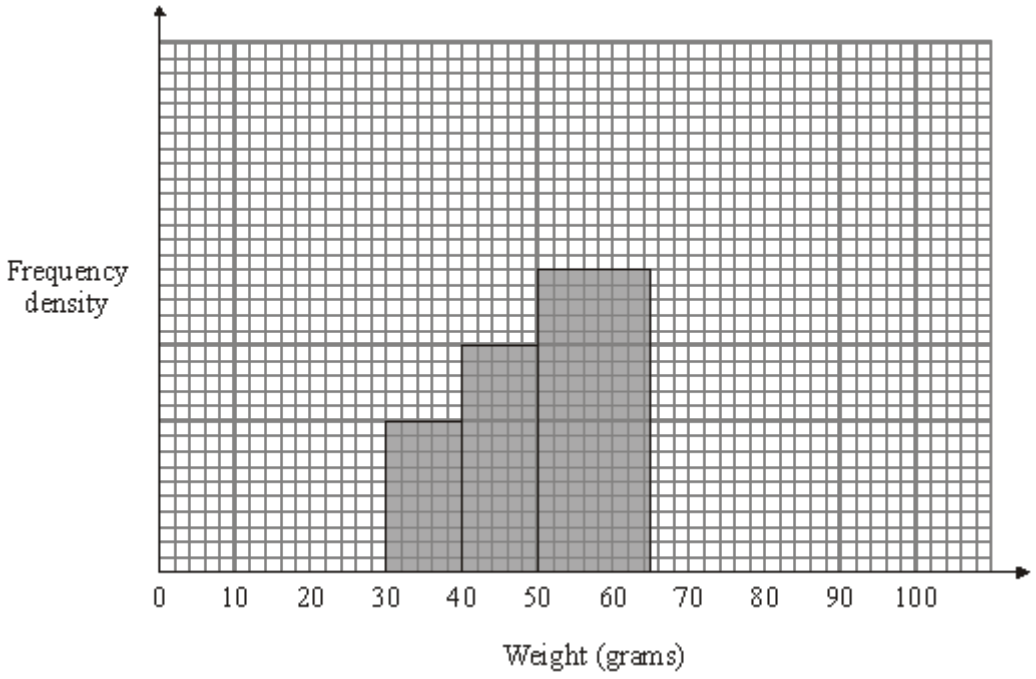
Q1. The table and histogram show some information about the weights, in grams, of some tomatoes.

Weight (w grams)	Frequency
$30 < w \leq 40$	4
$40 < w \leq 50$	6
$50 < w \leq 65$	15
$65 < w \leq 80$	9
$80 < w \leq 100$	4



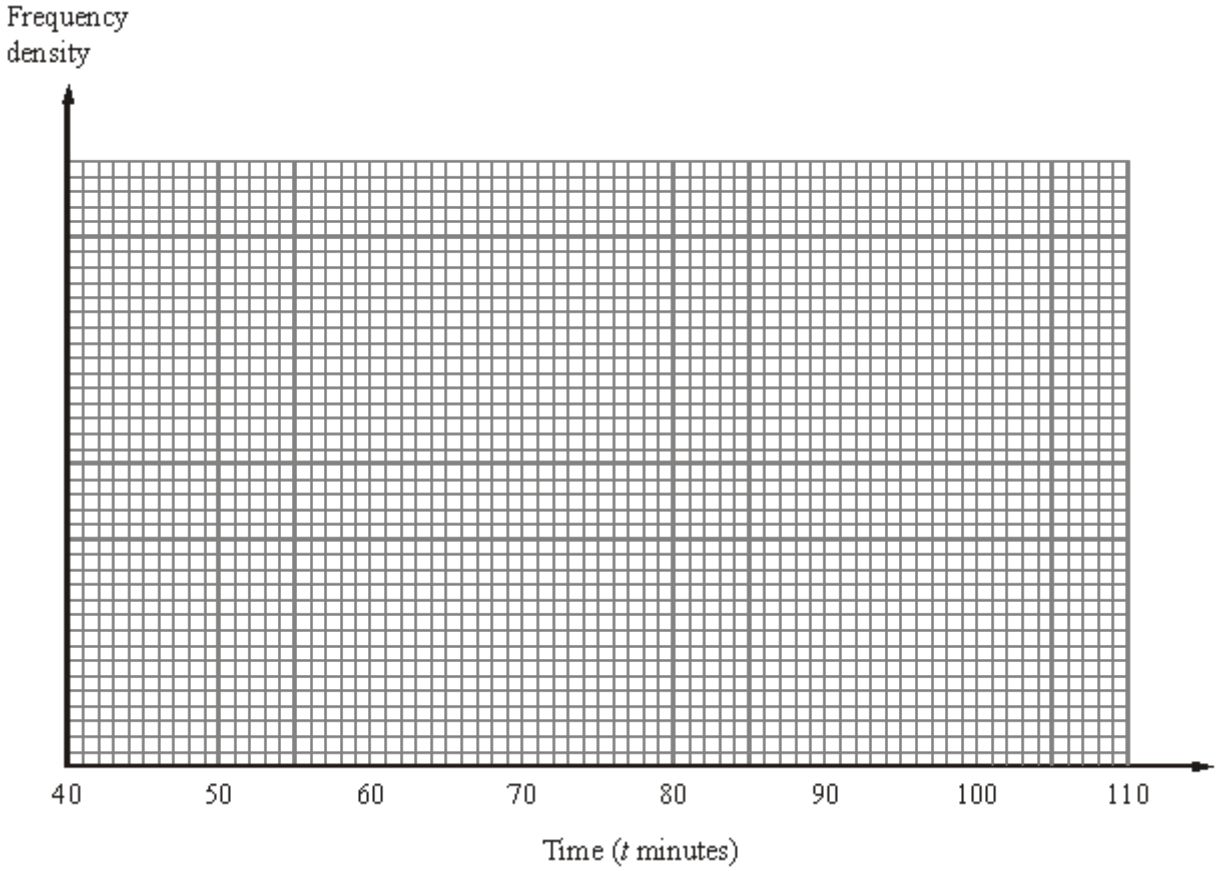
Use the table to complete the histogram.

(Total 2 marks)

Q2. The table gives some information about the lengths of time some boys took to run a race.

