

- 9 (a) The number of people living in six houses is

3, 8, 4, x , y and z .

The median is $7\frac{1}{2}$.

The mode is 8.

The mean is 7.

Find a value for each of x , y and z .

[5]

- (b) The grouped frequency table below shows the amount (\$ A) spent on travel by a number of students.

Cost of travel (\$ A)	$0 < A \leq 10$	$10 < A \leq 20$	$20 < A \leq 40$
Frequency	15	m	n

- (i) Write down an estimate for the total amount in terms of m and n .

[2]

- (ii) The calculated estimate of the mean amount is \$13 exactly.

Write down an equation containing m and n .

Show that it simplifies to $2m + 17n = 120$.

[3]

- (iii) A student drew a histogram to represent this data.

The area of the rectangle representing the $0 < A \leq 10$ group was equal to the sum of the areas of the other two rectangles.

Explain why $m + n = 15$.

[1]

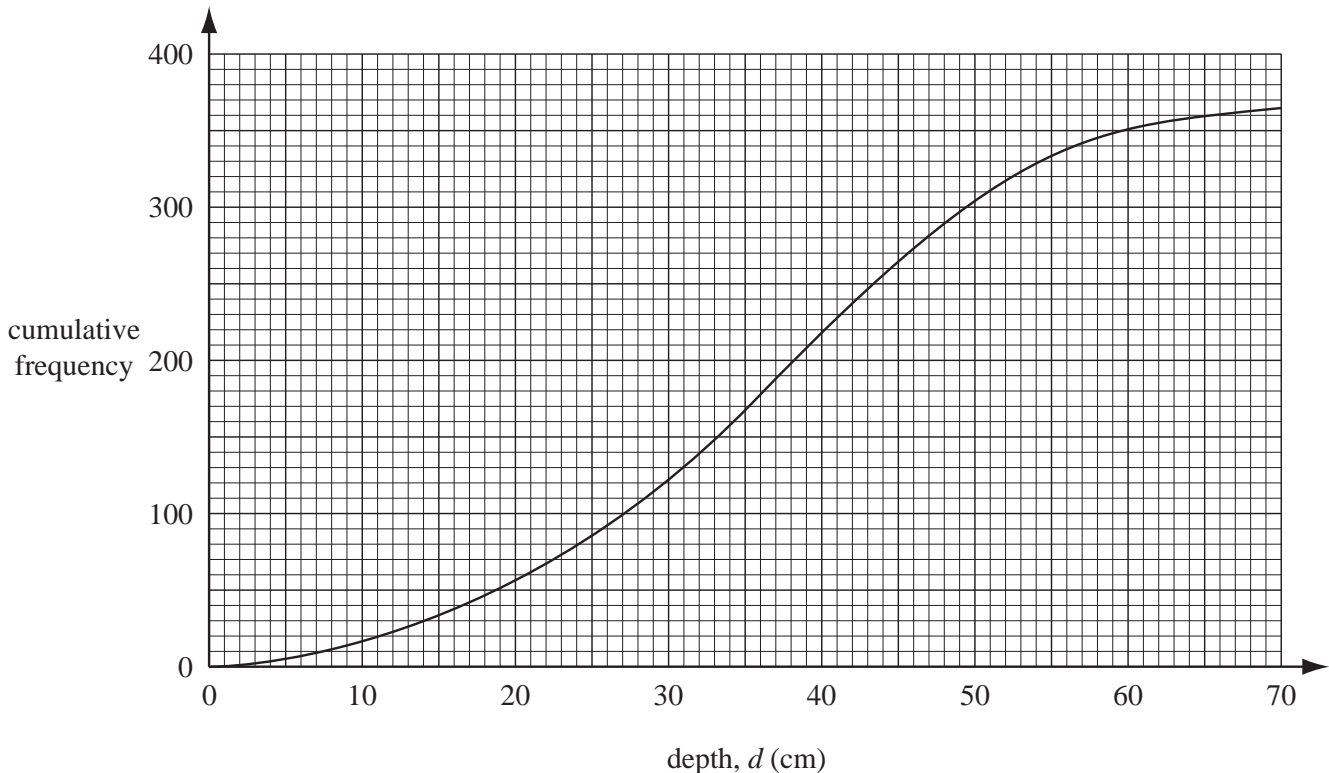
- (iv) Find the values of m and n by solving the simultaneous equations

$$2m + 17n = 120,$$

$$m + n = 15.$$

[3]

- 3 The depth, d centimetres, of a river was recorded each day during a period of one year (365 days). The results are shown by the cumulative frequency curve.



- (a) Use the cumulative frequency curve to find

- (i) the median depth, [1]
- (ii) the inter-quartile range, [2]
- (iii) the depth at the 40th percentile, [2]
- (iv) the number of days when the depth of the river was **at least** 25 cm. [2]

- (b)

d	$0 < d \leq 10$	$10 < d \leq 20$	$20 < d \leq 30$	$30 < d \leq 40$	$40 < d \leq 50$	$50 < d \leq 60$	$60 < d \leq 70$
Number of days	17	41	62	98	85	p	q

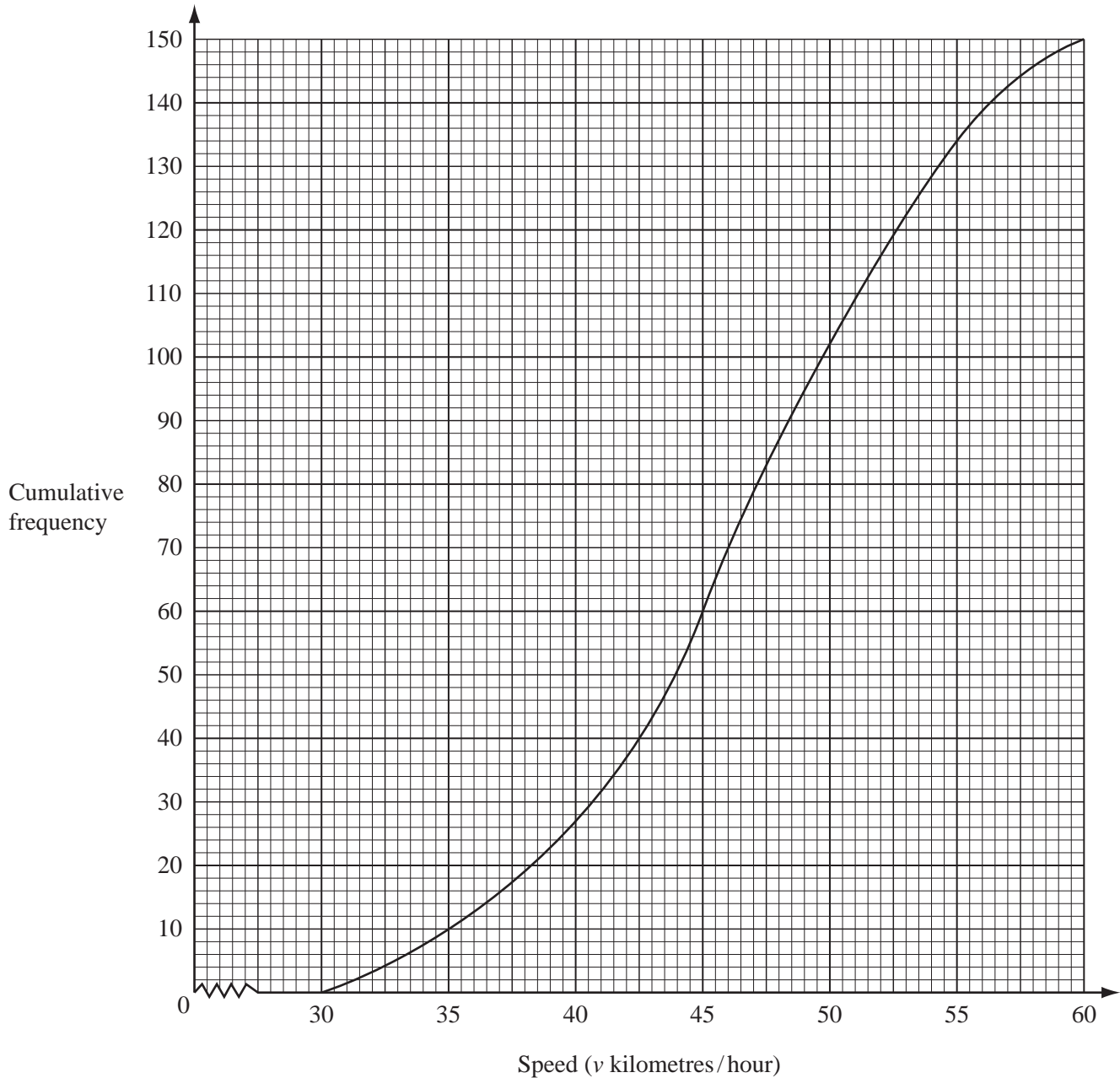
- (i) Show that $p = 47$ and $q = 15$. [2]
- (ii) Use the information in the table and the values of p and q to calculate an estimate of the mean depth of the river. [4]

- (c) The following information comes from the table in **part (b)**.

d	$0 < d \leq 20$	$20 < d \leq 40$	$40 < d \leq 70$
Number of days	58	160	147

A histogram was drawn to show this information.
 The height of the column for the interval $20 < d \leq 40$ was 8 cm.
 Calculate the height of each of the other two columns.
[Do not draw the histogram.]

