

- 1** Mr and Mrs Sayed and their 3 children go on holiday.  
They travel to the airport by train.

**(a)** The train departs at 1620.

**(i)** They leave home 45 minutes before the train departs.

Find the time at which they leave home.

*Answer(a)(i)* ..... [1]

**(ii)** Write 1620 using the 12-hour clock.

*Answer(a)(ii)* ..... [1]

**(b)** The train fare is \$24 for an adult.

The train fare for a child is  $\frac{2}{3}$  of an adult fare.

Find

**(i)** the fare for a child,

*Answer(b)(i)* \$ ..... [1]

**(ii)** the total fare for Mr and Mrs Sayed and their 3 children.

*Answer(b)(ii)* \$ ..... [2]

2 Aminata buys a business costing \$23 000.

(a) She pays part of this cost with \$12 000 of her own money.

Calculate what percentage of the \$23 000 this is.

*Answer(a)* ..... % [1]

(b) Aminata's brother gives her 32% of the remaining \$11 000.

Show that \$7 480 is still needed to buy the business.

*Answer(b)*

[2]

(c) Aminata borrows the \$7 480 at a rate of 3.5% per year **compound** interest.

Calculate how much money she owes at the end of 3 years.

*Answer(c)* \$ ..... [3]

(d) In the first year Aminata spent \$11 000 on salaries, equipment and expenses.

$\frac{2}{5}$  of this money was spent on salaries, 0.45 of this money was spent on equipment and the remainder was for expenses.

Calculate how much of the \$11 000 was spent on

(i) salaries,

*Answer(d)(i)* \$ ..... [1]

(ii) equipment,

*Answer(d)(ii)* \$ ..... [1]

(iii) expenses.

*Answer(d)(iii)* \$ ..... [1]

(e) The three items in **part (d)** are in the ratio salaries : equipment : expenses = 0.4 : 0.45 : 0.15 .

Write this ratio in its simplest form.

*Answer(e)* ..... : ..... : ..... [2]

3 (a)

$$\mathbf{r} = \begin{pmatrix} 3 \\ -2 \end{pmatrix} + \begin{pmatrix} -5 \\ -2 \end{pmatrix}$$

(i) Write down  $\mathbf{r}$  as a single vector.

$$\text{Answer(a)(i) } \mathbf{r} = \begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix} \quad [1]$$

(ii) The point  $G(3, 2)$  is translated by the vector  $\mathbf{r}$  to the point  $H$ .Find the co-ordinates of  $H$ .

