

FULL MODEL ANSWERS

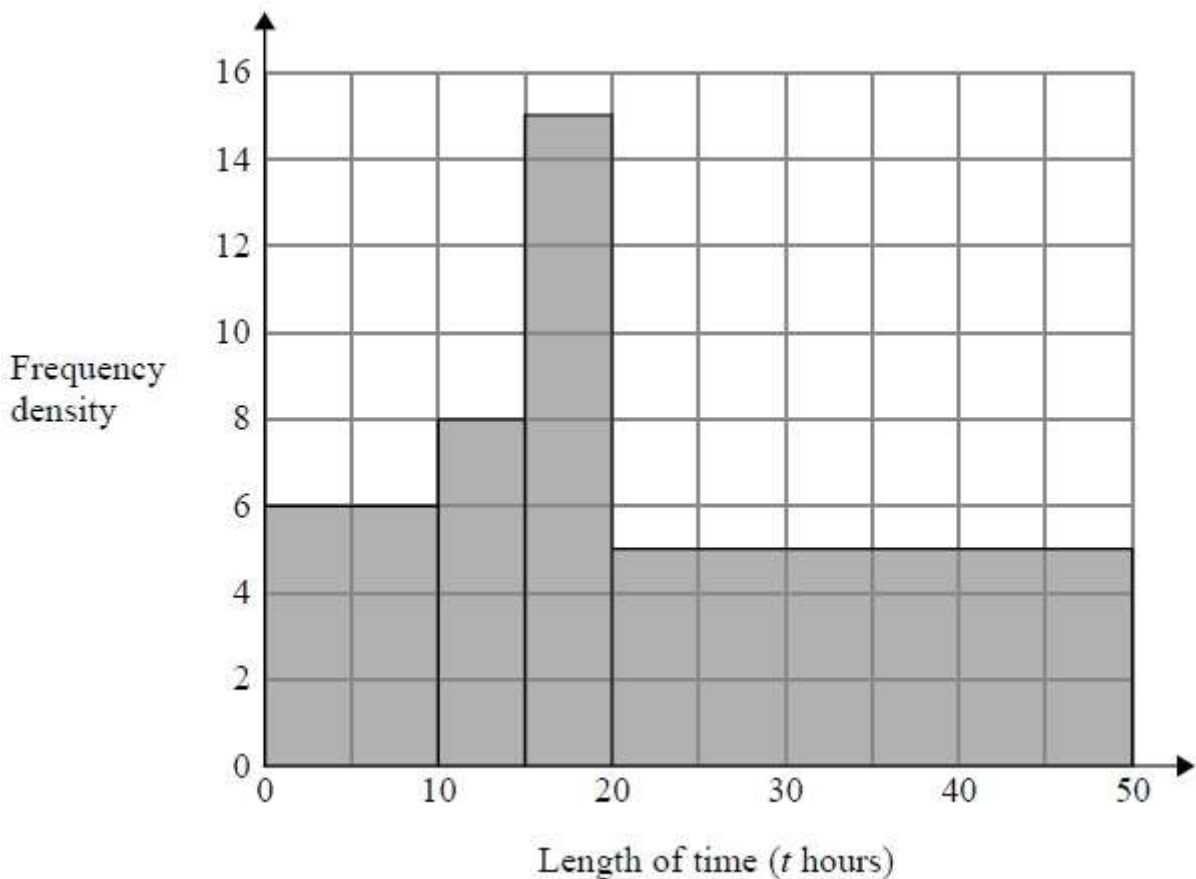
Q1. NON-CALCULATOR

Bhavna recorded the lengths of time, in hours, that some adults watched TV last week.

The table shows information about her results.

Length of time (t hours)	Frequency
$0 \leq t < 10$	6
$10 \leq t < 15$	8
$15 \leq t < 20$	15
$20 \leq t < 40$	5

Bhavna made some mistakes when she drew a histogram for this information.



Write down **two** mistakes Bhavna made.

1

Bhavna has plotted the frequency as the height of each bar, instead of freq. density.

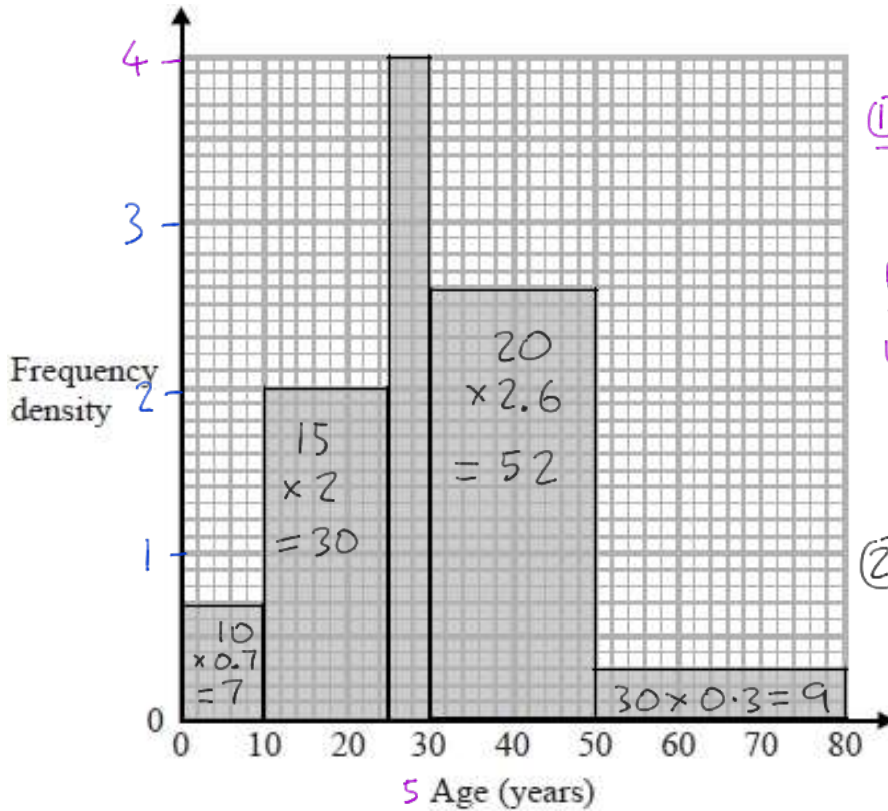
2

The final bar's width is incorrect. It should be 20 wide, not 30.

