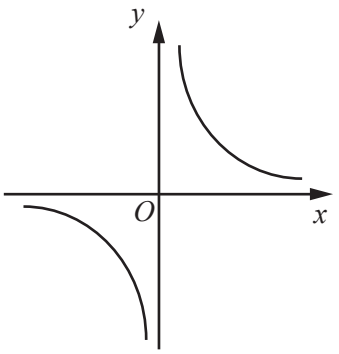


Figure A

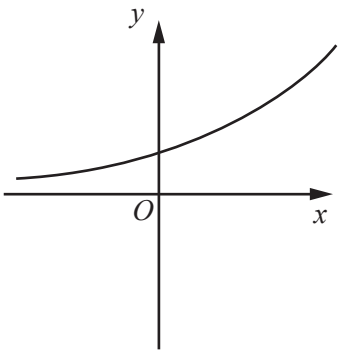


Figure B

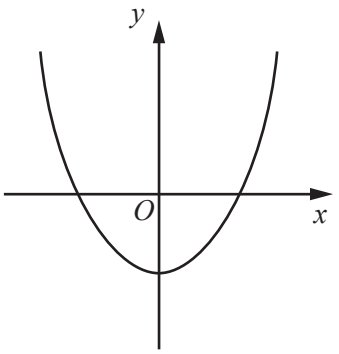


Figure C

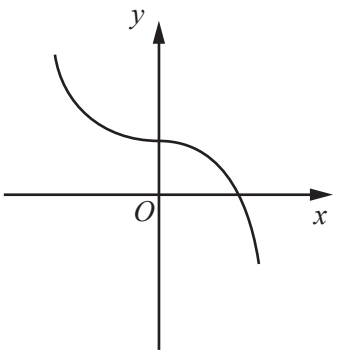


Figure D

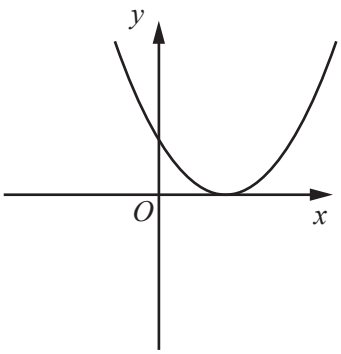


Figure E

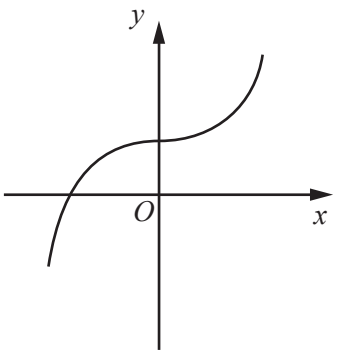


Figure F

State which figure could be the graph of

(a) $y = x^3 + 1$,

Answer Figure ..... [1]

(b) $y = x^2 - 3$,

Answer Figure ..... [1]

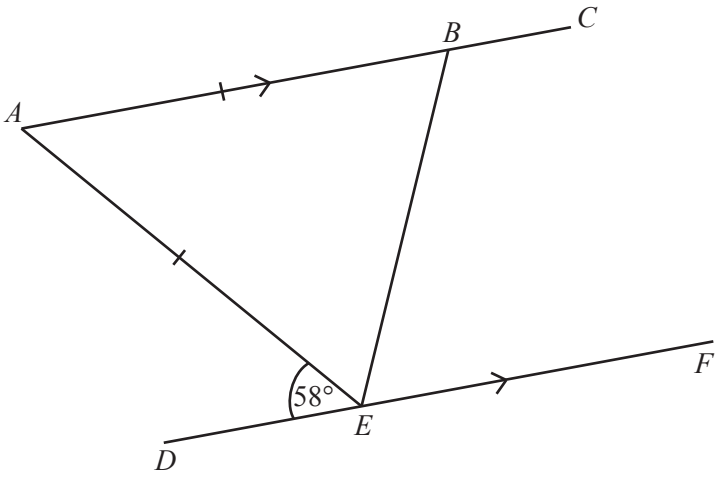
(c) $y = 3^x$,

Answer Figure ..... [1]

(d) $y = (x - 3)^2$.

Answer Figure ..... [1]

21 (a)



In the diagram the lines ABC and DEF are parallel.
$AB = AE$ and $A\hat{E}D = 58°$.

(i) Complete the statement below.

$E\hat{A}B = 58°$ because .....

..... [1]

(ii) Calculate $E\hat{B}C$.