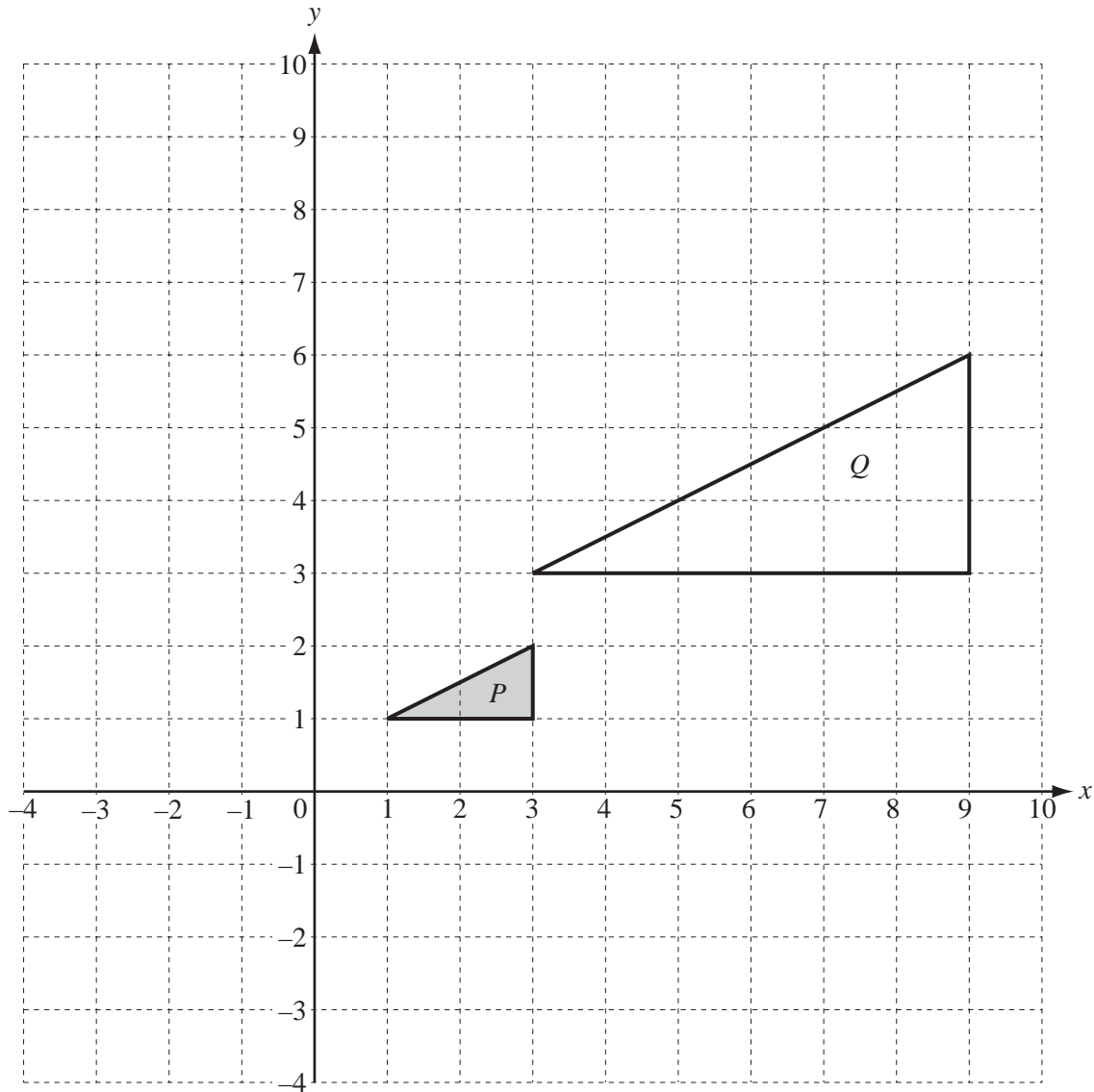
$$\text{Answer(a)(ii) } ( \dots\dots\dots , \dots\dots\dots ) \quad [1]$$

(iii) Write down the vector of the translation that maps  $H$  onto  $G$ .

$$\text{Answer(a)(iii) } \begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix} \quad [1]$$


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(b)



The diagram shows two triangles  $P$  and  $Q$ .

- (i) Describe fully the **single** transformation which maps  $P$  onto  $Q$ .

*Answer(b)(i)* ..... [3]

- (ii) On the grid, draw the reflection of  $P$  in the line  $x = 0$ . Label this image  $R$ . [2]

- (iii) On the grid, rotate  $P$  through  $180^\circ$  about  $(0, 0)$ . Label this image  $S$ . [2]

- (iv) Describe fully the **single** transformation which maps triangle  $S$  onto triangle  $R$ .

*Answer(b)(iv)* ..... [2]

4 (a) Expand and simplify  $3(2x + y) + 5(x - y)$ .

*Answer(a)* ..... [2]

(b) Expand  $x^2(3x - 2y)$ .

*Answer(b)* ..... [2]

(c) Factorise completely  $4y^2 - 10xy$ .

*Answer(c)* ..... [2]

(d)  $y = \frac{4x^2}{3}$

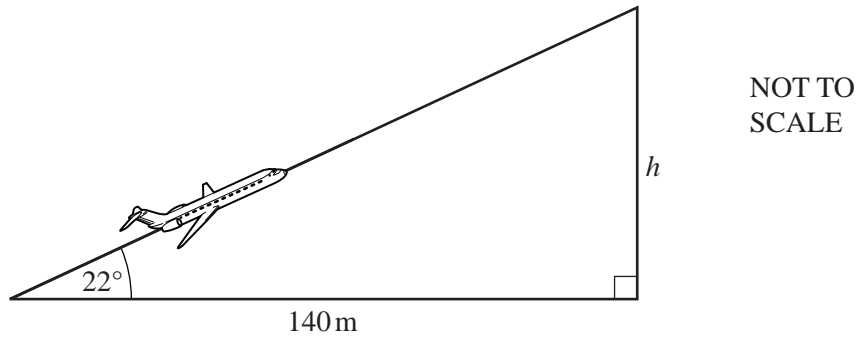
(i) Find the value of  $y$  when  $x = -3$ .