(Total for question = 2 marks)

Q2. NON-CALCULATOR

The histogram shows information about the ages of the members of a football supporters club.



① Find scale for y-axis.

$$\text{Freq} = \text{FD} \times \text{width}$$

$$\frac{20}{5} = 4$$

② Find frequency for each group.

$$\text{Freq} = \text{FD} \times \text{width}$$

There are 20 members aged between 25 and 30

One member of the club is chosen at random.

What is the probability that this member is more than 30 years old?

③ Find probability

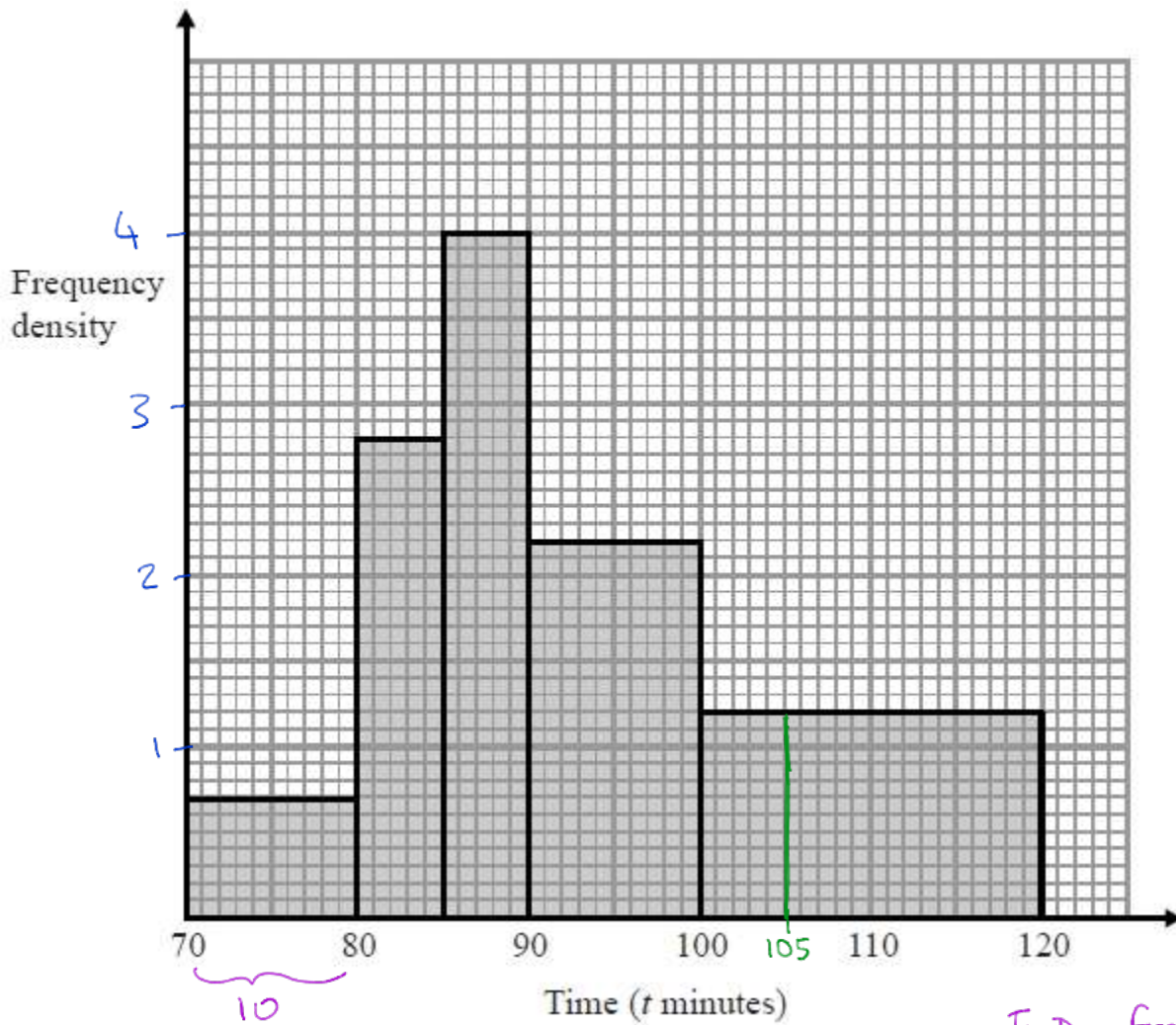
$$P(\text{more than 30 yrs old}) = \frac{\text{Total frequency more than 30}}{\text{Total frequency}}$$

$$= \frac{52 + 9}{7 + 30 + 20 + 52 + 9} = \frac{61}{118}$$

(Total for question = 3 marks)

Q3. NON-CALCULATOR

The histogram shows information about the time taken by cyclists to finish a cycle race.



7 cyclists took 80 minutes or less to finish the race.

- (i) Work out an estimate for the number of cyclists who took more than 105 minutes to finish the race. *Find scale for y-axis*

$$\begin{aligned}
 \text{F.D} &= \frac{\text{freq}}{\text{width}} \\
 &= \frac{7}{10} \\
 &= 0.7
 \end{aligned}$$

$$\begin{aligned}
 \text{Freq} &= \text{FD} \times \text{width} \\
 &= 1.2 \times 15 \\
 &= 1 \times 15 + 0.2 \times 15 \\
 &= 15 + 3
 \end{aligned}$$

..... 18

- (ii) Explain why your answer to part (i) is only an estimate.

The histogram is a representation of grouped data. I don't know how the frequency is distributed within each group.