- 7 The speeds (v kilometres/hour) of 150 cars passing a 50 km/h speed limit sign are recorded. A cumulative frequency curve to show the results is drawn below.



- (a) Use the graph to find
- (i) the median speed, [1]
 - (ii) the inter-quartile range of the speeds, [2]
 - (iii) the number of cars travelling with speeds of more than 50 km/h. [2]

(b) A frequency table showing the speeds of the cars is

Speed (v km/h)	$30 < v \leq 35$	$35 < v \leq 40$	$40 < v \leq 45$	$45 < v \leq 50$	$50 < v \leq 55$	$55 < v \leq 60$
Frequency	10	17	33	42	n	16

(i) Find the value of n . [1]

(ii) Calculate an estimate of the mean speed. [4]

(c) Answer this part of this question on a sheet of graph paper.

Another frequency table for the same speeds is

Speed (v km/h)	$30 < v \leq 40$	$40 < v \leq 55$	$55 < v \leq 60$
Frequency	27	107	16

Draw an accurate histogram to show this information.

Use 2 cm to represent 5 units on the speed axis and 1 cm to represent 1 unit on the frequency density axis (so that 1 cm² represents 2.5 cars). [5]

8 $f(x) = x^2 - 4x + 3$ and $g(x) = 2x - 1$.

(a) Solve $f(x) = 0$. [2]

(b) Find $g^{-1}(x)$. [2]

(c) Solve $f(x) = g(x)$, giving your answers correct to 2 decimal places. [5]

(d) Find the value of $gf(-2)$. [2]

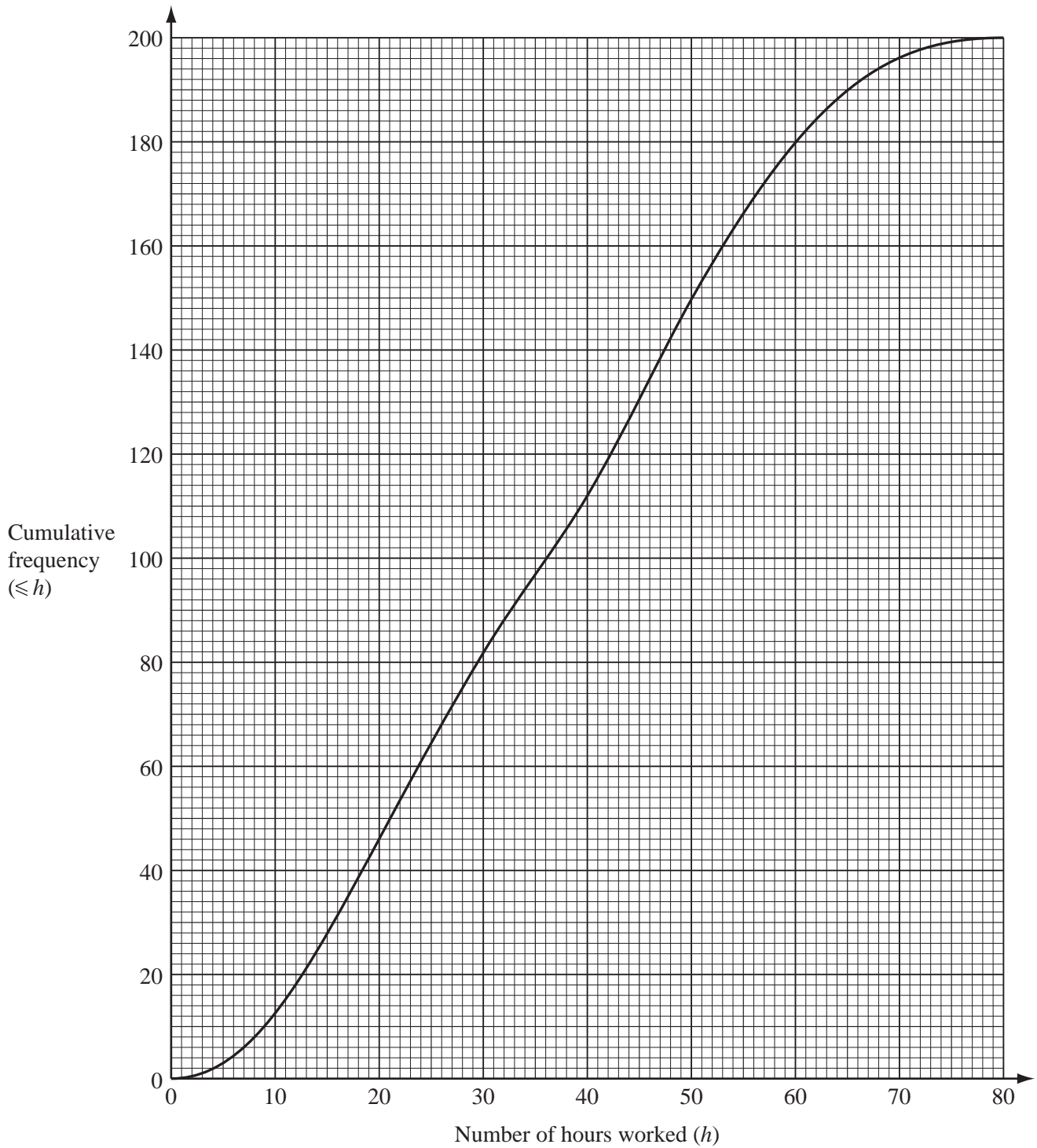
(e) Find $fg(x)$. Simplify your answer. [3]

Kristina asked 200 people how much water they drink in one day.

The table shows her results.

Amount of water (x litres)	Number of people
$0 < x \leq 0.5$	8
$0.5 < x \leq 1$	27
$1 < x \leq 1.5$	45
$1.5 < x \leq 2$	50
$2 < x \leq 2.5$	39
$2.5 < x \leq 3$	21
$3 < x \leq 3.5$	7
$3.5 < x \leq 4$	3

- (a) Write down the modal interval. [1]
- (b) Calculate an estimate of the mean. [4]
- (c) Make a cumulative frequency table for this data. [2]
- (d) Using a scale of 4 cm to 1 litre of water on the horizontal axis and 1 cm to 10 people on the vertical axis, draw the cumulative frequency graph. [5]
- (e) Use your cumulative frequency graph to find
- (i) the median, [1]
 - (ii) the 40th percentile, [1]
 - (iii) the number of people who drink at least 2.6 litres of water. [2]
- (f) A doctor recommends that a person drinks at least 1.8 litres of water each day. What percentage of these 200 people do not drink enough water? [2]
-



200 people record the number of hours they work in a week.
The cumulative frequency graph shows this information.

(a) Use the graph to find

(i) the median, [1]

(ii) the upper quartile, [1]

(iii) the inter-quartile range, [1]

(iv) the number of people who work more than 60 hours in a week. [2]

(b) Omar uses the graph to make the following frequency table.

Hours worked (h)	$0 < h \leq 10$	$10 < h \leq 20$	$20 < h \leq 30$	$30 < h \leq 40$	$40 < h \leq 50$	$50 < h \leq 60$	$60 < h \leq 70$	$70 < h \leq 80$
Frequency	12	34	36	30	38	30	p	q

(i) Use the graph to find the values of p and q . [2]

(ii) Calculate an estimate of the mean number of hours worked in a week. [4]

(c) Shalini uses the graph to make a different frequency table.

Hours worked (h)	$0 < h \leq 30$	$30 < h \leq 40$	$40 < h \leq 50$	$50 < h \leq 80$
Frequency	82	30	38	50

When she draws a histogram, the height of the column for the interval $30 < h \leq 40$ is 9 cm.

Calculate the height of each of the other three columns. [4]

2 A normal die, numbered 1 to 6, is rolled 50 times.



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The results are shown in the frequency table.

Score	1	2	3	4	5	6
Frequency	15	10	7	5	6	7

(a) Write down the modal score.

Answer(a) [1]

(b) Find the median score.

Answer(b) [1]

(c) Calculate the mean score.