*Answer(d)(i)*  $y =$  ..... [2]

(ii) Make  $x$  the subject of the formula.

*Answer(d)(ii)*  $x =$  ..... [3]

- 5 (a) An aeroplane takes off 140 metres before reaching the end of the runway. It climbs at an angle of  $22^\circ$  to the horizontal ground.



Calculate the height of the aeroplane,  $h$ , when it is vertically above the end of the runway.

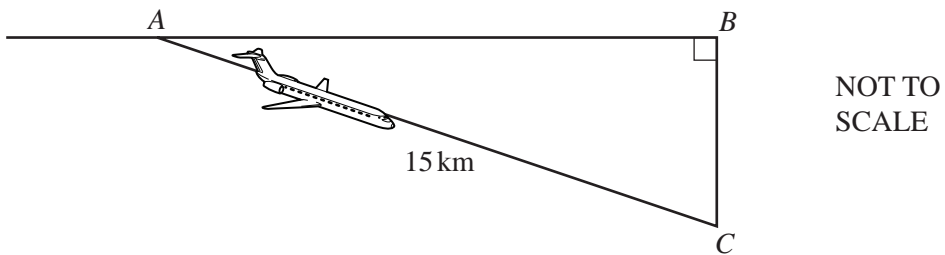
Answer(a)  $h = \dots\dots\dots$  m [2]

- (b) After 3 hours 30 minutes the aeroplane has travelled 1850 km.

Calculate the average speed of the aeroplane.

Answer(b)  $\dots\dots\dots$  km/h [2]

- (c)



The aeroplane descends from  $A$ , at a height of 12 000 metres, to  $C$ , at a height of 8 300 metres.

- (i) Work out the vertical distance,  $BC$ , that the aeroplane descends.

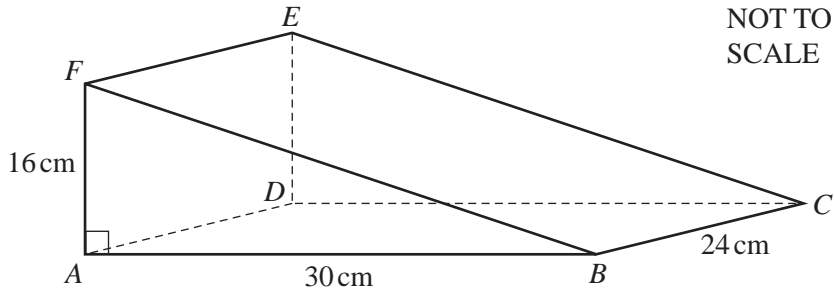
Answer(c)(i)  $\dots\dots\dots$  m [1]

- (ii) The distance  $AC$  is 15 kilometres.

Calculate angle  $BAC$ .

Answer(c)(ii) Angle  $BAC = \dots\dots\dots$  [2]

6



The diagram shows a wedge in the shape of a triangular prism.

$AB = 30$  cm,  $AF = 16$  cm and  $BC = 24$  cm. Angle  $BAF = 90^\circ$ .

(a) Calculate

(i) the area of triangle  $ABF$ ,

Answer(a)(i) .....  $\text{cm}^2$  [2]

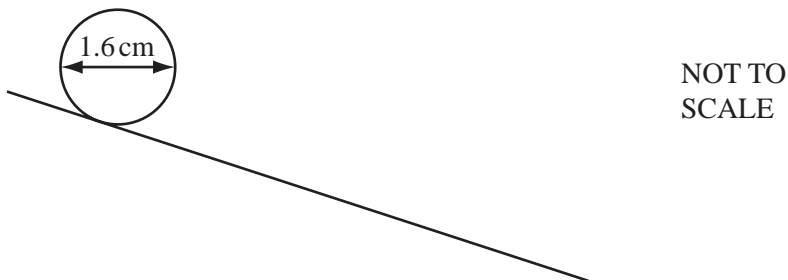
(ii) the volume of the wedge.

Answer(a)(ii) .....  $\text{cm}^3$  [1]

(b) (i) Calculate  $BF$ .