Answer $E\hat{B}C =$ ..... [2]

(b) A pentagon has interior angles of 80º, 95º and 125º.
Each of the remaining angles is equal to xº.

Calculate the value of x.

Answer $x =$ ..... [2]

[Turn over

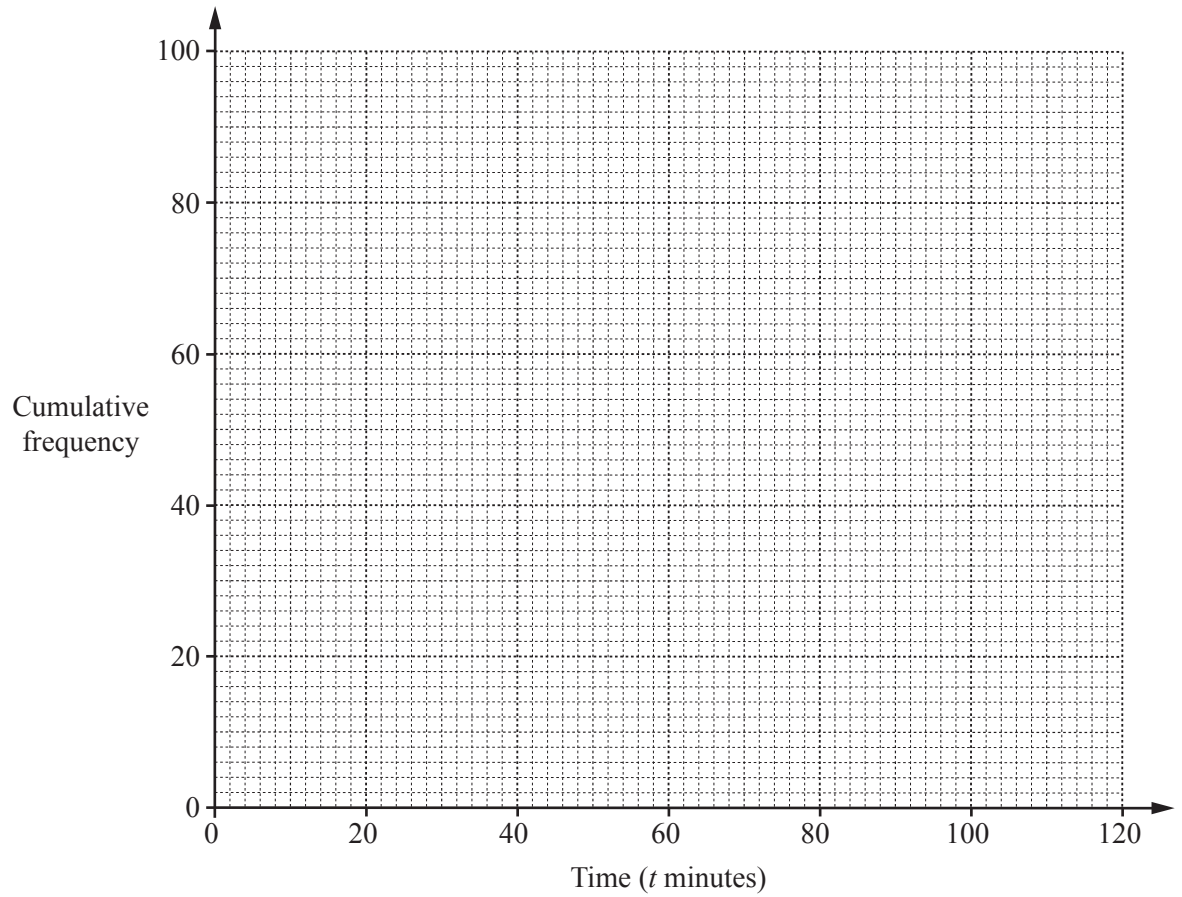
22 Each member of a group of 100 people was asked how long they spent at a gym one afternoon. The results are summarised in the **cumulative** frequency table below.

Time (t mins)	$t \leqslant 20$	$t \leqslant 40$	$t \leqslant 60$	$t \leqslant 90$	$t \leqslant 120$
Cumulative frequency	6	20	46	88	100

(a) How many people spent between 60 and 90 minutes at the gym?

Answer ..... [1]

(b) On the grid below, draw the cumulative frequency curve to represent the information in the table.