Answer(c) [2]

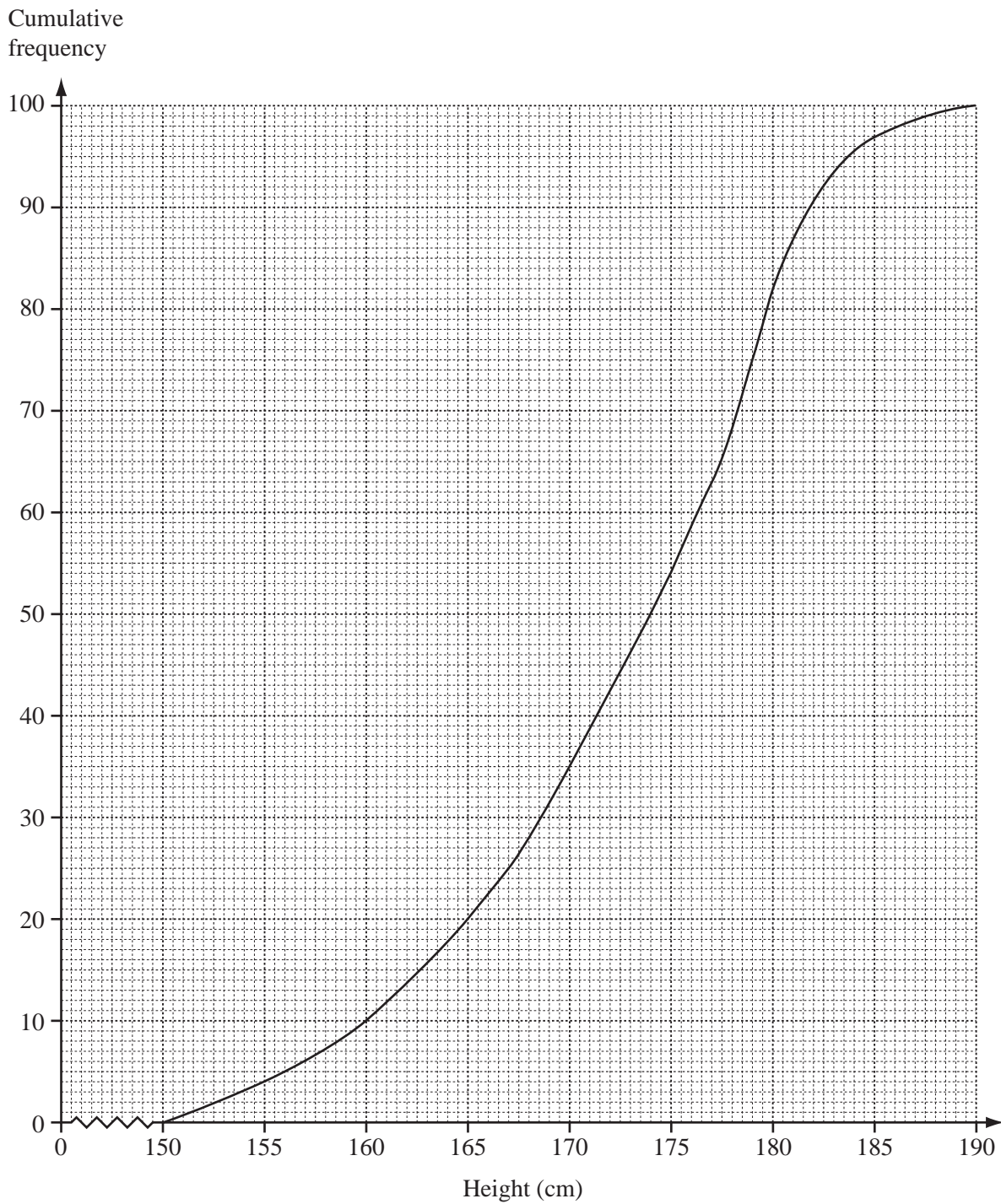
(d) The die is then rolled another 10 times.
The mean score for the 60 rolls is 2.95.
Calculate the mean score for the extra 10 rolls.

Answer(d) [3]

9 The heights of 100 students are measured.

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The results have been used to draw this cumulative frequency diagram.



(a) Find

(i) the median height,

Answer(a)(i) cm [1]

(ii) the lower quartile,

Answer(a)(ii) cm [1]

(iii) the inter-quartile range,

Answer(a)(iii) cm [1]

(iv) the number of students with a height greater than 177 cm.

Answer(a)(iv) [2]

(b) The frequency table shows the information about the 100 students who were measured.

Height (h cm)	$150 < h \leq 160$	$160 < h \leq 170$	$170 < h \leq 180$	$180 < h \leq 190$
Frequency			47	18

(i) Use the cumulative frequency diagram to complete the table above. [1]

(ii) Calculate an estimate of the mean height of the 100 students.

Answer(b)(ii) cm [4]

2 40 students are asked about the number of people in their families.

The table shows the results.

Number of people in family	2	3	4	5	6	7
Frequency	1	1	17	12	6	3

(a) Find

(i) the mode,

Answer(a)(i) [1]

(ii) the median,

Answer(a)(ii) [1]

(iii) the mean.

Answer(a)(iii) [3]

(b) Another n students are asked about the number of people in their families.

The mean for these n students is 3.

Find, in terms of n , an expression for the mean number for all $(40 + n)$ students.

Answer(b) [2]

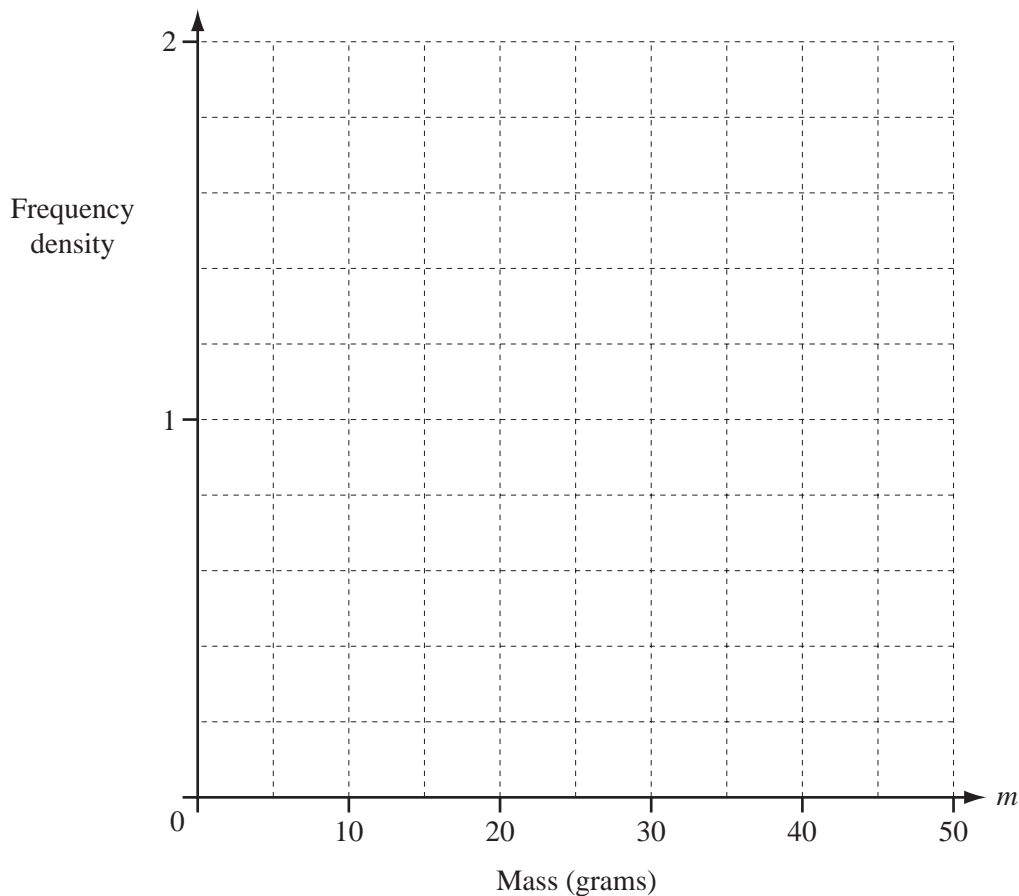
- 6 The masses of 60 potatoes are measured.
The table shows the results.

Mass (m grams)	$10 < m \leq 20$	$20 < m \leq 40$	$40 < m \leq 50$
Frequency	10	30	20

- (a) Calculate an estimate of the mean.

Answer(a) g [4]

- (b) On the grid, draw an accurate histogram to show the information in the table.



200 students were asked how many hours they exercise each week.

The table shows the results.