Answer(b)(i) ..... cm [2]

(ii)



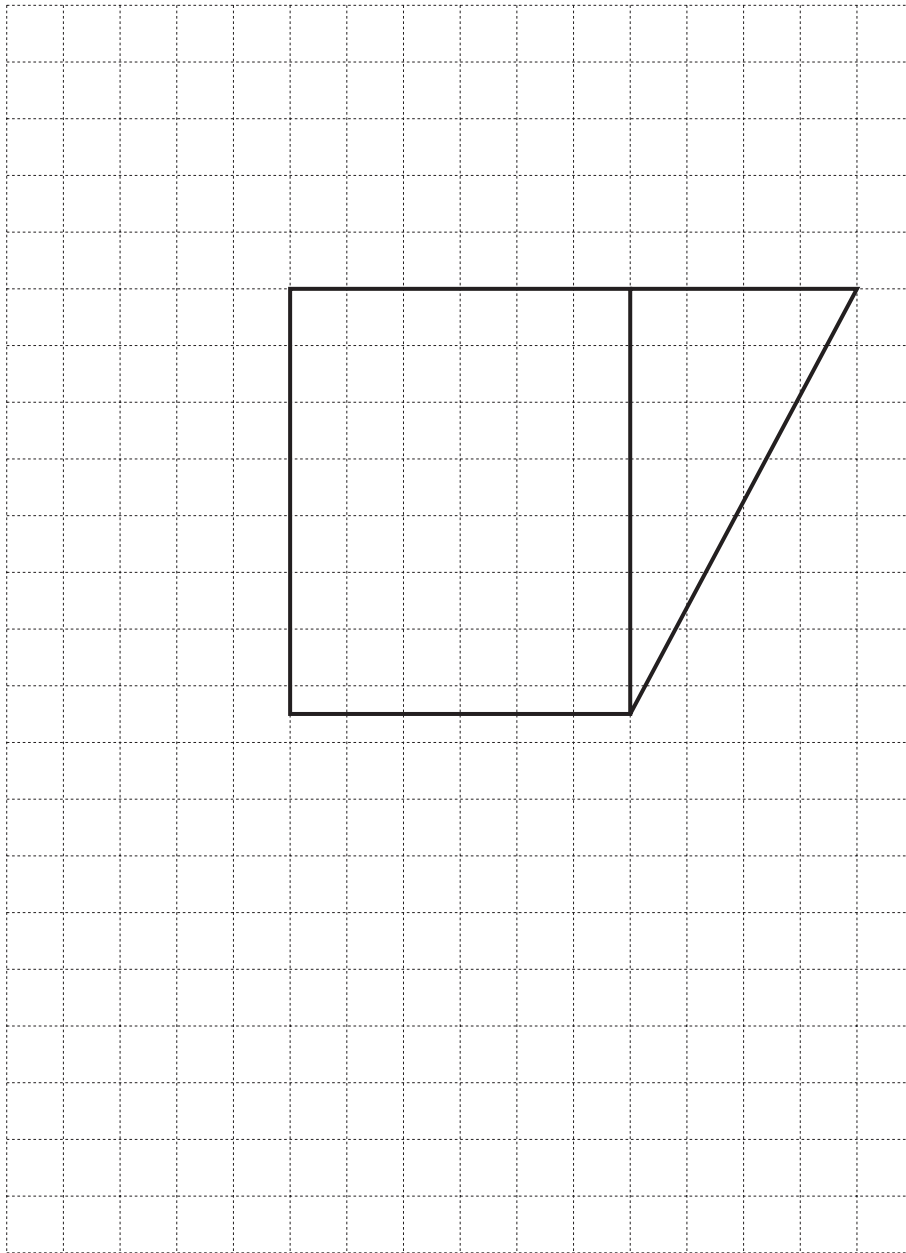
A coin with diameter 1.6 cm is rolled down the sloping surface of the wedge. It travels in a straight line parallel to  $BF$ , starting on  $FE$  and ending on  $BC$ .

Calculate the number of **complete** turns it makes.

Answer(b)(ii) ..... [3]

- (c) On the grid, complete the net of the wedge.  
The base and one of the triangles have been drawn for you.

Each square on the grid represents a square of side 4 centimetres.



[3]

- (d) Calculate the surface area of the wedge.