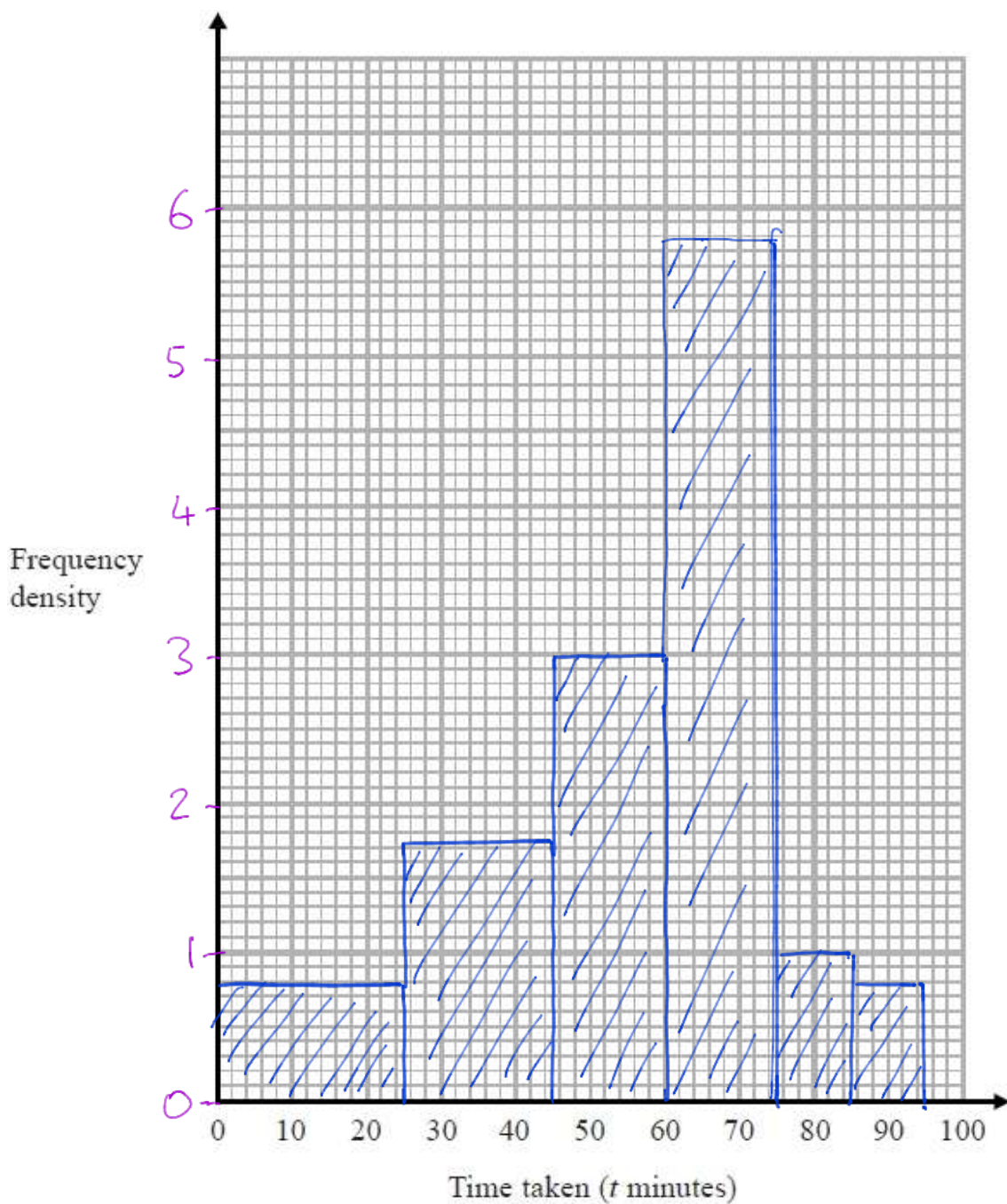
(Total for question = 4 marks)

Q4. CALCULATOR ALLOWED

The table shows information about the times a group of students took to do a park run.

Time taken (t minutes)	Frequency	F.D.
$0 < t \leq 25$	20	$20 \div 25 = 0.8$
$25 < t \leq 45$	35	$35 \div 20 = 1.75$
$45 < t \leq 60$	45	$45 \div 15 = 3$
$60 < t \leq 75$	87	$87 \div 15 = 5.8$
$75 < t \leq 85$	10	$10 \div 10 = 1$
$85 < t \leq 95$	8	$8 \div 10 = 0.8$

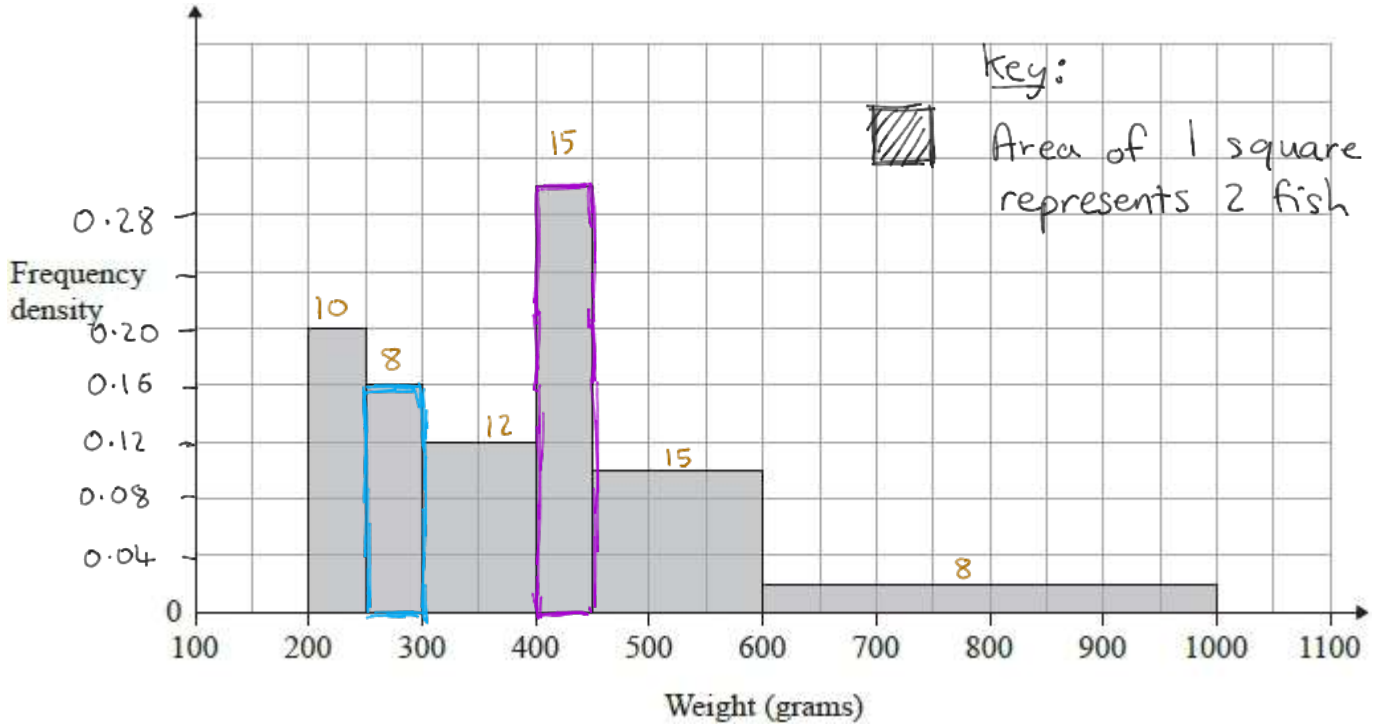
Draw a histogram for this information.