Time (t minutes)	Frequency
$40 \le t < 50$	16
$50 \le t < 55$	18
$55 \le t < 65$	32
$65 \le t < 80$	30
$80 \le t < 100$	24

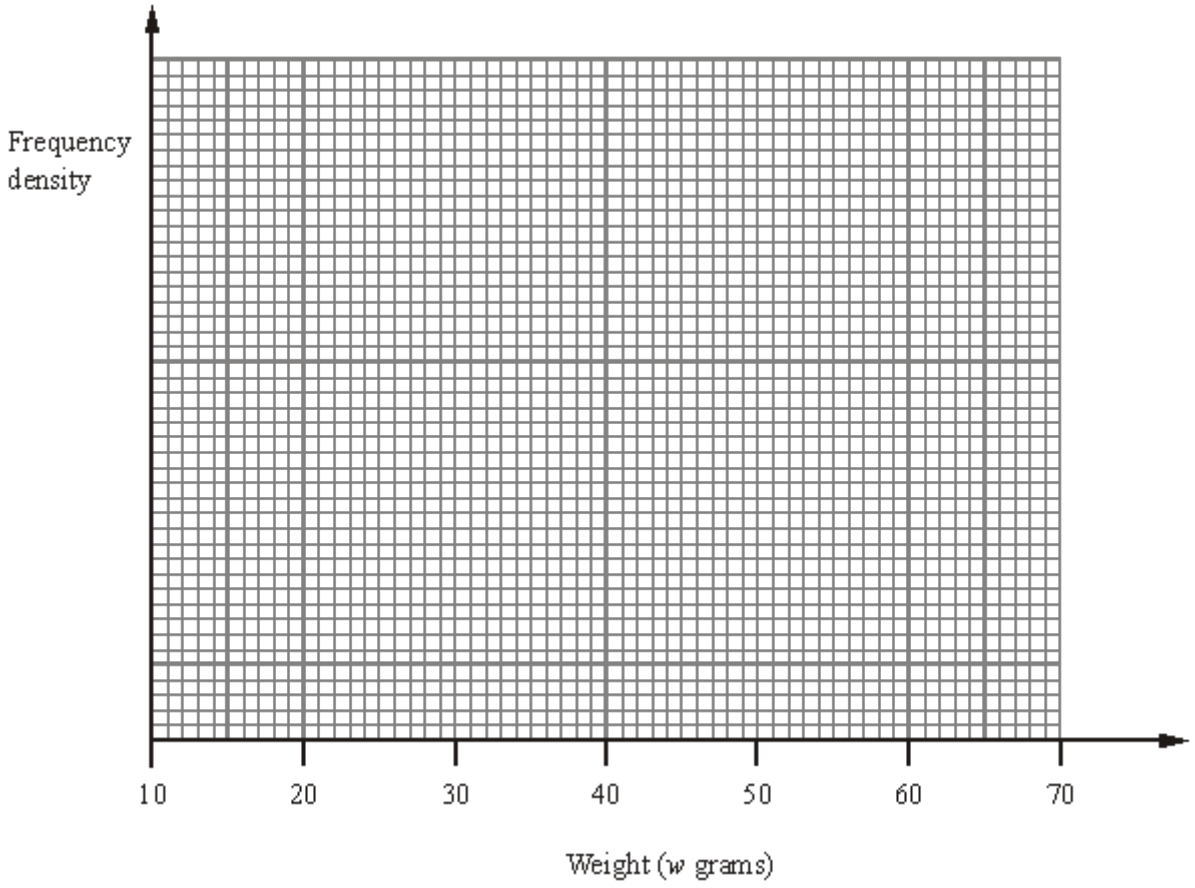
Draw a histogram for the information in the table.



(Total 3 marks)

Q3. The table shows some information about the weights of some packets of crisps.

Weight (w grams)	Frequency
$20 < w \leq 25$	4
$25 < w \leq 35$	12
$35 < w \leq 45$	14
$45 < w \leq 50$	8
$50 < w \leq 70$	6



Use the information in the table to draw a histogram.

(Total 3 marks)

Q4. The table gives some information about the weights, in kg, of 50 suitcases at an airport check-in desk.

Weight (w kg)	Frequency
$0 < w \leq 10$	16
$10 < w \leq 15$	18
$15 < w \leq 20$	10
$20 < w \leq 35$	6

(a) Work out an estimate for the mean weight.

..... kg

(4)

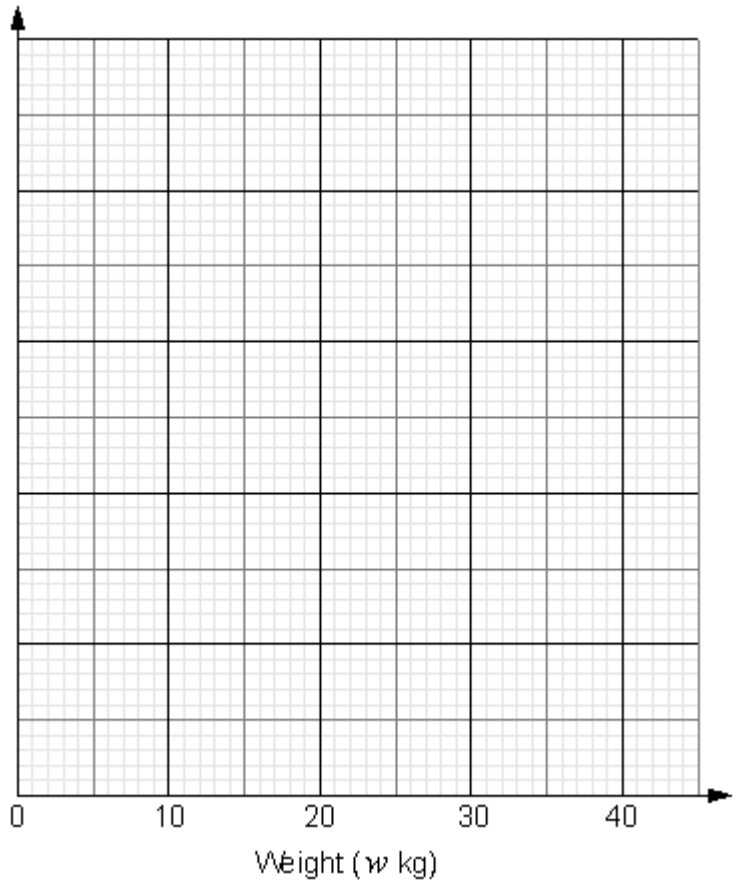
Passengers have to pay extra money for any suitcase that weighs more than 20 kg.
Two of the 50 suitcases are chosen at random.