Time (t hours)	$0 < t \leq 5$	$5 < t \leq 10$	$10 < t \leq 15$	$15 < t \leq 20$	$20 < t \leq 25$	$25 < t \leq 30$	$30 < t \leq 35$	$35 < t \leq 40$
Number of students	12	15	23	30	40	35	25	20

(a) Calculate an estimate of the mean.

Answer(a) .

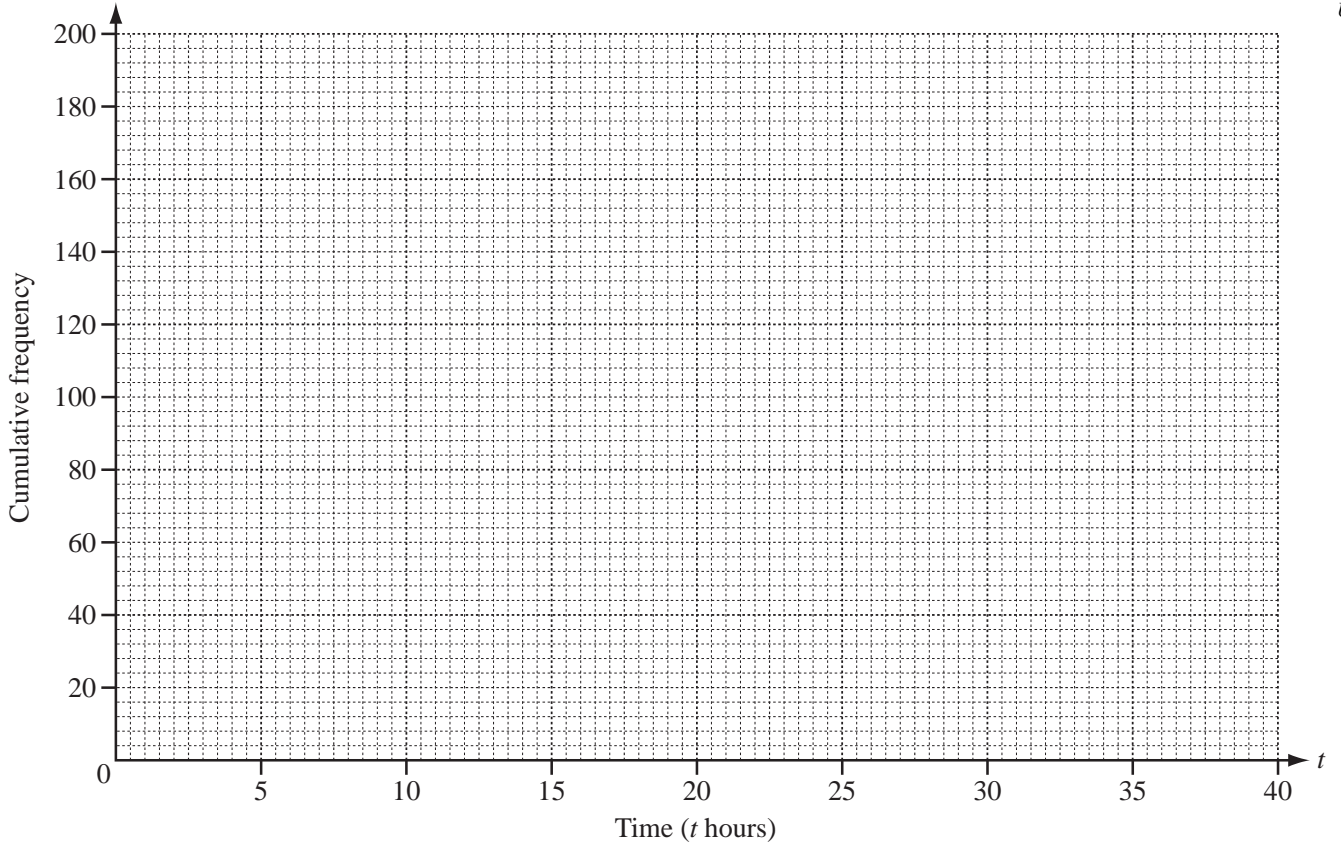
h [4]

Use the information in the table above to complete the cumulative frequency table.

.....

(b)

Time (t hours)	$t \leq 5$	$t \leq 10$	$t \leq 15$	$t \leq 20$	$t \leq 25$	$t \leq 30$	$t \leq 35$	$t \leq 40$
Cumulative frequency	12	27	50	80	120			200



(c) On the grid, draw a cumulative frequency diagram to show the information in the table in **part (b)**. [4]

(d) On your cumulative frequency diagram show how to find the lower quartile. [1]

(e) Use your cumulative frequency diagram to find

(i) the median,

Answer(e)(i) [1]

(ii) the inter-quartile range,

Answer(e)(ii) [1]

(iii) the 64th percentile,

Answer(e)(iii) [1]

(iv) the number of students who exercise for more than 17 hours.

Answer(e)(iv) [2]

- 7 (a) The table shows how many books were borrowed by the 126 members of a library group in a month.

Number of books	11	12	13	14	15	16
Number of members (frequency)	35	28	22	18	14	9

Find the mode, the median and the mean for the number of books borrowed.

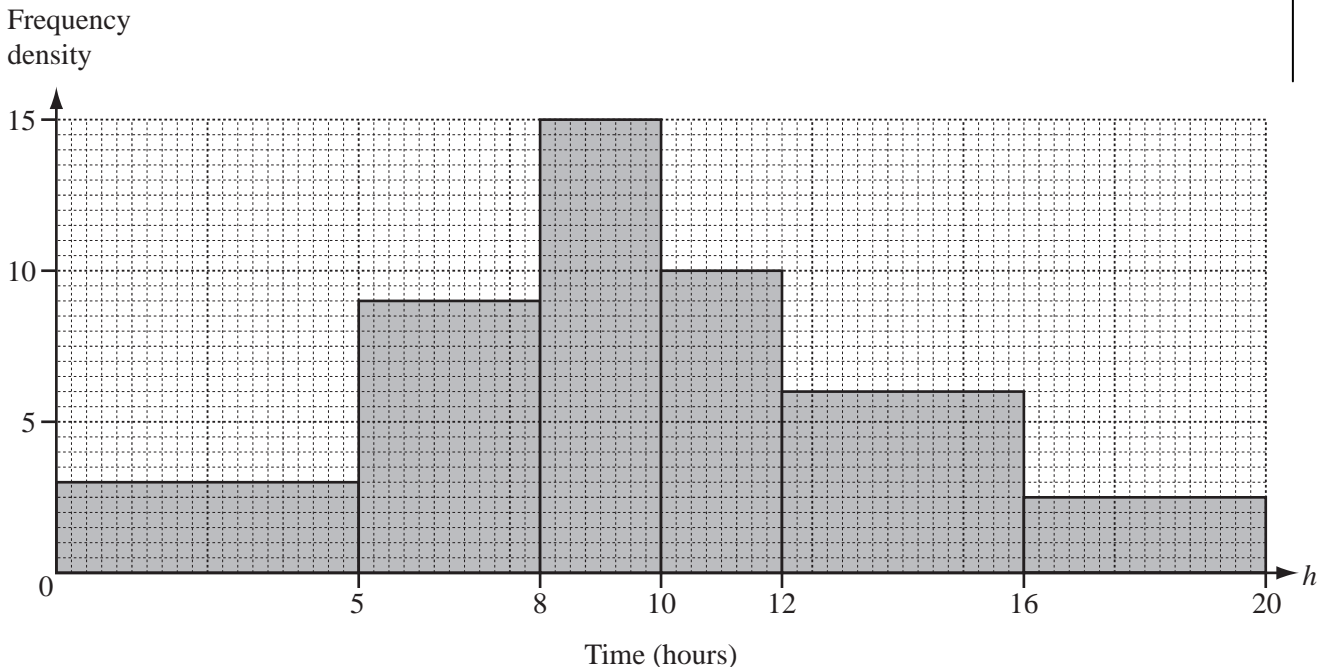
Answer(a) mode =

median =

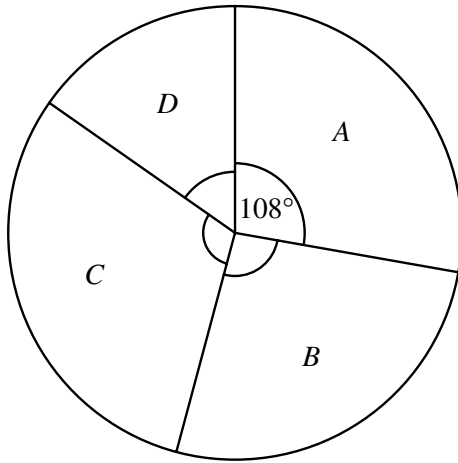
mean = [6]

- (b) The 126 members record the number of hours they read in one week.