(Total for question = 3 marks)

Q5. CALCULATOR ALLOWED

The histogram gives information about the weights of some fish.



The number of fish with a weight between 400 g and 450 g is 7 more than the number of fish with a weight between 250 g and 300 g.

(a) Calculate the total number of fish represented by the histogram.

Area - Area = Frequency of 7.

$\div 3.5$ \downarrow 3.5 squares = 7

$\times 34$ \downarrow 1 square = frequency of 2

34 squares = 68

..... (3)

(b) (i) Use the histogram to find an estimate for the median weight.

Using $\frac{n+1}{2} = 34.5^{\text{th}}$ value

Counting from the top, there are 23 in the highest 2 groups. So we need the weight of the 11.5th fish

Since the frequency of that group is 15, and the width is 50, the median is: $11.5 \times \frac{50}{15} = 38.3\bar{3}$

$450 - 38.3\bar{3} \approx 412$ g

..... (2)

(ii) Give a reason why your answer to part (b)(i) is only an estimate.

The histogram represents grouped data. I don't know the exact weight of each fish.

..... (1)

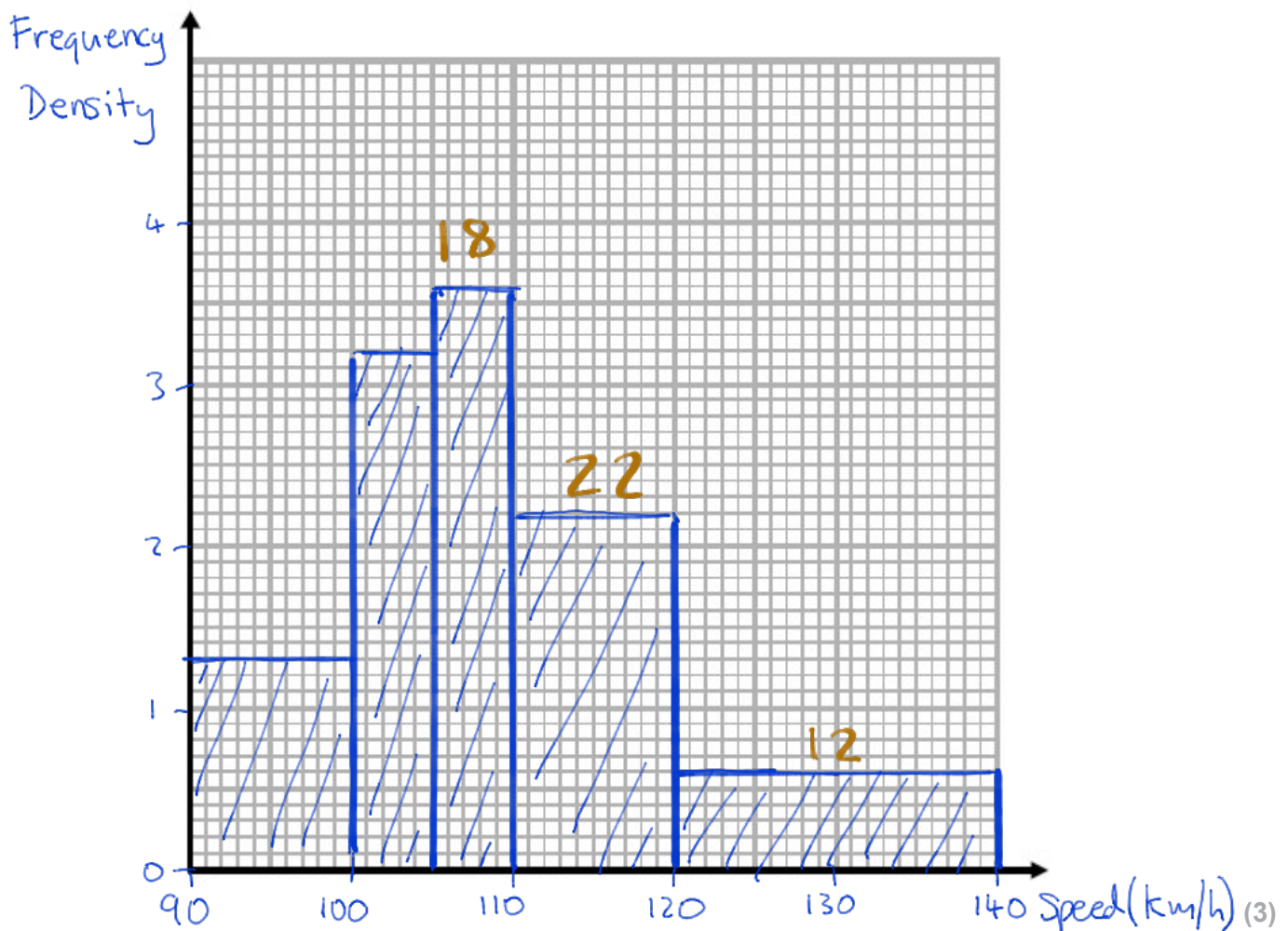
(Total for question = 6 marks)

Q6. CALCULATOR ALLOWED

The table gives information about the speeds, in km/h, of 81 cars.

Speed (s km/h)	Frequency	F.D.
$90 < s \leq 100$	13	$13 \div 10 = 1.3$
$100 < s \leq 105$	16	$16 \div 5 = 3.2$
$105 < s \leq 110$	18	$18 \div 5 = 3.6$
$110 < s \leq 120$	22	$22 \div 10 = 2.2$
$120 < s \leq 140$	12	$12 \div 20 = 0.6$

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



(b) Find an estimate for the median.