Answer(d) .....  $\text{cm}^2$  [3]



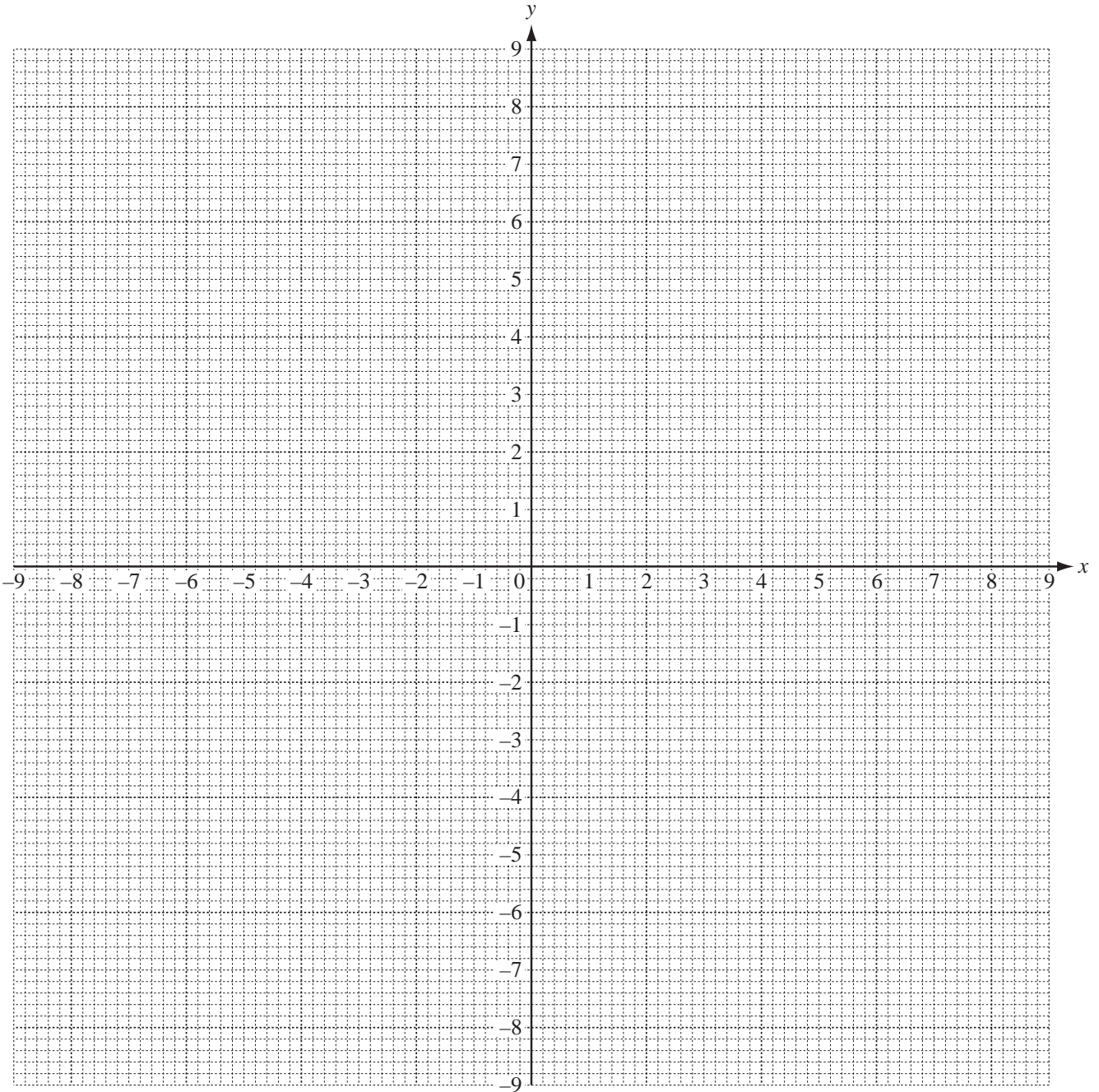
7 (a) The table shows some values for  $y = \frac{18}{x}$ .

$x$	-9	-6	-4	-3	-2		2	3	4	6	9
$y$	-2		-4.5		-9				4.5	3	

(i) Complete the table.

[2]

(ii) On the grid, draw the graph of  $y = \frac{18}{x}$  for  $-9 \leq x \leq -2$  and  $2 \leq x \leq 9$ .