(b) Work out the probability that both suitcases weigh more than 20 kg.

.....

(2)

(c) On the grid, draw a histogram for the information in the table.

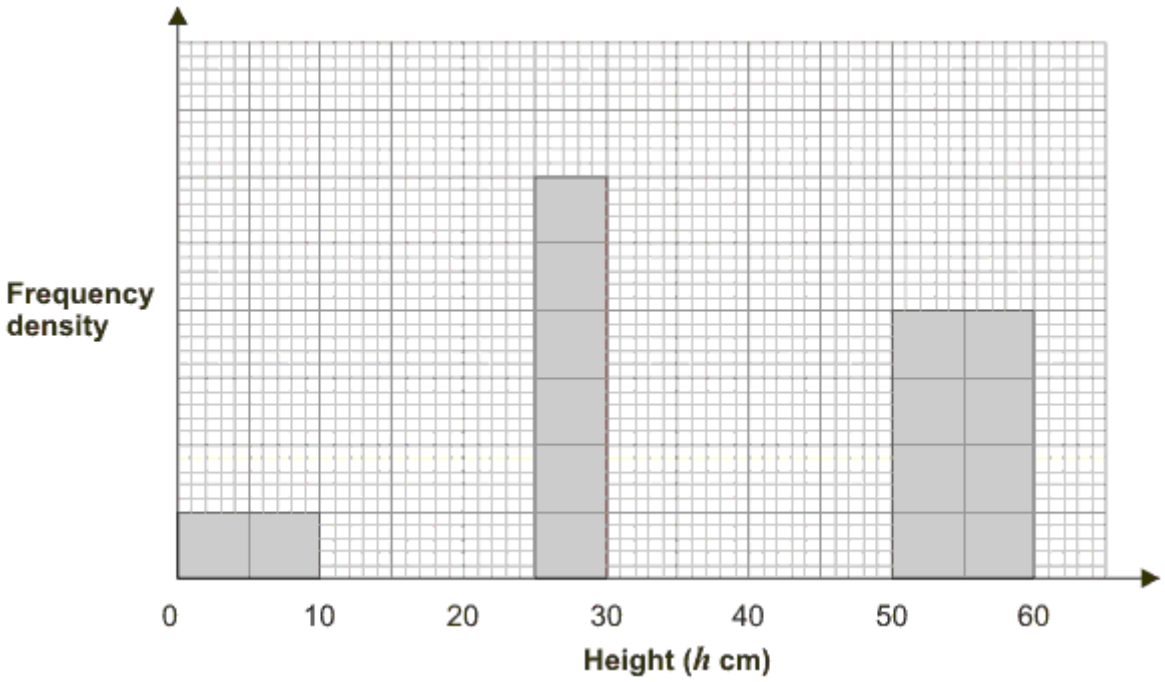


(3)
(Total 9 marks)

Q5. The incomplete frequency table and histogram give some information about the heights, in centimetres, of some tomato plants.

Height (h cm)	**Frequency**
$0 < h \leq 10$	
$10 < h \leq 25$	30
$25 < h \leq 30$	
$30 < h \leq 50$	50

$50 < h \leq 60$	20



(a) Use the information in the histogram to complete the table.

(2)

(b) Use the information in the table to complete the histogram.

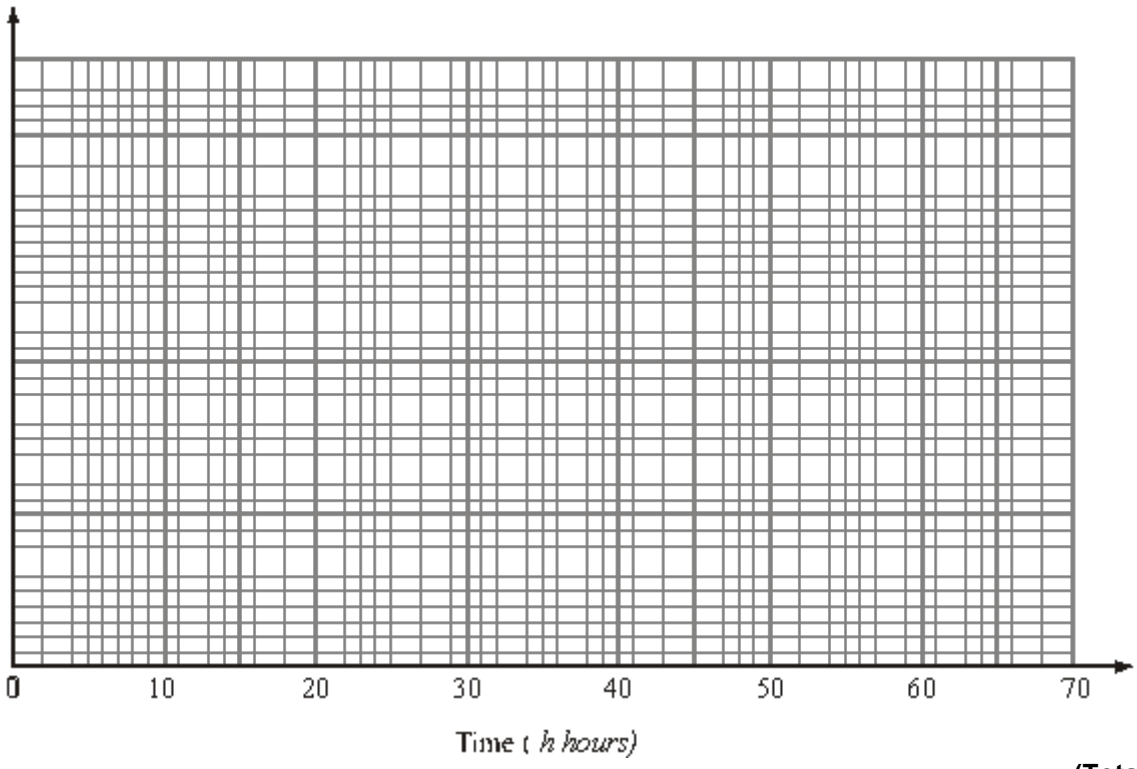
(2)
(Total 4 marks)

Q6. The table gives some information about the lengths of time, in hours, that some batteries lasted.