Using $\frac{n+1}{2} = 41^{\text{st}}$ value.
 Counting from the top there are 34 values in the highest 2 groups.
 So we need the speed of the 7th car

Since the frequency of that group is 18, and the width is 5, the median is:

$$7 \times \frac{5}{18} = 1.94 \text{ km/h}$$

$$110 - 1.94 \approx \dots\dots\dots 108 \dots\dots\dots \text{ km/h}$$

(2)

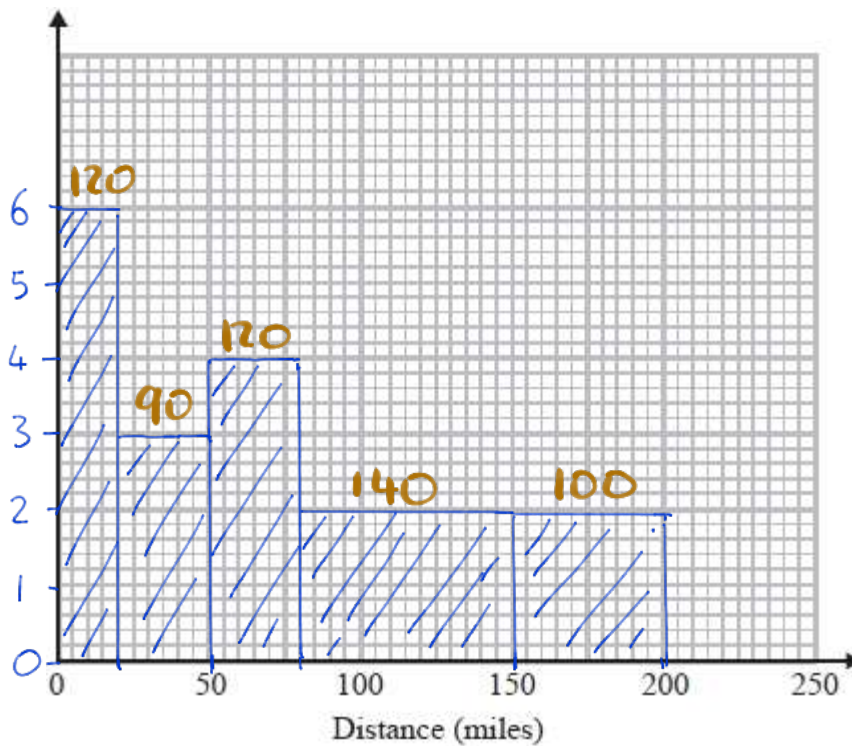
(Total for question = 5 marks)

Q7. CALCULATOR ALLOWED

The table shows information about the distances 570 students travelled to a university open day.

Distance (d miles)	Frequency	F.D.
$0 < d \leq 20$	120	$120 \div 20 = 6$
$20 < d \leq 50$	90	$90 \div 30 = 3$
$50 < d \leq 80$	120	$120 \div 30 = 4$
$80 < d \leq 150$	140	$140 \div 70 = 2$
$150 < d \leq 200$	100	$100 \div 50 = 2$

(a) Draw a histogram for the information in the table.



(b) Estimate the median distance.

$$\frac{n+1}{2} = 285.5^{\text{th}}$$

There are 240 in the top 2 groups, so we need the distance of the 45.5th student

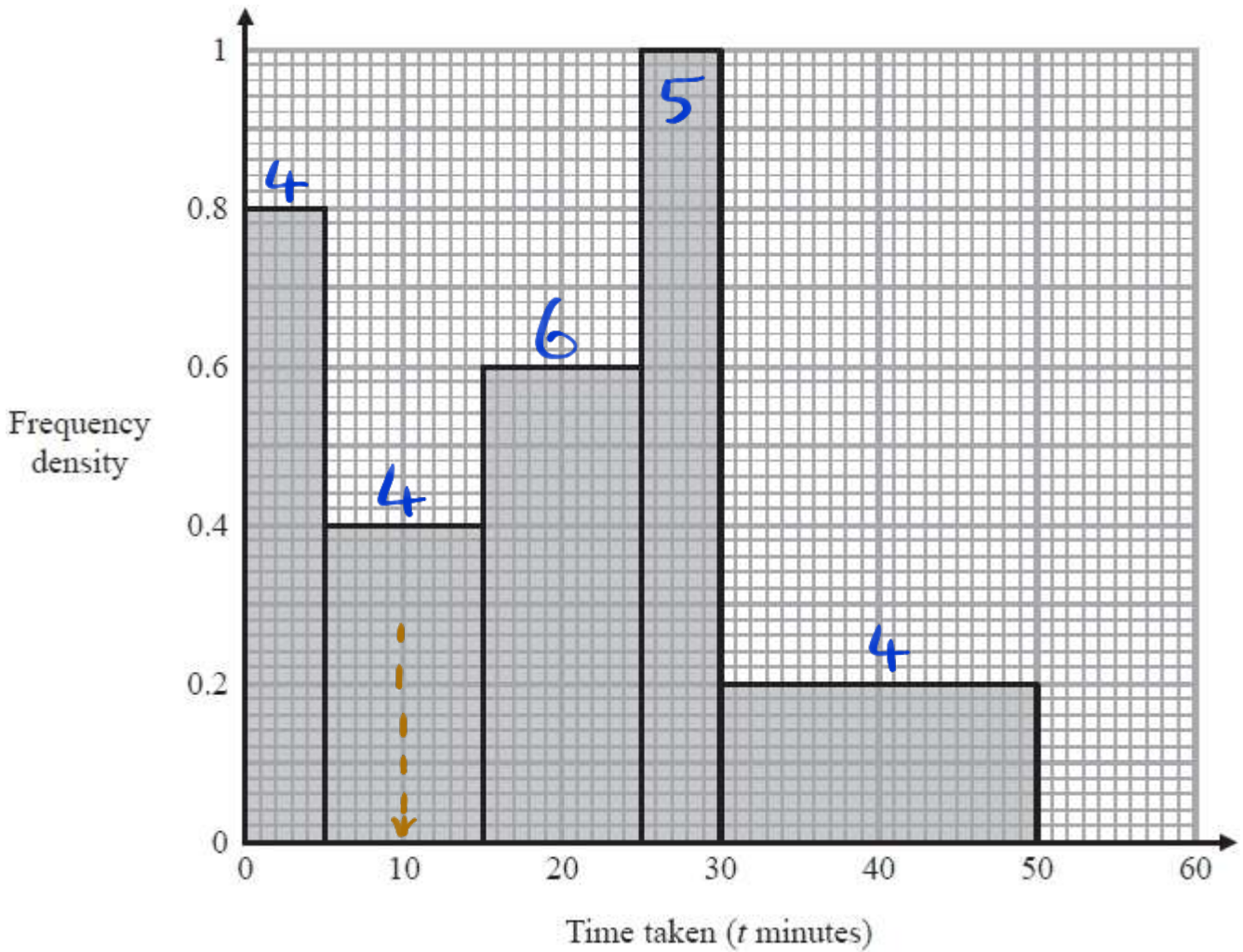
Since the frequency of the middle group is 120, and the width is 30, the median is: $45.5 \times \frac{30}{120} = 11.4$ (3)