[4]

(iii) Use your graph to solve the equation  $\frac{18}{x} = -5$ .

Answer(a)(iii)  $x =$  ..... [1]

(b) (i) Complete the table of values for  $y = 2x + 3$ .

$x$	-4	-3	2	3
$y$	-5		7	

[2]

(ii) On the grid, draw the graph of  $y = 2x + 3$  for  $-4 \leq x \leq 3$ .

[1]

(iii) Find the co-ordinates of the points of intersection of the graphs of

$$y = \frac{18}{x} \text{ and } y = 2x + 3.$$

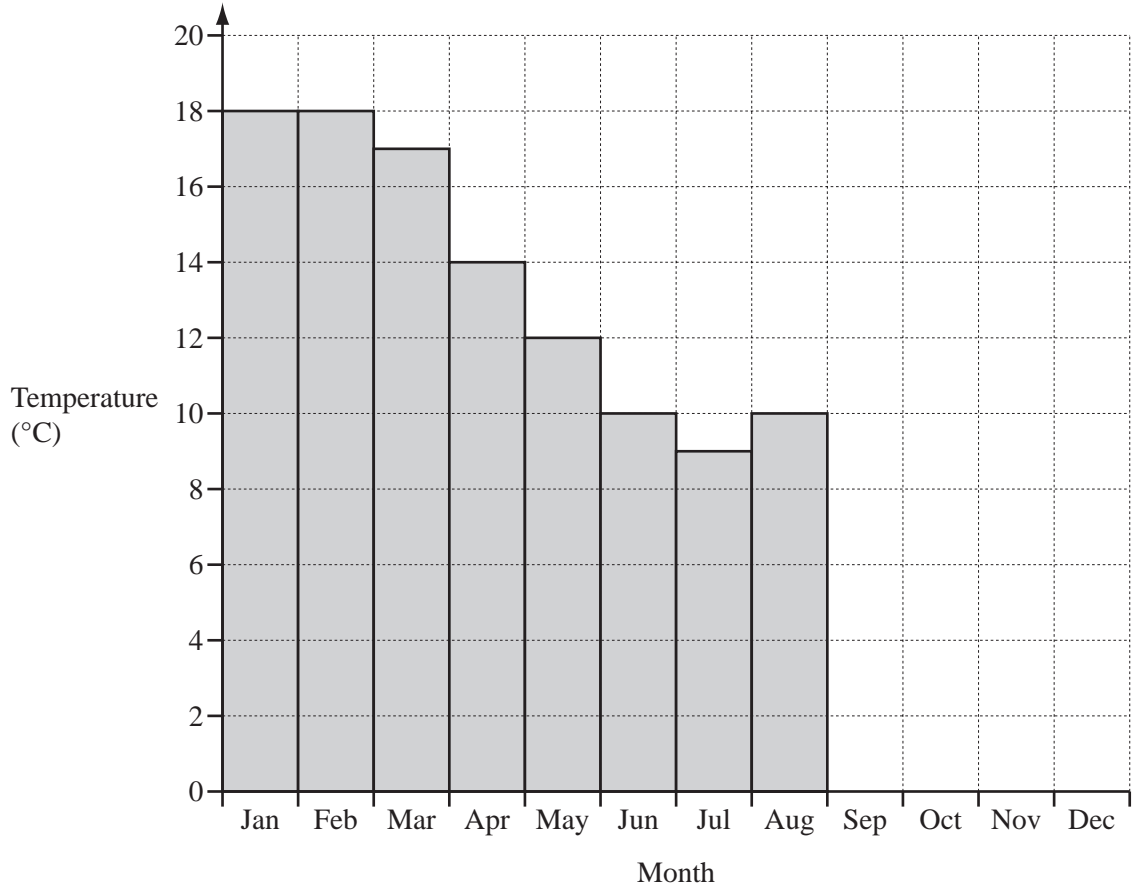
*Answer(b)(iii)* ( ..... , ..... ) and ( ..... , ..... ) [2]

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8 The table shows the average temperature and rainfall each month at Wellington airport.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature (°C)	18	18	17	14	12	10	9	10	11	13	15	16
Rainfall (mm)	67	48	76	87	99	113	111	106	82	81	74	74

(a) Complete the bar chart to show the **temperature** each month.