Time (h hours)	Frequency
$0 \leq h < 10$	5
$10 \leq h < 20$	18
$20 \leq h < 25$	15

$25 \leq h < 40$	12
$40 \leq h < 60$	10

Draw a histogram for the information in the table.



(Total 3 marks)

Q7. The incomplete histogram and table show information about the weights of some containers.

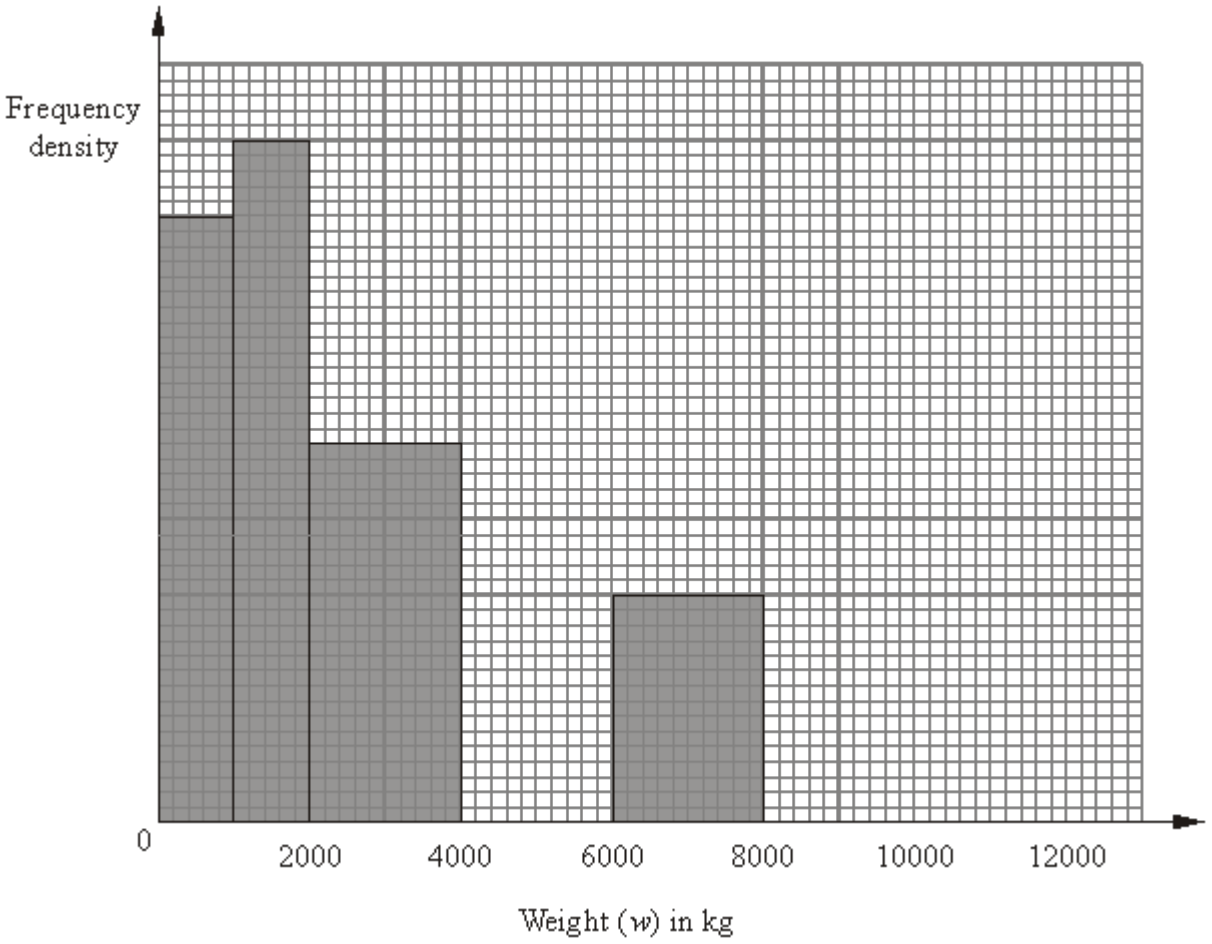
Weight (w) in kg	**Frequency**
$0 < w \leq 1000$	16
$1000 < w \leq 2000$	
$2000 < w \leq 4000$	
$4000 < w \leq 6000$	16

$6000 < w \leq 8000$	
$8000 < w \leq 12000$	8

(a) Use the information in the histogram to complete the table.