$$80 - 11.4 \approx \dots\dots\dots 69 \dots\dots\dots \text{miles}$$

(2)
(Total for question = 5 marks)

Q8. CALCULATOR ALLOWED

The histogram shows information about the times taken by some students to finish a puzzle.



(a) Complete the frequency table for this information.

$\text{Freq} = \text{F.D} \times \text{width}$

Time taken (t minutes)	Frequency	<u>FD x width</u>
$0 < t \leq 5$	4	
$5 < t \leq 15$	4	0.4×10
$15 < t \leq 25$	6	0.6×10
$25 < t \leq 30$	5	1.0×5
$30 < t \leq 50$	4	0.2×20

23

(2)

(b) Find an estimate for the lower quartile of the times taken to finish the puzzle.

$\frac{n+1}{4} = 6^{\text{th}}$ position from lowest.

By inspection this would be: 10 minutes

(2)

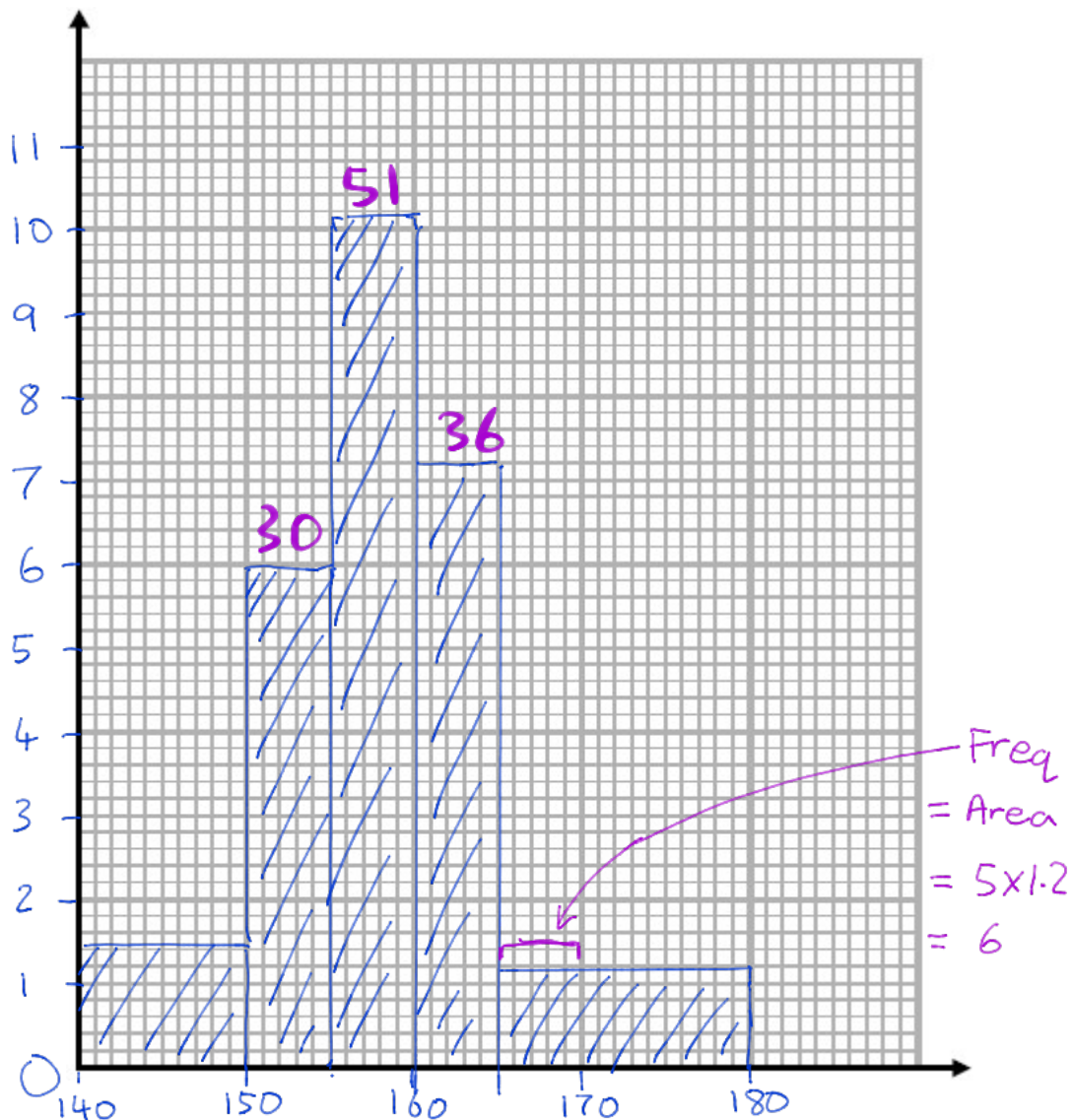
(Total for question = 4 marks)

Q9. CALCULATOR ALLOWED

The table gives information about the heights of 150 students.

Height (h cm)	Frequency	F.D.
$140 < h \leq 150$	15	$15 \div 10 = 1.5$
$150 < h \leq 155$	30	$30 \div 5 = 6$
$155 < h \leq 160$	51	$51 \div 5 = 10.2$
$160 < h \leq 165$	36	$36 \div 5 = 7.2$
$165 < h \leq 180$	18	$18 \div 15 = 1.2$

(a) On the grid, draw a histogram for this information.