The histogram shows the results.



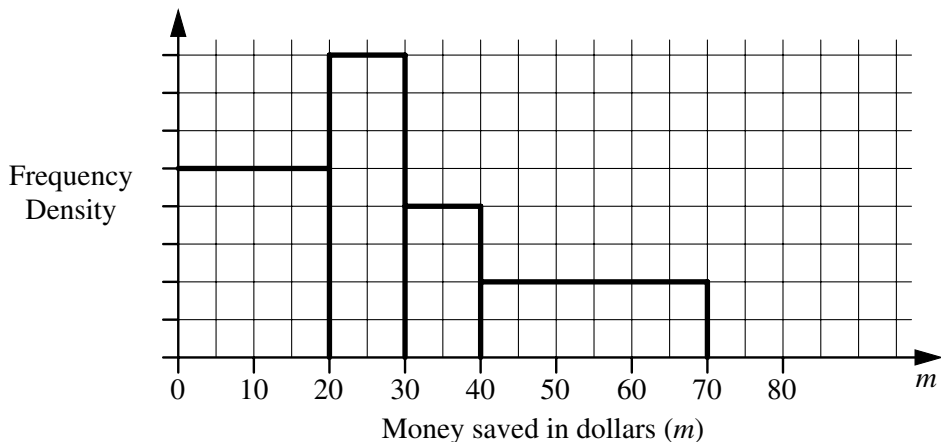
- 7 (a) A group of students sat an examination. Each student got one of the grades *A*, *B*, *C* or *D*. The pie chart shows these results.



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36 students got grade *A*, shown by an angle of 108° .

- (i) Calculate the total number of students who sat the examination. [2]
 - (ii) How many students did **not** get grade *A*? [1]
 - (iii) The ratio of the number of students getting grades *B*, *C* or *D* is 4 : 5 : 3. Find the number of students getting each grade. [3]
 - (iv) Work out the angles in the pie chart for grades *B*, *C* and *D*. [3]
 - (v) Find the ratio, **in its lowest terms**, the number of students with grade *A* : the number of students with grade *B*. [1]
- (b) A group of children were asked how much money they had saved. The histogram and table show the results.



Money saved (\$ m)	$0 < m \leq 20$	$20 < m \leq 30$	$30 < m \leq 40$	$40 < m \leq 70$
Frequency	25	p	q	r

Use the histogram to calculate the values of p , q and r .

[4]

8 Answer the whole of this question on a sheet of graph paper.

120 passengers on an aircraft had their baggage weighed. The results are shown in the table.

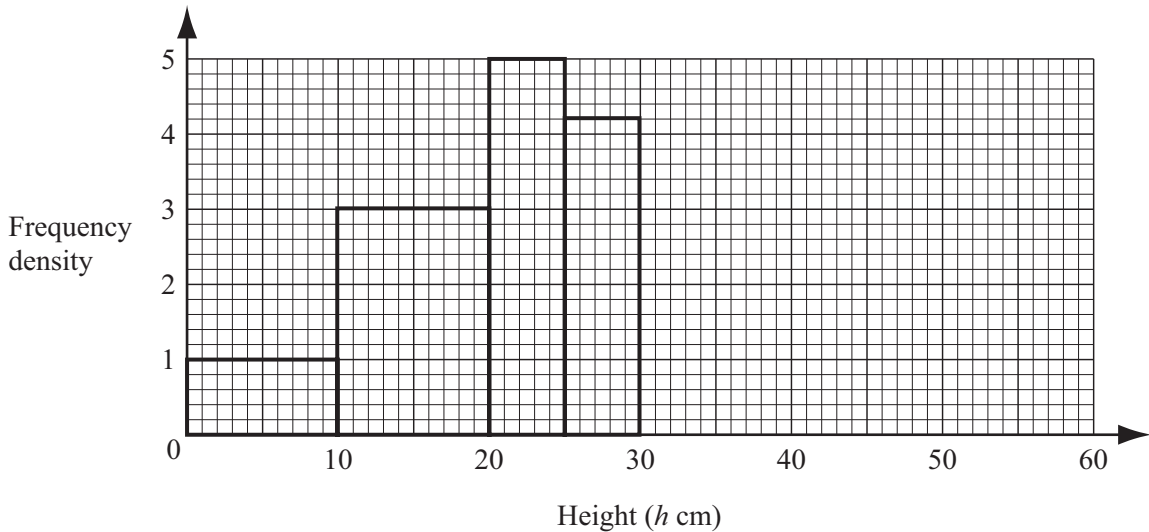
Mass of baggage (M kg)	$0 < M \leq 10$	$10 < M \leq 15$	$15 < M \leq 20$	$20 < M \leq 25$	$25 < M \leq 40$
Number of passengers	12	32	28	24	24

- (a) (i) Write down the modal class. [1]
- (ii) Calculate an estimate of the mean mass of baggage for the 120 passengers. Show all your working. [4]
- (iii) Sophia draws a pie chart to show the data.
What angle should she have in the $0 < M \leq 10$ sector? [1]
- (b) Using a scale of 2 cm to represent 5 kg, draw a horizontal axis for $0 < M \leq 40$.
Using an area scale of 1 cm^2 to represent 1 passenger, draw a histogram for this data. [7]
-

- 6 (a) Students are given marks 0, 1, 2, 3 or 4 for a piece of work.
The table shows the number of students getting each mark.

Mark	0	1	2	3	4
Frequency	3	10	12	9	x

- (i) The mean mark is 2.125.
Find the value of x . [4]
- (ii) Write down the lower quartile mark. [1]
- (b) The heights (h centimetres) of flowers in a shop are shown in the histogram below.
All the flowers are less than 60 cm high.
One bar has not been drawn on the histogram.



- (i) There are 25 flowers in the interval $20 < h \leq 25$.
How many flowers are there in the intervals
- (a) $25 < h \leq 30$, [1]
- (b) $10 < h \leq 20$? [1]
- (ii) There are 42 flowers in the interval $30 < h \leq 60$.
This can be shown by a single bar on the histogram.
Calculate the height of this bar. [2]
- (iii) Calculate an estimate of the mean height of the flowers. [3]

Answer the whole of this question on one sheet of graph paper.

The heights (h cm) of 270 students in a school are measured and the results are shown in the table.

h	Frequency
$120 < h \leq 130$	15
$130 < h \leq 140$	24
$140 < h \leq 150$	36
$150 < h \leq 160$	45
$160 < h \leq 170$	50
$170 < h \leq 180$	43
$180 < h \leq 190$	37
$190 < h \leq 200$	20

- (a) Write down the modal group. [1]
- (b) (i) Calculate an estimate of the mean height. [4]
- (ii) Explain why the answer to **part (b)(i)** is an estimate. [1]
- (c) The following table shows the cumulative frequencies for the heights of the students.

h	Cumulative frequency
$h \leq 120$	0
$h \leq 130$	p
$h \leq 140$	q
$h \leq 150$	r
$h \leq 160$	120
$h \leq 170$	170
$h \leq 180$	213
$h \leq 190$	250
$h \leq 200$	270

Write down the values of p , q and r . [2]