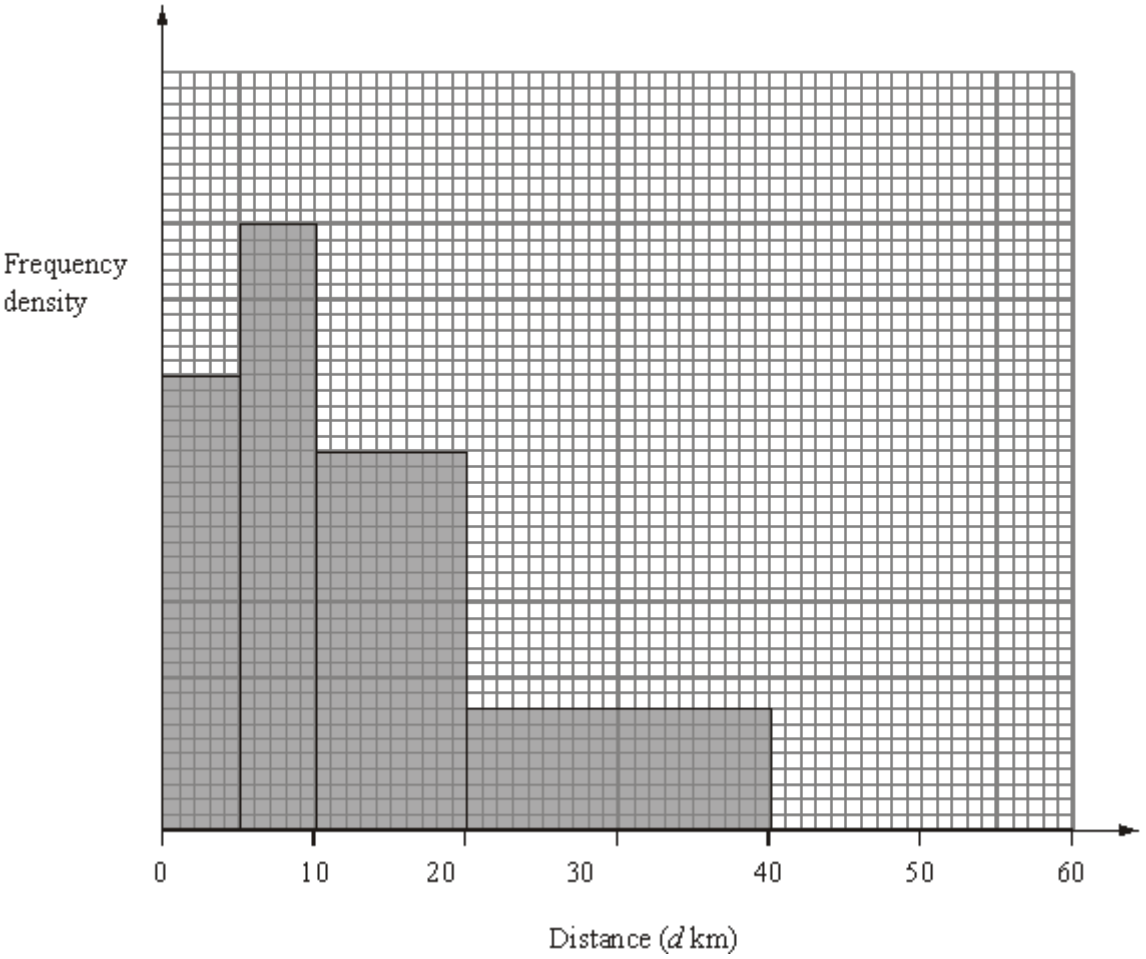
(2)

(b) Use the information in the table to complete the histogram.



(2)
(Total 4 marks)

Q8. The incomplete histogram and table give some information about the distances some teachers travel to school.



(a) Use the information in the histogram to complete the frequency table.

Distance ($d$km)	Frequency
$0 < d \leq 5$	15
$5 < d \leq 10$	20
$10 < d \leq 20$	
$20 < d \leq 40$	
$40 < d \leq 60$	10

(2)

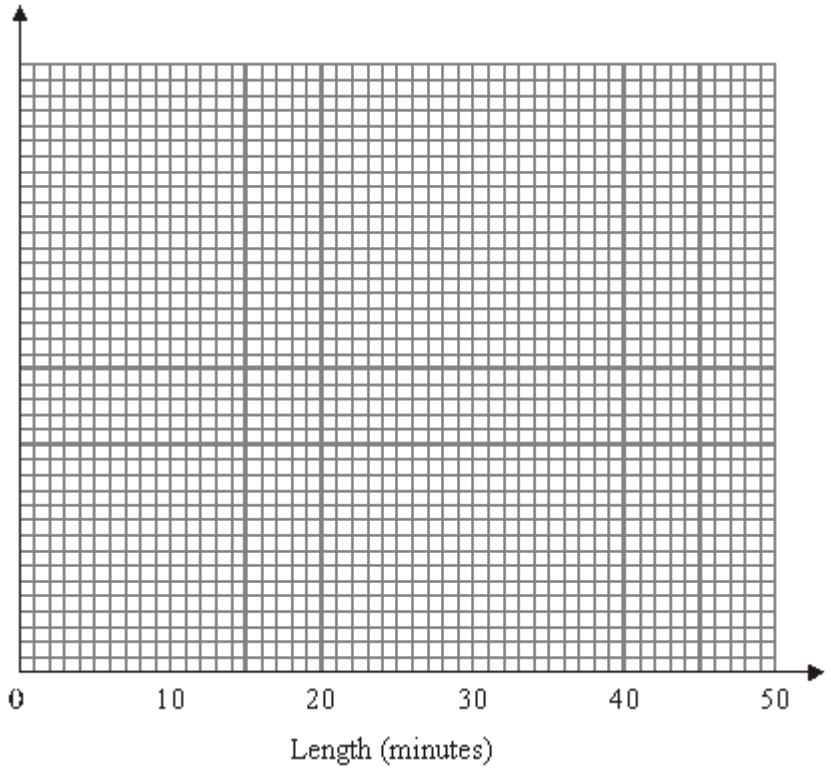
(b) Use the information in the table to complete the histogram.

(1)
(Total 3 marks)

Q9. A call centre receives 64 telephone calls one morning.
The table gives information about the lengths, in minutes, of these telephone calls.

Length (x) minutes	**Frequency**
$0 < x \leq 5$	4
$5 < x \leq 15$	10
$15 < x \leq 30$	24
$30 < x \leq 40$	20
$40 < x \leq 45$	6

Draw a histogram for this information.



(Total 4 marks)

Q10. Mr Walton is responsible for maintaining fish stocks in a river. The table gives some information about the lengths, in centimetres, of a type of fish caught from the river.