[2]

(b) For the **rainfall** calculate

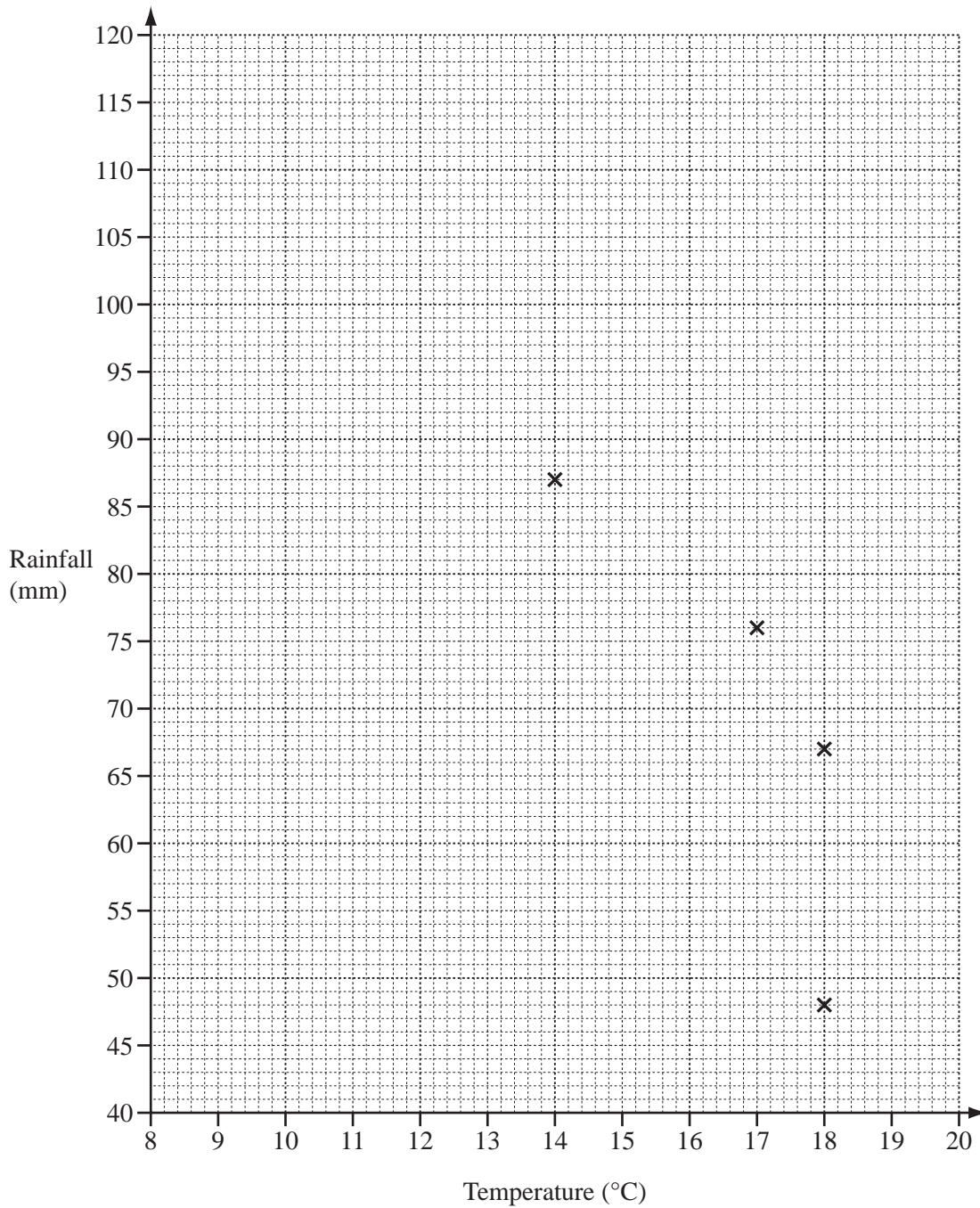
(i) the mean,

Answer(b)(i) ..... mm [2]

(ii) the median.

Answer(b)(ii) ..... mm [2]

(c) In the scatter diagram the rainfall for January to April is plotted against temperature.



- (i) Complete the scatter diagram by plotting the values for the months May to December. [3]
- (ii) Draw the line of best fit on the scatter diagram. [1]
- (iii) What type of correlation does the scatter diagram show?