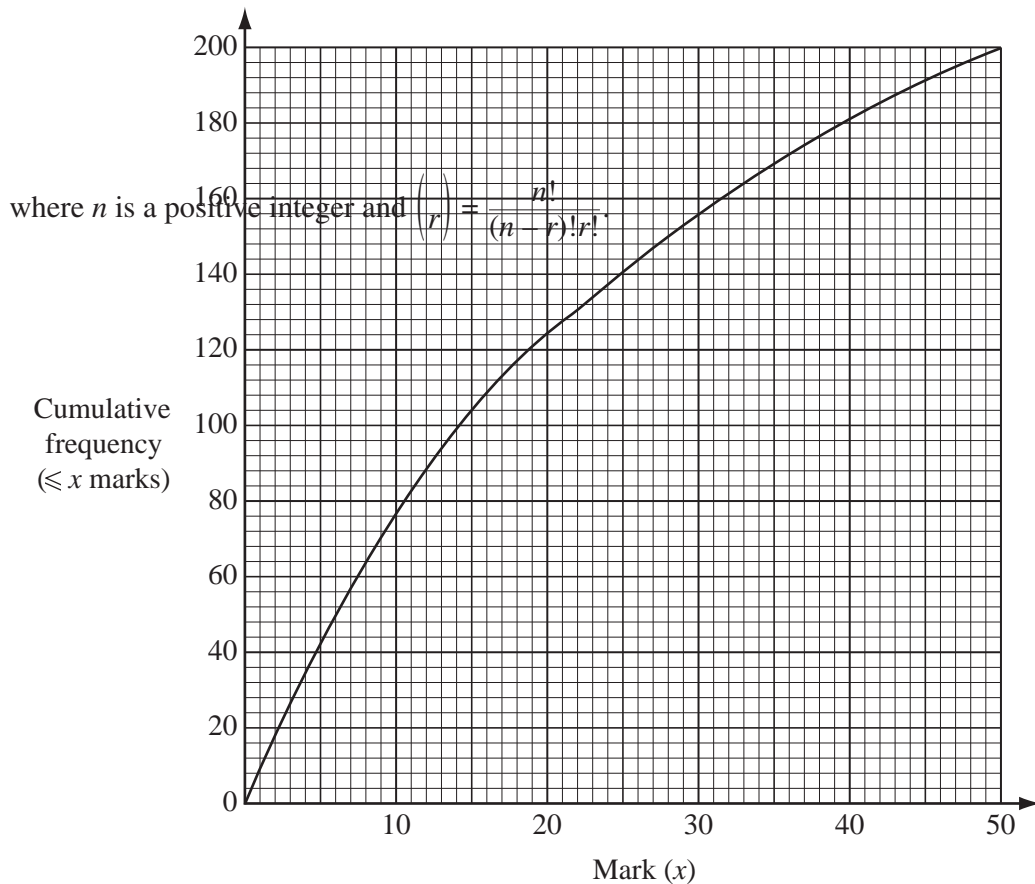
- (d) Using a scale of 1cm to 5 units, draw a horizontal h -axis, starting at $h = 120$.
Using a scale of 1cm to 20 units on the vertical axis, draw a cumulative frequency diagram. [5]
- (e) Use your diagram to find
- (i) the median height, [1]
- (ii) the upper quartile, [1]
- (iii) the inter-quartile range, [1]
- (iv) the 60th percentile. [1]
- (f) All the players in the school's basketball team are chosen from the 30 tallest students.
Use your diagram to find the least possible height of any player in the basketball team. [2]

- 7 (a) The quiz scores of a class of n students are shown in the table.

Quiz score	6	7	8	9
Frequency (number of students)	9	3	a	5

The mean score is 7.2. Find

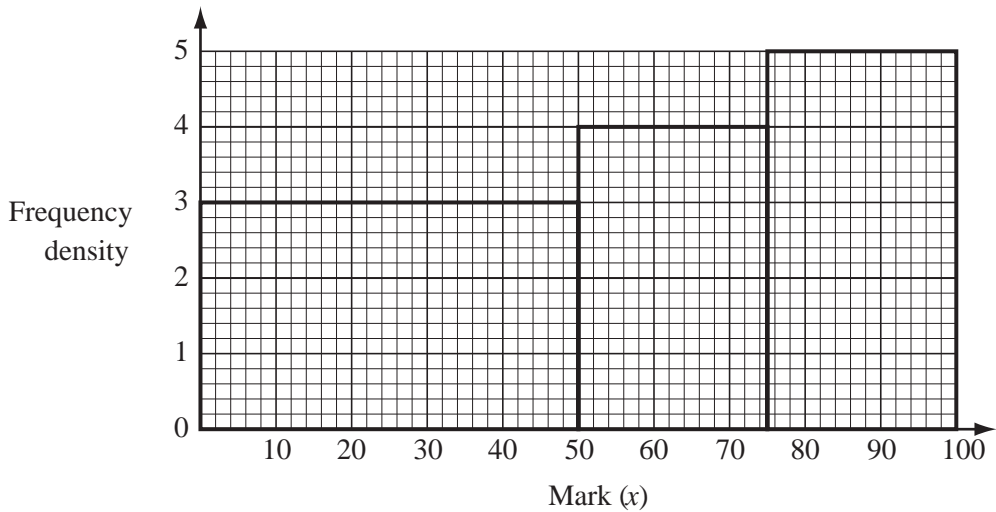
- (i) a , [3]
(ii) n , [1]
(iii) the median score. [1]
- (b) 200 students take a mathematics test.
The cumulative frequency diagram shows the results.



Write down

- (i) the median mark, [1]
(ii) the lower quartile, [1]
(iii) the upper quartile, [1]
(iv) the inter-quartile range, [1]
(v) the lowest possible mark scored by the top 40 students, [1]
(vi) the number of students scoring more than 25 marks. [1]

- (c) Another group of students takes an English test.
The results are shown in the histogram.



100 students score marks in the range $50 < x \leq 75$.

- (i) How many students score marks in the range $0 < x \leq 50$? [1]
- (ii) How many students score marks in the range $75 < x \leq 100$? [1]
- (iii) Calculate an estimate of the mean mark of this group of students. [4]
-

2 (a)

Grade	1	2	3	4	5	6	7
Number of students	1	2	4	7	4	8	2

The table shows the grades gained by 28 students in a history test.

(i) Write down the mode. [1]

(ii) Find the median. [1]

(iii) Calculate the mean. [3]

(iv) Two students are chosen at random.

Calculate the probability that they both gained grade 5. [2]

(v) From all the students who gained grades 4 or 5 or 6 or 7, two are chosen at random.

Calculate the probability that they both gained grade 5. [2]

(vi) Students are chosen at random, one by one, from the original 28, until the student chosen has a grade 5.

Calculate the probability that this is the third student chosen. [2]

(b) Claude goes to school by bus.

The probability that the bus is late is 0.1 .

If the bus is late, the probability that Claude is late to school is 0.8 .

If the bus is not late, the probability that Claude is late to school is 0.05 .

(i) Calculate the probability that the bus is late and Claude is late to school. [1]

(ii) Calculate the probability that Claude is late to school. [3]

(iii) The school term lasts 56 days.

How many days would Claude expect to be late? [1]

- 6 (a) Each student in a class is given a bag of sweets.

The students note the number of sweets in their bag.

The results are shown in the table, where $0 \leq x < 10$.

Number of sweets	30	31	32
Frequency (number of bags)	10	7	x

- (i) State the mode. [1]
- (ii) Find the possible values of the median. [3]
- (iii) The mean number of sweets is 30.65.
Find the value of x . [3]

- (b) The mass, m grams, of each of 200 chocolates is noted and the results are shown in the table.

Mass (m grams)	$10 < m \leq 20$	$20 < m \leq 22$	$22 < m \leq 24$	$24 < m \leq 30$
Frequency	35	115	26	24

- (i) Calculate an estimate of the mean mass of a chocolate. [4]
- (ii) On a histogram, the height of the column for the $20 < m \leq 22$ interval is 11.5 cm.
Calculate the heights of the other three columns.
Do not draw the histogram. [5]
-

- 8 Fifty students are timed when running one kilometre.

The results are shown in the table.

Time (t minutes)	$4.0 < t \leq 4.5$	$4.5 < t \leq 5.0$	$5.0 < t \leq 5.5$	$5.5 < t \leq 6.0$	$6.0 < t \leq 6.5$	$6.5 < t \leq 7.0$
Frequency	2	7	8	18	10	5

- (a) Write down the modal time interval.

Answer(a) min [1]

- (b) Calculate an estimate of the mean time.

Answer(b) min [4]

- (c)

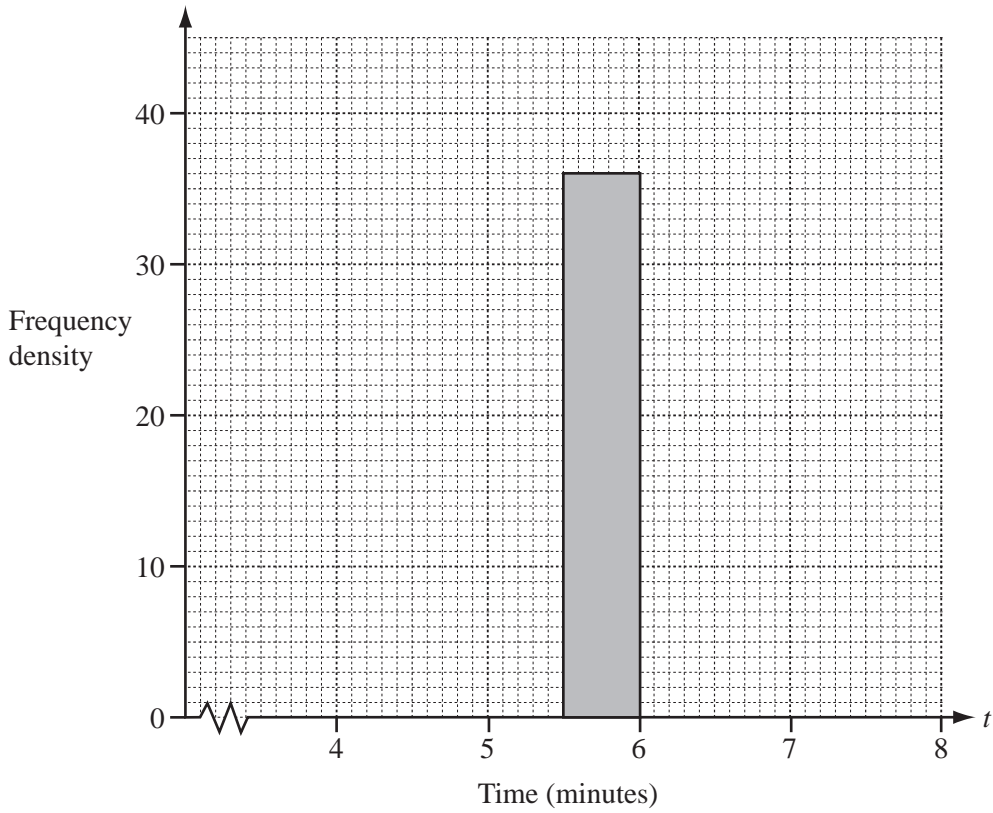
A new frequency table is made from the results shown in the table above.