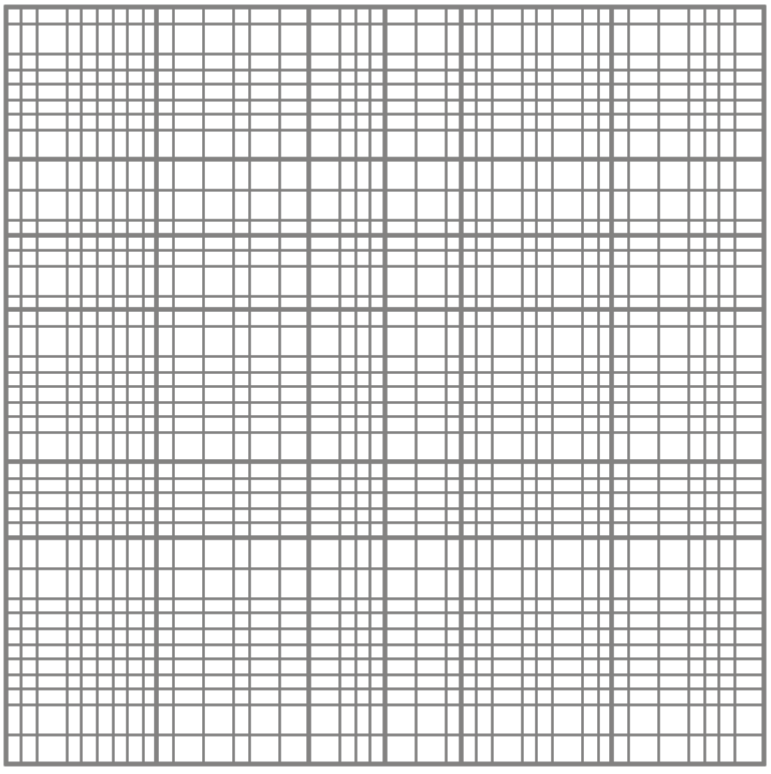
Length (L) cm	Frequency
$0 < L \leq 10$	40
$10 < L \leq 20$	60
$20 < L \leq 40$	90
$40 < L \leq 80$	60
$L > 80$	0

He wants to study the effect of returning to the river fish less than 50 cm in length that are caught.

Mr Walton suggests that fish which are less than 50 cm in length are returned to the river.

Draw a suitable statistical diagram for the information in the table.

Use it to find an estimate of the percentage of fish returned to the river.



..... %

(Total 6 marks)

M1.

Working	Answer	Mark	Additional Guidance
frequency densities 0.4, 0.6, 1.0, 0.6, 0.2	bars 3cm, 1cm high respectively	2	**M1** for consistent correct use of fd or $1cm^2$ =2 (may be implied by one correct bar) **A1** for 2 correct bars
			Total for Question: 2 marks

M2.

Working	Answer	Mark	Additional Guidance
$40 \leq t < 50$ fd 1.6 $50 \leq t < 55$ fd 3.6 $55 \leq t < 65$ fd 3.2 $65 \leq t < 80$ fd 2 $80 \leq t < 100$ fd 1.2		3	**B3** for 5 correct histogram bars ± ½`square AND frequency density numbered appropriately or key and consistent scaling  (**B2** for 5 correct histogram bars ± ½`square **or** all heights correct with frequency density numbered appropriately with one error in numbering **or** 3 or 4 histogram bars correct AND frequency density numbered appropriately or key and consistent scaling) (**B1** for 4 histogram bars in correct proportion, no numbering **or** 2 or more frequency densities correctly **or** 2 or more histogram bars in correct proportion with appropriate numbering on the f.d. axis)
			Total for Question: 3 marks

M3.

Answer	Mark	Additional Guidance
Bars at 4cm, 6cm, 7cm, 8 cm and 1.5 cm in height oe with fd axis labeled correctly	3	**M1** for dividing frequency by group size or sight of 0.8, 1.2, 1.4, 1.6, 0.3 (minimum 2 seen) **A1** for bars of consistent areas for all given frequencies **B1** for fd axis labeled correctly and consistently **Alternative scheme** **B3** for bars at 4cm, 6cm, 7cm, 8 cm and 1.5 cm in height oe with fd axis labeled correctly and consistently (e.g. 1 cm fd 0.2) [**B2** for bars at 4cm, 6cm, 7cm, 8cm and 1.5cm in height oe with no labeling or incorrect labeling on the fd axis **OR** fully and correctly labeled fd axis with one bar error] [**B1** for 4th bar twice as high as 1st bar] [**B0** for bar chart with unequal bars] **NB** apply the same mark-scheme if a different frequency density is used e.g. bars at 1.6 cm, 2.4 cm, 2.8 cm, 3.2 cm, 0.6 cm
		Total for Question: 3 marks

M4.

	Working	Answer	Mark	Additional Guidance
(a)	5 × 16 = 80 12.5 × 18 = 225 17.5 × 10 = 175 27.5 × 6 = 165 645 ÷ 50 = 12.9 or 5.5 × 16 = 88 13 × 18 = 234 18 × 10 = 180 28 × 6 = 168 670 ÷ 50 = 13.4	12.9	4	**M1** for fx consistently within interval including ends (allow 1 error) **M1** consistently using appropriate midpoints **M1** (dep on first M1) for $\sum fx \div \sum f$ **A1** for 12.9 or 13.4

(b)	$\frac{6}{50} \times \frac{5}{49} = \frac{30}{2450}$	$\frac{3}{245}$	2	**M1** for $\frac{6}{50} \times \frac{5}{49}$ **A1** for $\frac{3}{245}$ oe If M0A0, SC B1 for $\frac{9}{625}$ oe
(c)	$0 \le d < 10$ fd 1.6 $10 \le d < 15$ fd 3.6 $15 \le d < 20$ fd 2 $20 \le d < 35$ fd 0.4	Correct histogram	3	**B2** for 4 correct histogram bars (±½ square) (B1 for 2 or 3 histogram bars of different widths correct) **B1** for frequency density label or key and consistent scaling SC if B0 then M1 for clear attempt to use frequency density or area
				Total for Question: 9 marks

M5.

	Answer	Mark	Additional Guidance
(a)	5 15	2	**B1** cao **B1** cao
(b)	fd = 2 (ht 4 cm) fd = 2.5 (ht 5 cm)	2	**B2** for 2 correct bars **B1** for 1 correct bar If **B0** is scored then you can award **M1** at least one correct frequency density calculated for the missing bars Or 1 sq = 2.5 plants oe
			Total for Question: 4 marks

M6.

Working	Answer	Mark	Additional Guidance
0 ≤ *d* < 10 fd 0.5 10 ≤ *d* < 20 fd 1.8 20 ≤ *d* < 25 fd 3.0 25 ≤ *d* < 40 fd 0.8 40 ≤ *d* < 60 fd 0.5	Correct histogram	3	**B2** for 5 correct histogram bars ⌖ ½ square (B1 for 3 histogram bars correct) **B1** for frequency density label or key and consistent scaling
			Total for Question: 3 marks

M7.