Answer(c)(iii) ..... [1]

- 9 On the scale drawing opposite, point  $A$  is a port.  
 $B$  and  $C$  are two buoys in the sea and  $L$  is a lighthouse.

The scale is 1 cm = 3 km.

- (a) A boat leaves port  $A$  and follows a straight line course that bisects angle  $BAC$ .

Using a straight edge and compasses only, construct the bisector of angle  $BAC$  on the scale drawing. [2]

- (b) When the boat reaches a point that is equidistant from  $B$  and from  $C$ , it changes course.  
 It then follows a course that is equidistant from  $B$  and from  $C$ .

- (i) Using a straight edge and compasses only, construct the locus of points that are equidistant from  $B$  and from  $C$ .

Mark the point  $P$  where the boat changes course. [2]

- (ii) Measure the distance  $AP$  in centimetres.

Answer(b)(ii) ..... cm [1]

- (iii) Work out the actual distance  $AP$ .

Answer(b)(iii) ..... km [1]

- (iv) Measure the **obtuse** angle between the directions of the two courses.

Answer(b)(iv) ..... [1]

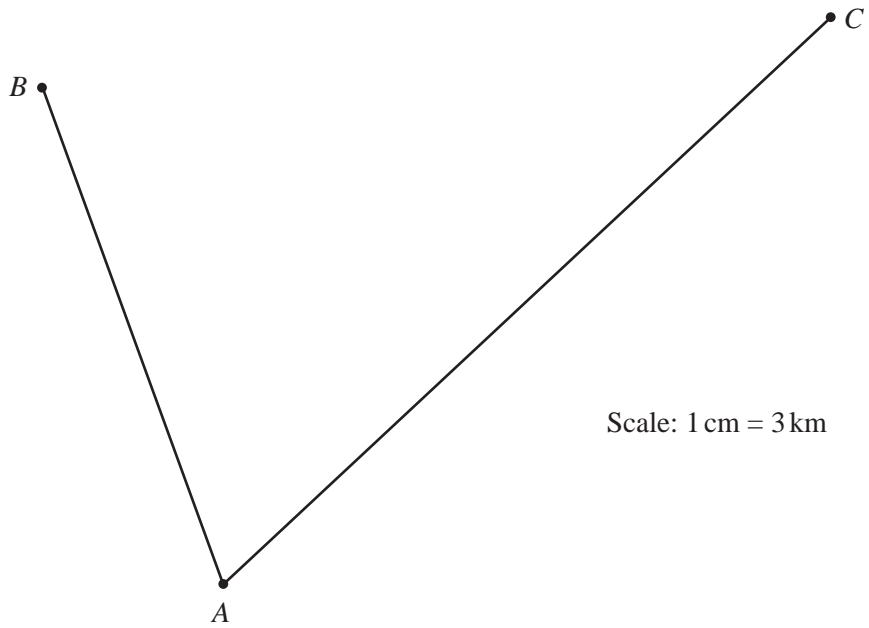
- (c) Boats must be more than 9 kilometres from the lighthouse,  $L$ .

- (i) Construct the locus of points that are 9 kilometres from  $L$ . [2]

- (ii) Mark the point  $R$  where the course of the boat meets this locus.  
 Work out the actual straight line distance,  $AR$ , in kilometres.

Answer(c)(ii) ..... km [1]

*L* •



10 (a) Write down the next term in each of the following sequences.

(i) 2, 9, 16, 23, ..... [1]

(ii) 75, 67, 59, 51, ..... [1]

(iii) 2, 5, 9, 14, ..... [1]

(iv) 2, 1,  $\frac{1}{2}$ ,  $\frac{1}{4}$ , ..... [1]

(v) 2, 4, 8, 16, ..... [1]

(b) For the sequence in part (a)(i) write down

(i) the 10th term,

Answer(b)(i) ..... [1]

(ii) the  $n$ th term.

Answer(b)(ii) ..... [2]

(c) The  $n$ th term of the sequence in part (a)(iii) is  $\frac{n^2 + 3n}{2}$ .

Calculate the 50th term of this sequence.

Answer(c) ..... [2]

(d) The  $n$ th term of the sequence in part (a)(v) is  $2^n$ .

Calculate the 12th term of this sequence.

Answer(d) ..... [1]

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