Time (t minutes)	$4.0 < t \leq 5.5$	$5.5 < t \leq 6.0$	$6.0 < t \leq 7.0$
Frequency		18	

- (i) Complete the table by filling in the two empty boxes.

[1]

(ii) On the grid below, complete an accurate histogram to show the information in this new table.



[3]

(iii) Find the number of students represented by 1 cm^2 on the histogram.

Answer(c)(iii)

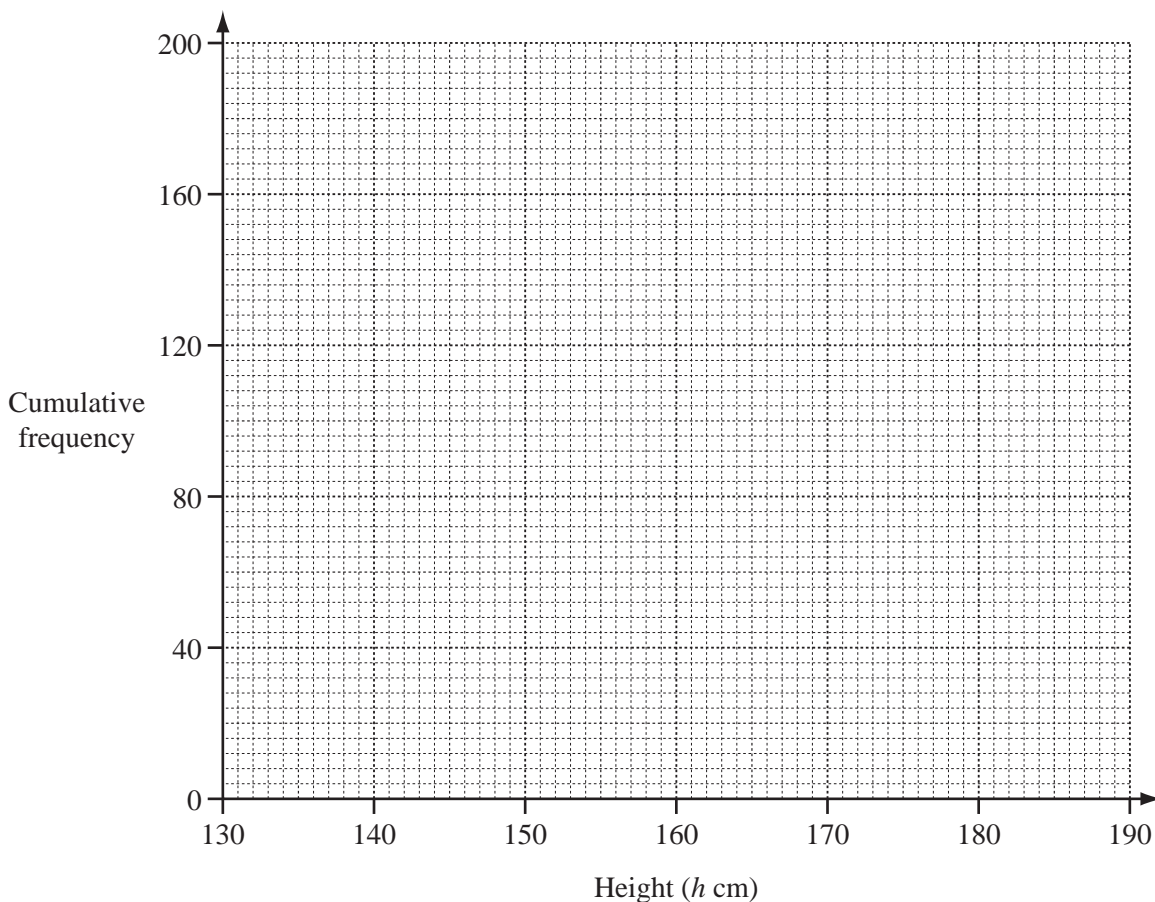
[1]

5 The cumulative frequency table shows the distribution of heights, h centimetres, of 200 students.

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Height (h cm)	≤ 130	≤ 140	≤ 150	≤ 160	≤ 165	≤ 170	≤ 180	≤ 190
Cumulative frequency	0	10	50	95	115	145	180	200

(a) Draw a cumulative frequency diagram to show the information in the table.



[4]

(b) Use your diagram to find

(i) the median,

Answer(b)(i) cm [1]

(ii) the upper quartile,

Answer(b)(ii) cm [1]

(iii) the interquartile range.

Answer(b)(iii) cm [1]

(c) (i) One of the 200 students is chosen at random.

Use the table to find the probability that the height of this student is greater than 170 cm.

- (ii) One of the 200 students is chosen at random and then a second student is chosen at random from the remaining students.

Calculate the probability that one has a height greater than 170 cm and the other has a height of 140 cm or less.

Give your answer as a fraction.

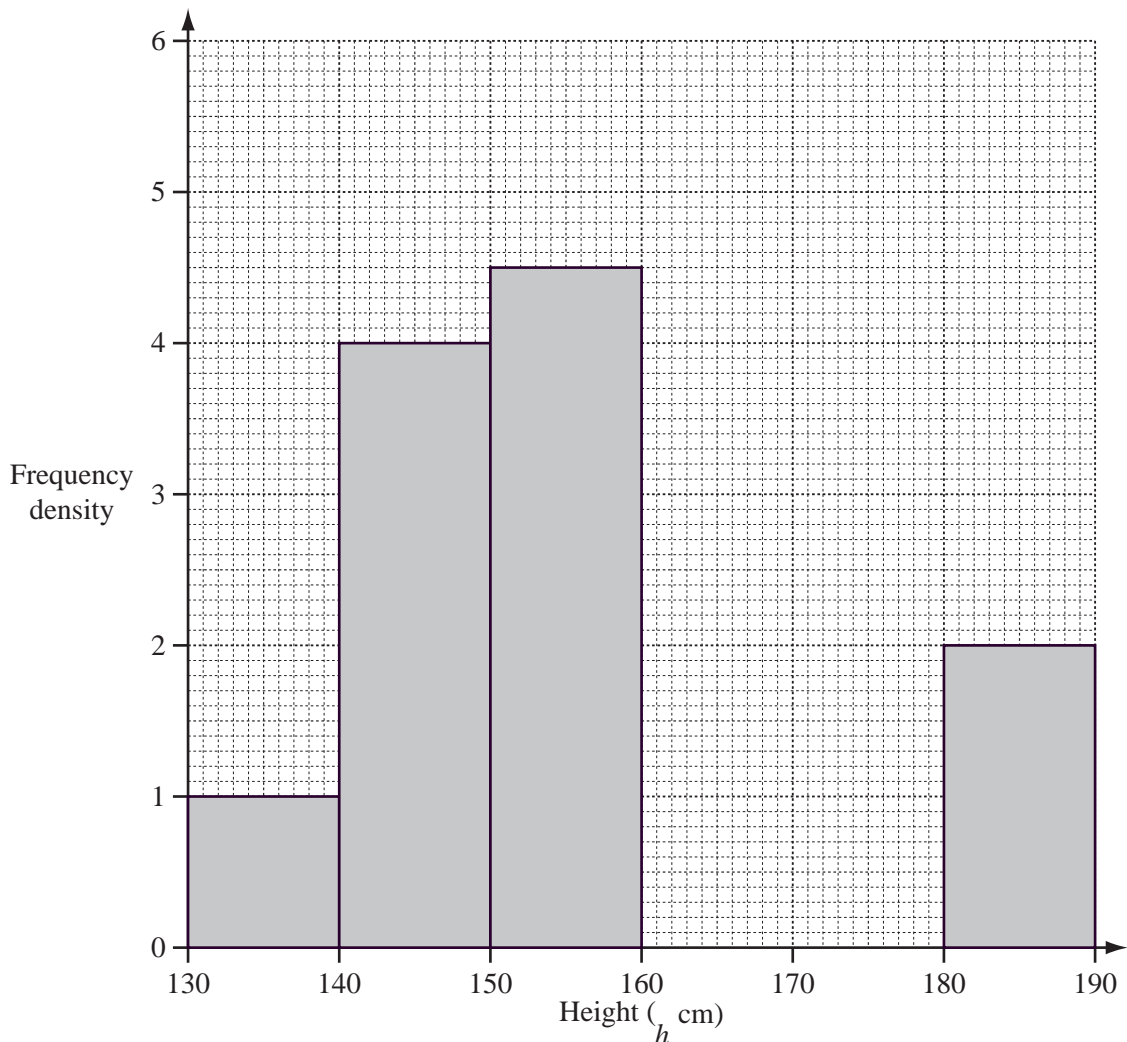
Answer(c)(ii) [3]

- (d) (i) Complete this frequency table which shows the distribution of the heights of the 200 students.