	Working	Answer	Mark	Additional Guidance
(a)	Freq = FD × int width = 0.018 × 1000 = 18 Or = 18 × 1 = 18 = 0.010 × 2000 = 20 or 10 × 2 = 20 = 0.006 × 2000 = 12 or 6 × 2 = 12 **OR** No of small squares = 200 Total freq = 16 So 1 small square = 16 ÷ 200 = 0.08 9 × 25 × 0.08 = 18 10 × 25 × 0.08 = 20 6 × 25 × 0.08 = 12 **OR** 8 cm^2 = 16 so 1 cm^2 = 2 etc	18,20,12	2	**M1** use of Freq = FD × int width or attempt to find freq of 1 standard square (or one answer correct) **A1** cao: all three
(b)	FD = Freq ÷ int width = 16 ÷ 2000 = 0.008 so 4 sqs up = 8 ÷ 4000 = 0.002 so 1 sq up	4000-6000 4 cm high 8000-12000	2	**B1** 4000-6000; 4 cm high **B1** 8000-12000; 1 cm high or if **B0**, **M1** use of Freq = FD × int width or attempt to

	OR 16 ÷ 0.08 = 200 200 ÷ 25 = 8 so 4 sqs up 8 ÷ 0.08 = 100 100 ÷ 25 = 4 so 1 square up **OR** 16 ÷ 2 = 8 so 4 sqs up etc	1 cm high		find freq of 1 standard square
				Total for Question: 4 marks

M8.

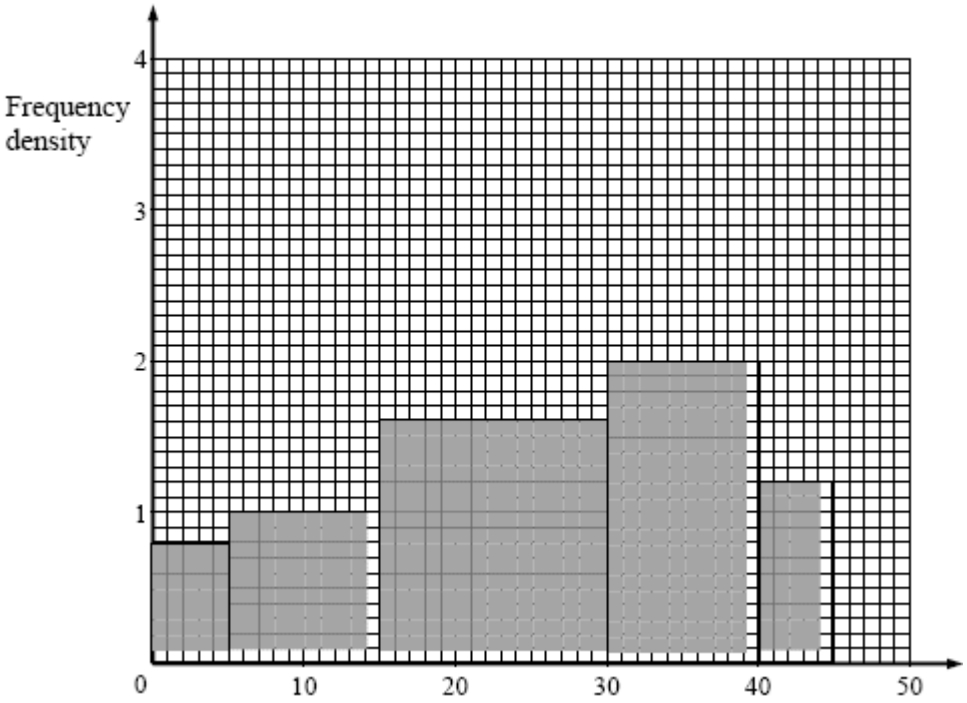
	Answer	Mark	Additional Guidance
(a)	25 16	2	**M1** for correct use of frequency density to find a unit of area (for example 1 cm^2 = 2.5 or 1 small square = 0.1) or the area of one block. **A1** cao
(b)	Correct black (1 cm high between 40 and 60)	1	**B1** for correct black
			Total for Question: 3 marks

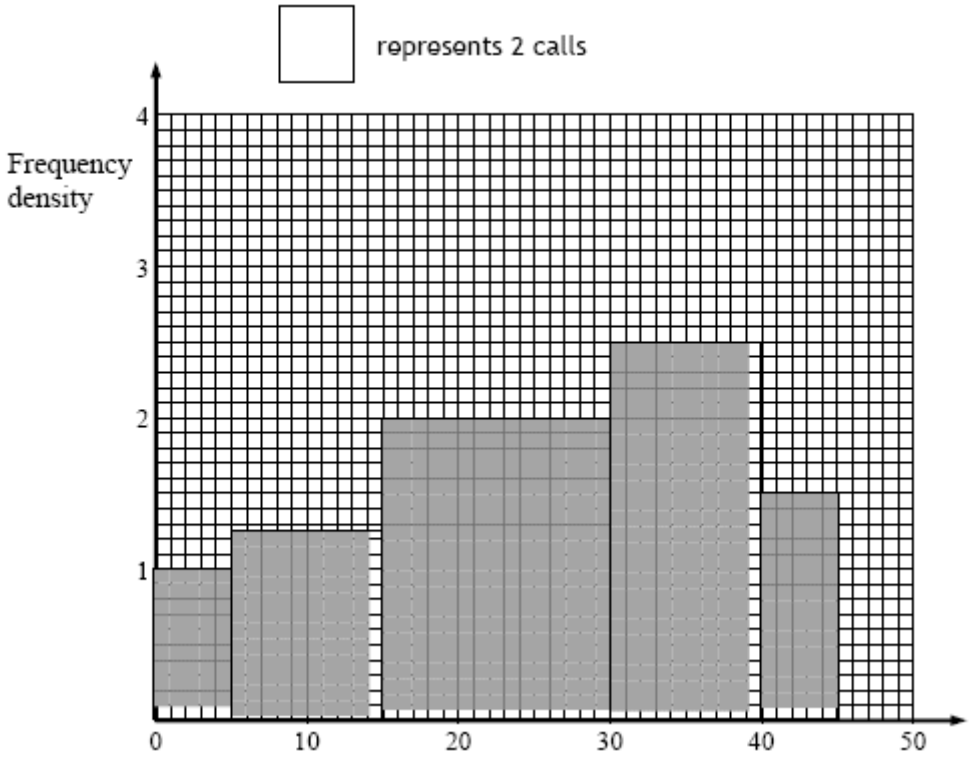
M9.