(3)

(b) Work out an estimate for the fraction of the students who have a height between 150 cm and 170 cm.

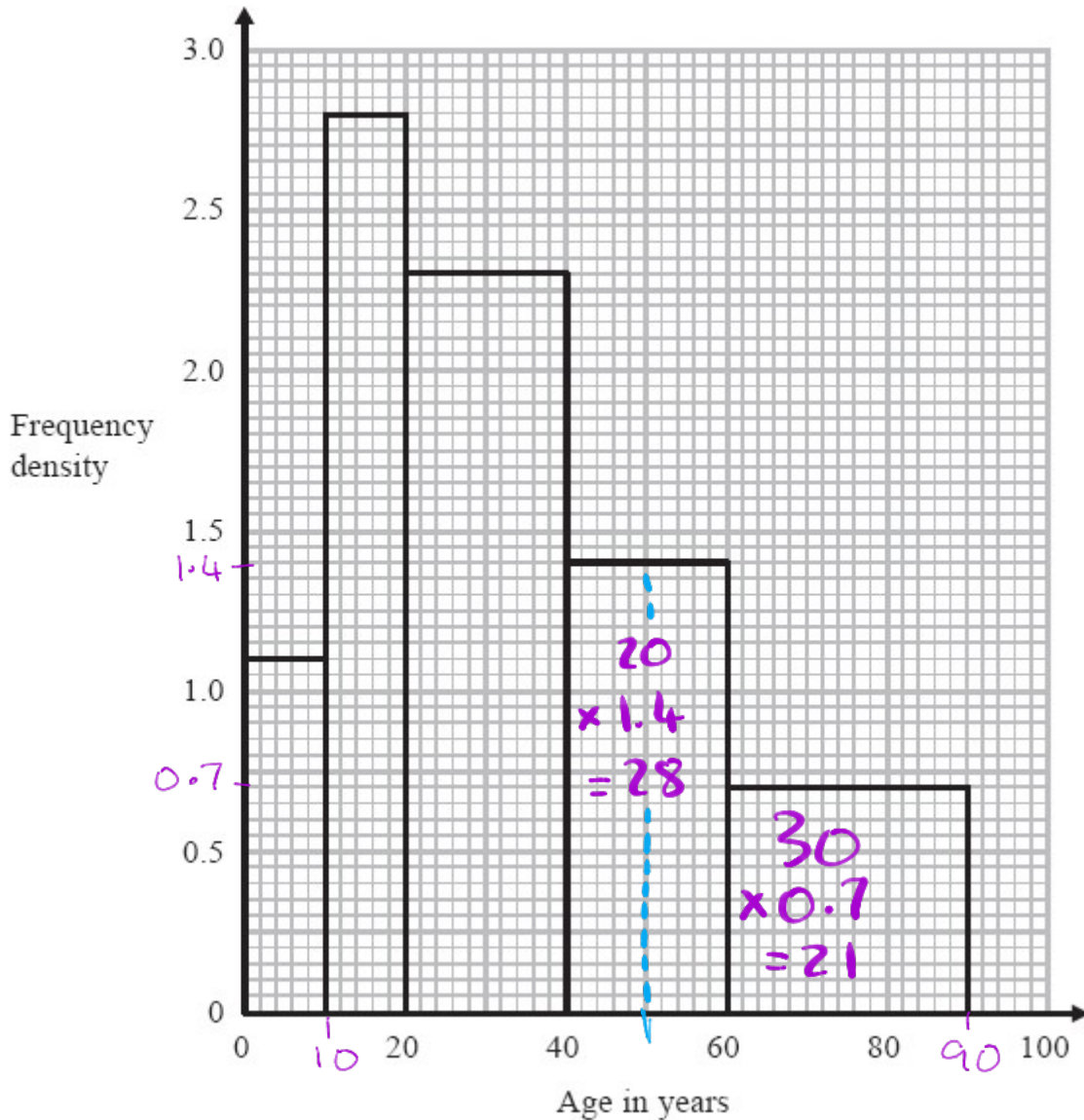
$$\frac{30 + 51 + 36 + 6}{150} = \frac{123}{150}$$

(2)

(Total for question = 5 marks)

Q10. CALCULATOR ALLOWED

The histogram shows some information about the ages of the 134 members of a sports club.



20% of the members of the sports club who are over 50 years of age are female.

Work out an estimate for the number of female members who are over 50 years of age.

$$\begin{aligned} \text{Total members over 50} &= \frac{28}{2} + 21 \\ &= 35 \end{aligned}$$