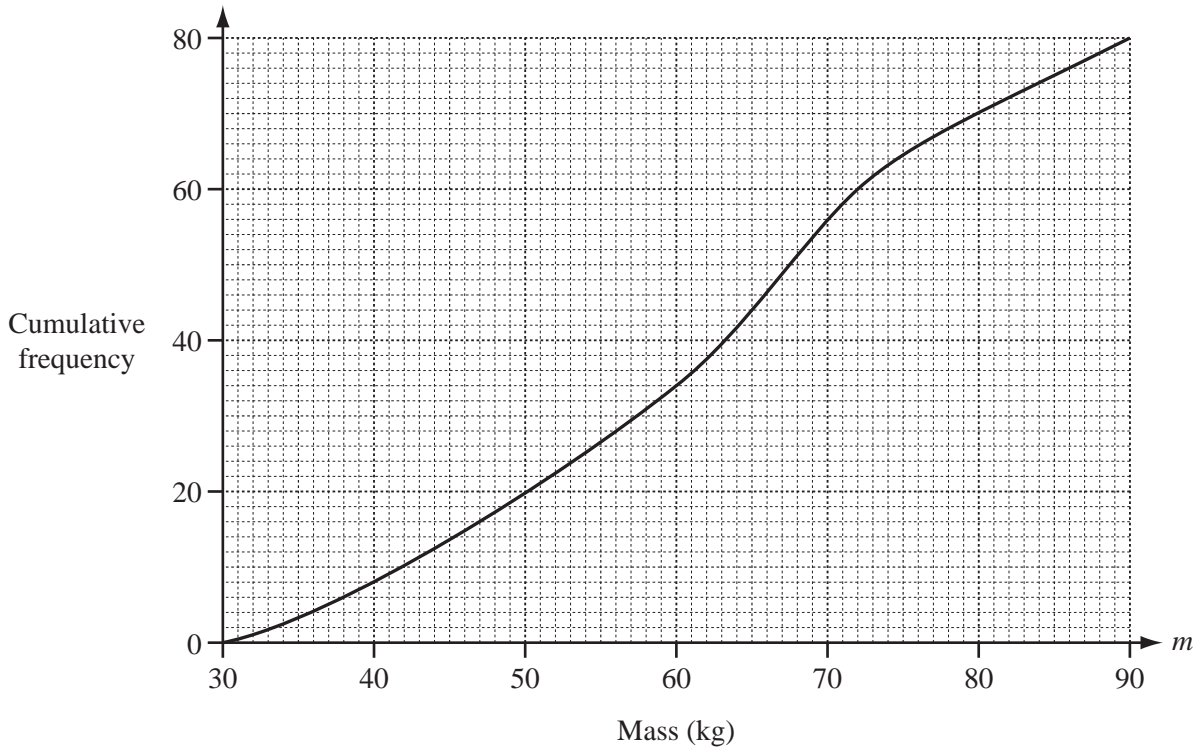
Height (h cm)	$130 < h \leq 140$	$140 < h \leq 150$	$150 < h \leq 160$	$160 < h \leq 165$	$165 < h \leq 170$	$170 < h \leq 180$	$180 < h \leq 190$
Frequency	10	40	45	20			

- (ii) Complete this histogram to show the distribution of the heights of the 200 students.

[2]



- 3 80 boys each had their mass, m kilograms, recorded.
The cumulative frequency diagram shows the results.



(a) Find

(i) the median,

Answer(a)(i) kg [1]

(ii) the lower quartile,

Answer(a)(ii) kg [1]

(iii) the interquartile range.

Answer(a)(iii) kg [1]

(b) How many boys had a mass greater than 60kg?

(c) (i) Use the cumulative frequency graph to complete this frequency table.

Mass, m	Frequency
$30 < m \leq 40$	8
$40 < m \leq 50$	
$50 < m \leq 60$	14
$60 < m \leq 70$	22
$70 < m \leq 80$	
$80 < m \leq 90$	10

[2]

(ii) Calculate an estimate of the mean mass.

Answer(c)(ii) kg [4]

10 (a) For a set of six integers, the mode is 8, the median is 9 and the mean is 10.

The smallest integer is greater than 6 and the largest integer is 16.

Find the two possible sets of six integers.

Answer(a) First set , , , , ,

Second set , , , , , [5]

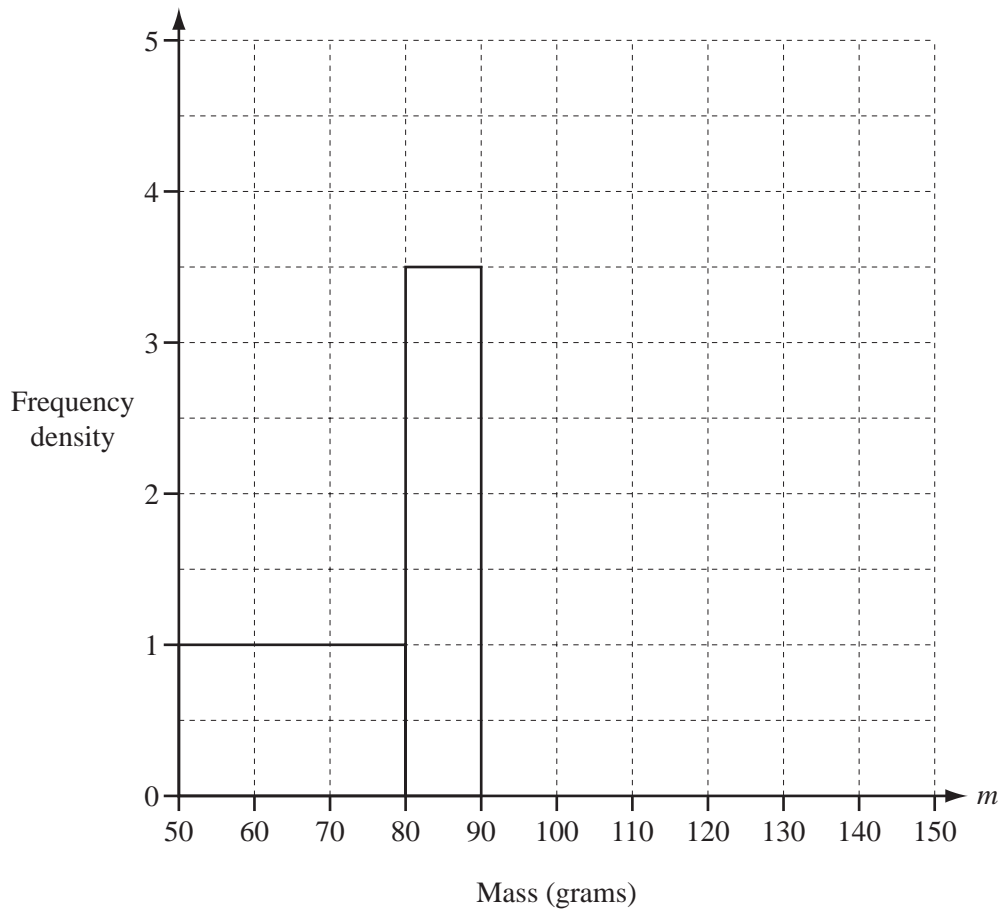
(b) One day Ahmed sells 160 oranges.
He records the mass of each orange.
The results are shown in the table.

Mass (m grams)	$50 < m \leq 80$	$80 < m \leq 90$	$90 < m \leq 100$	$100 < m \leq 120$	$120 < m \leq 150$
Frequency	30	35	40	40	15

(i) Calculate an estimate of the mean mass of the 160 oranges.

(ii) On the grid, complete the histogram to show the information in the table.

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[4]