Working						Answer	Mark	Additional Guidance
F	4	10	24	20	6	Correct histogram	4	**M1** use of frequency density as two frequency ÷ width (can be implied by correct frequency densities or two correct bars with different widths) or area (can be implied by one correct bar) to represent frequency
Fd	0.8	1	1.6	2	1.2			
or								
F	4	10	24	20	6			
Fd	4	5	8	10	6			

			A2 for all 5 histogram bars correct ±½ square (**A1** at least 3 correct histogram bars ±½ square) **A1** for correct label and scale numbered appropriately **or** for key and consistent scaling
			Total for Question: 4 marks

Examples





M10.

Working	Answer	Mark	Additional Guidance
L | F | FD | CF 0–10 | 40 | 4 | 40 10–20 | 60 | 6 | 100 20–40 | 90 | 4.5 | 190 40–80 | 60 | 1.5 | 250 >80 | 0 | 0 | 250	Histogram **OR** Cumulative Frequency polygon 82%	6	**B1** Scales labelled and also marked on the vertical axis with frequency density or with cumulative frequency **M1** frequency densities calculated, at least one non-trivial one correct. **A1** all correctly plotted (M1 cumulative frequencies correct) **M1** Use 50 on the horizontal scale of CF diagram read off vertical axis (200-210) **or** Use 50 on the horizontal scale of a histogram and covert area to the left to a frequency

			M1 convert to a percentage **A1** 80 – 85
			Total for Question: 6 marks

E1. More than half the candidates were able to score at least 1 mark for this question. The most popular approach was to do a calculation of the frequency densities, e.g. 4/10 = 0.4, etc and then to write down an appropriate scaling on the vertical axis. A common error here was to use frequencies on the vertical axis. Examiners reported that it was sometimes difficult to see the bars in students' responses. Candidates should be advised to draw bold lines in their diagrams.

E2. 57% of the candidates scored no marks on this question, generally for drawing a histogram with heights 16, 18, 32, 30 and 24, clearly having no understanding of a histogram with bars of unequal width. Those that did often correctly calculated some of the frequency density values. Many of those that did know what they were doing tended to not number the Frequency Density axis whilst others made errors in the proportion of the bars by starting their numbering at 0.5 or 1 rather than 0 losing a mark. Quite a few candidates did everything correctly but extended the last bar to 110. Many who constructed the histogram accurately using "blocks" then failed to show a key. Nearly a quarter of the candidates scored all 3 available marks.

E3. Candidates did not perform very well on this histogram question. Only 31% of candidates scored all 3 marks for a fully correct histogram with correctly labelled and scaled frequency density axis. For this question they needed to work out the frequency density for each of the groups and then draw appropriate bars. Many candidates (about 40%) drew a bar chart and they received no marks. Marks for partial success were awarded to those candidates that could work out the frequency density or who could draw bars of correct the height but omitted the scaling on the frequency density axis. Insufficient heed was paid to the x-axis values with some candidates extending the first and last bars to cover values outside of the ranges given. There was a disappointing tendency for candidates to simply multiply or divide various values given, finding mid points etc, indicating that they were trying to apply poorly remembered rules rather than demonstrating understanding.

##

Part (a) of this question was poorly attempted. About one third of candidates gained all four marks. Many candidates attempts were blighted by the inability to find the midpoint of each of the intervals in the table. It was common to see these recorded as 5, 13, 18 and 28. Some candidates used the lengths of the intervals, 10, 5, 5 and 15 to represent the weights of the suitcases. Other lower attaining candidates merely carried out the calculation “50 ÷ 4” or summed their midpoints and divided by 4. About one in every ten candidates gave a correct answer in part (b). Few candidates identified the need to use multiplication and there were many instances of fractions appearing on the answer line, most commonly 6/50 or equivalent, without any working shown. For part (c) a fair proportion of candidates worked out the frequency densities but only about one third were able to go on to use them in order to complete a histogram. Even the better candidates often failed to label/scale the vertical axes or provide a key for their graph. A large proportion of lower attaining candidates drew bars with heights representing the frequencies.

##

In (a), most candidates were able to find the first frequency, but a frequency of 30 was common for the second value in the table. Other wrong responses often seen were 10 and 30 or 50 and 150.

Many candidates left part (b) blank or produced answers with bars drawn off the graph or very tiny. Also, some candidates just drew bars of frequency 30 and 50, so in effect a bar chart with different size widths. Other candidates were able to calculate the frequency density correctly, so picked up a M1 mark, but then were unable to draw the two bars required.

In general candidates appear not to be aware that the area of the bars of a histogram are the frequencies, evidenced by a lack of frequency density calculations. A few of them had used 1 sq. cm = 2.5 to calculate the frequencies and the drawing of the bars but this was rarely seen.

E7. Many candidates were well prepared for this histogram question and were able to score full marks. Both frequency density methods and area methods were in evidence, but often there was little sign of any working. Some otherwise competent candidates lost a mark on part (b) by drawing their rectangle to the right hand end of the given axis.

E8. The great majority of candidates treated the histogram as a simple bar chart, equating frequencies to the height of each bar. 12.5 and 4 in part (a) and a 'bar' at height 2 cm in part (b) were therefore the most common answer s seen. Very few candidates showed any understanding of frequency density. Those who did clearly understand what was required often found the correct frequency of 25 in (a) but then gave an answer of 15 in part (ii) as some candidates read the scale at 0.75 instead of 0.8

E9. This question was very poorly attempted with many candidates displaying a lack of understanding of histograms. The majority used the given frequencies to draw bars of different widths and some drew frequency polygons. Very few candidates gained full marks.

Candidates who showed understanding of frequency density often made mistakes carrying out the divisions involved. Some wrote down no calculations at all and went straight to drawing the histogram, often with errors. The final bar was frequently drawn with an incorrect width. Even when correct histograms were seen the candidates often failed to gain full marks because they did not label the vertical axis or provide a key. Some candidates used frequency × class width as frequency density.