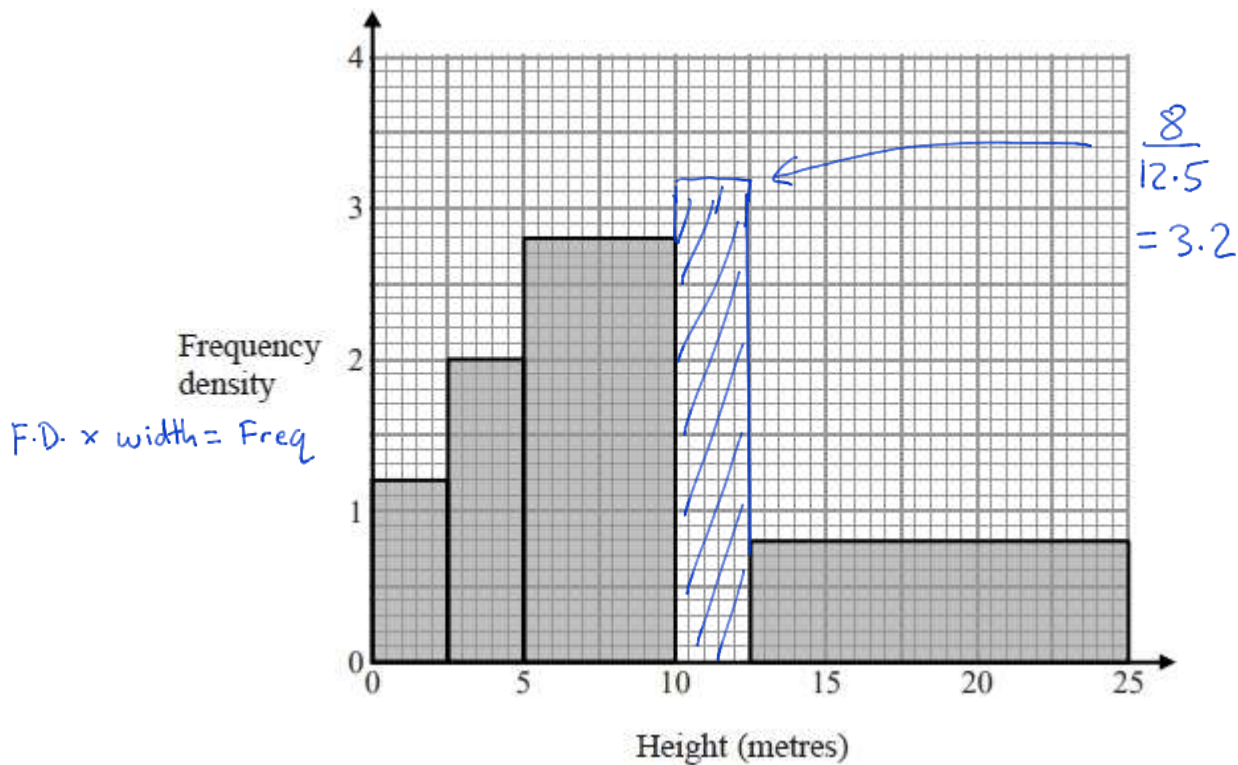
$$\begin{aligned} 20\% \text{ of } 35 &= \frac{20}{100} \times 35 \\ &= 7 \end{aligned}$$

7

(Total for question = 3 marks)

Q11. CALCULATOR ALLOWED

The histogram gives information about the heights, in metres, of the trees in a park.
The histogram is incomplete.



20% of the trees in the park have a height between 10 metres and 12.5 metres.
None of the trees in the park have a height greater than 25 metres.

Complete the histogram.

$$\begin{array}{l} \text{F.D.} \times \text{width} = \text{Frequency} \\ 1.2 \times 2.5 = 3 \\ 2 \times 2.5 = 5 \\ 2.8 \times 5 = 14 \\ 0.8 \times 12.5 = \frac{10}{32} \end{array}$$

Using reverse percentages:

$$\begin{array}{l} \text{Total} \quad \xrightarrow{-20\%} \quad 32 \\ \text{frequency} \quad (\times 0.80) \end{array}$$

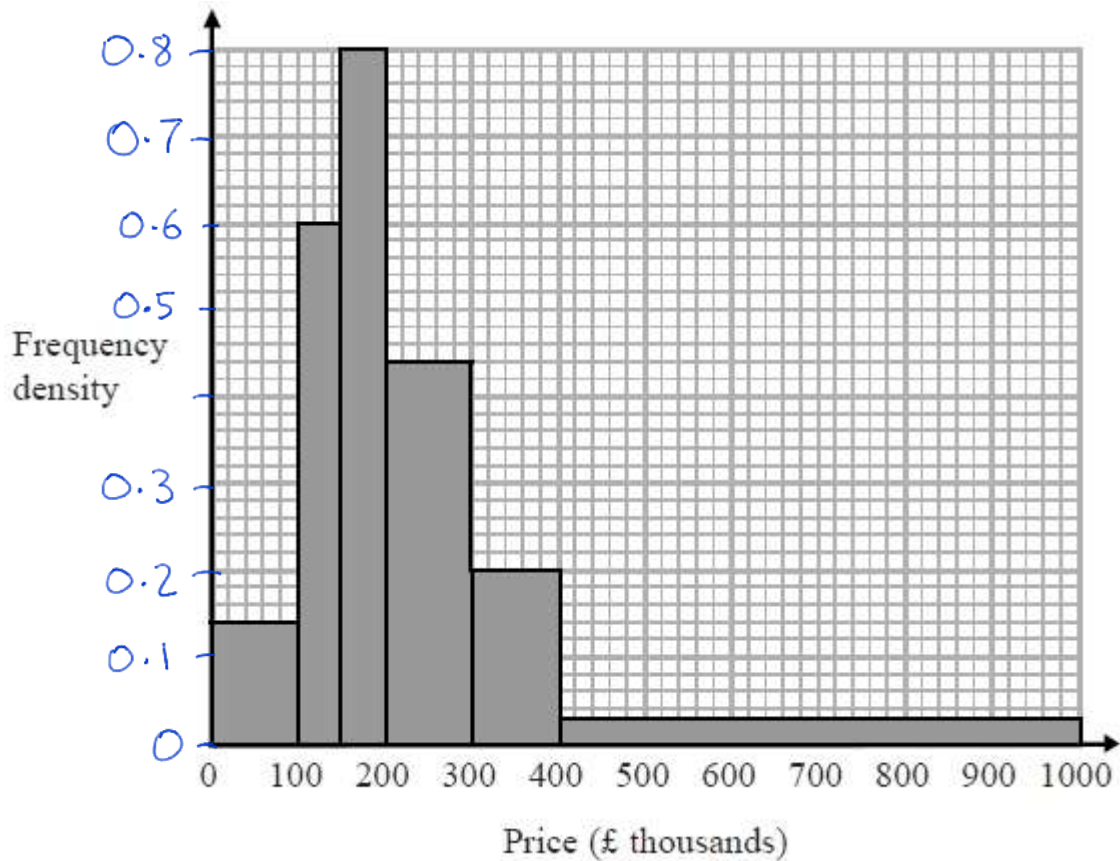
$$32 \div 0.8 = 40$$

$$40 - 32 = 8$$

(Total for question = 3 marks)

Q12. CALCULATOR ALLOWED

The histogram gives information about house prices in a village in 2015



20 houses in the village have a price between £300 000 and £400 000

Work out the number of houses in the village with a price under £200 000

$$\begin{aligned}
 \text{F.D.} &= \frac{\text{Frequency}}{\text{Width}} \\
 &= \frac{20}{100} \\
 &= 0.2
 \end{aligned}$$

F.D.	width	Freq
0.14	100	14
0.6	50	30
0.8	50	40 +
		<u>84</u>

84

(Total for question is 3 marks)