[2]

(c) Use your cumulative frequency curve to estimate

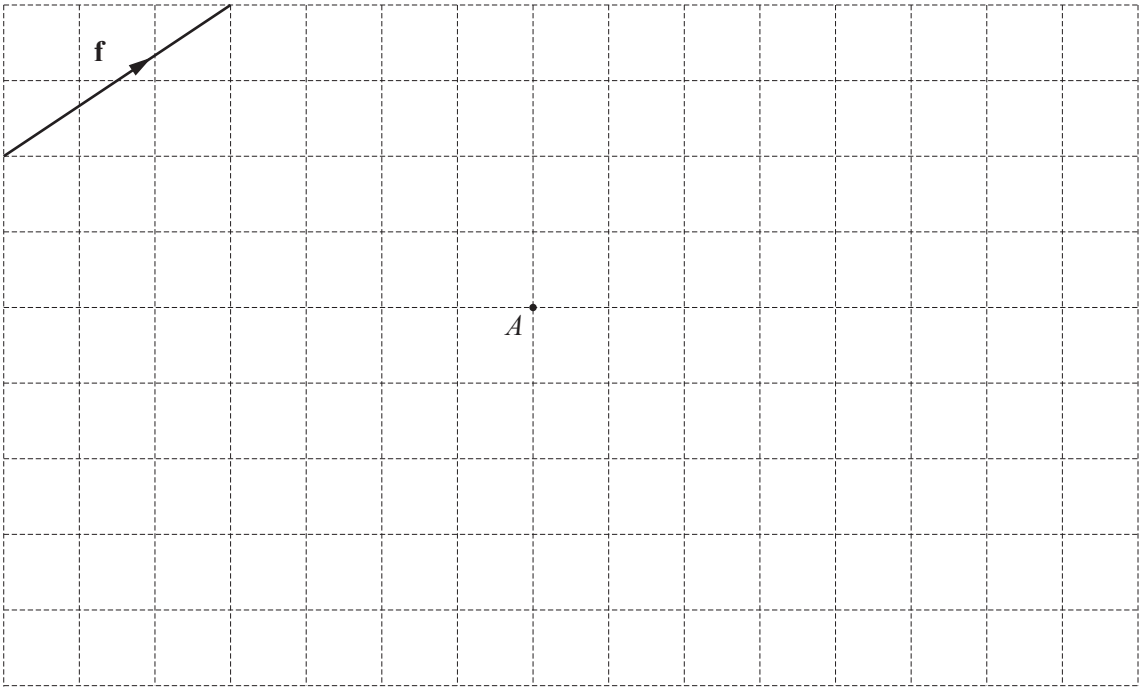
(i) the median time spent at the gym,

Answer ..... minutes [1]

(ii) the number of people who spent between 50 and 80 minutes at the gym.

Answer ..... [2]

23 (a)



$\mathbf{f} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ $\mathbf{g} = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$ $\mathbf{h} = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$

The vector **f** and the point A are shown on the grid.

On the grid, mark and label

(i) the point B when $\overrightarrow{AB} = \mathbf{f} + \mathbf{g}$, [1]

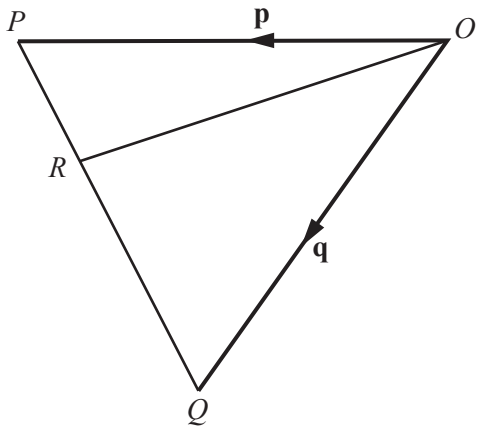
(ii) the point C when $\overrightarrow{AC} = -2\mathbf{h}$, [1]

(iii) the point D when $\overrightarrow{AD} = 2\mathbf{f} - 3\mathbf{g}$. [1]

The rest of this question is on the next page.

[Turn over

(b)



In the diagram, $\overrightarrow{OP} = \mathbf{p}$ and $\overrightarrow{OQ} = \mathbf{q}$.
R is the point on PQ such that $PR : RQ = 1 : 2$.

(i) Express $\overrightarrow{PQ}$, as simply as possible, in terms of **p** and **q**.

Answer ..... [1]

(ii) Express $\overrightarrow{OR}$, as simply as possible, in terms of **p** and **q**.

Answer ..... [1]

(iii) T is a point such that $\overrightarrow{TR} = 2\overrightarrow{OP}$.

Express $\overrightarrow{OT}$, as simply as possible, in terms of **p** and **q**.

Answer ..... [2]