

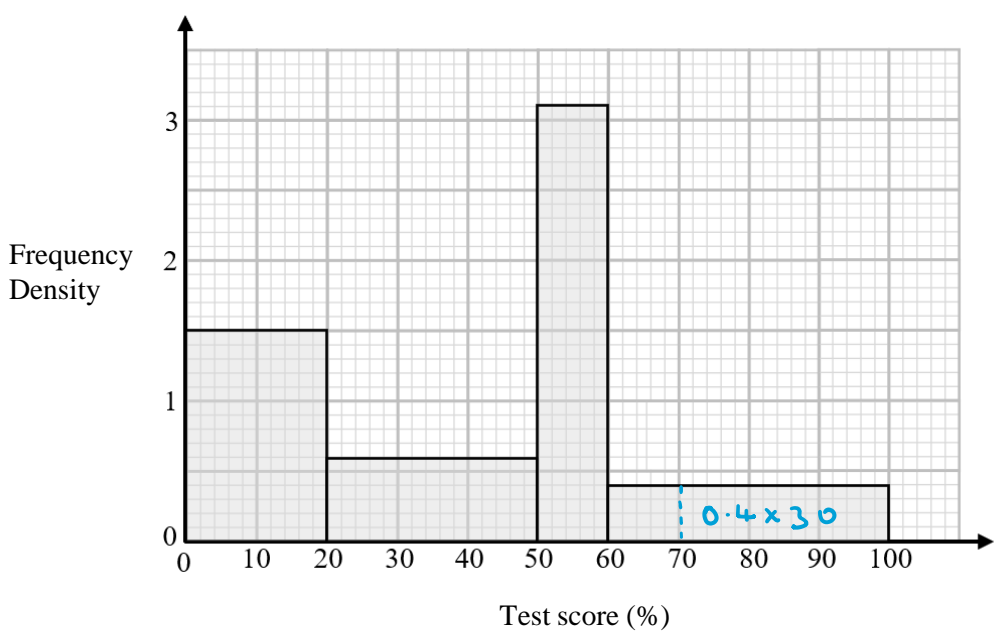


# Interpreting Histograms



← REVISE THIS TOPIC

1 The histogram shows information about the test scores  $S$ , as percentages, for some students.



(a) Complete the frequency table for this information.

Test Score, $S$ (%)	Frequency
$0 \leq S \leq 20$	30
$20 < S \leq 50$	18
$50 < S \leq 60$	31
$60 < S \leq 100$	16

(2)

(b) Work out an estimate for the number of students who scored more than 70% in the test.

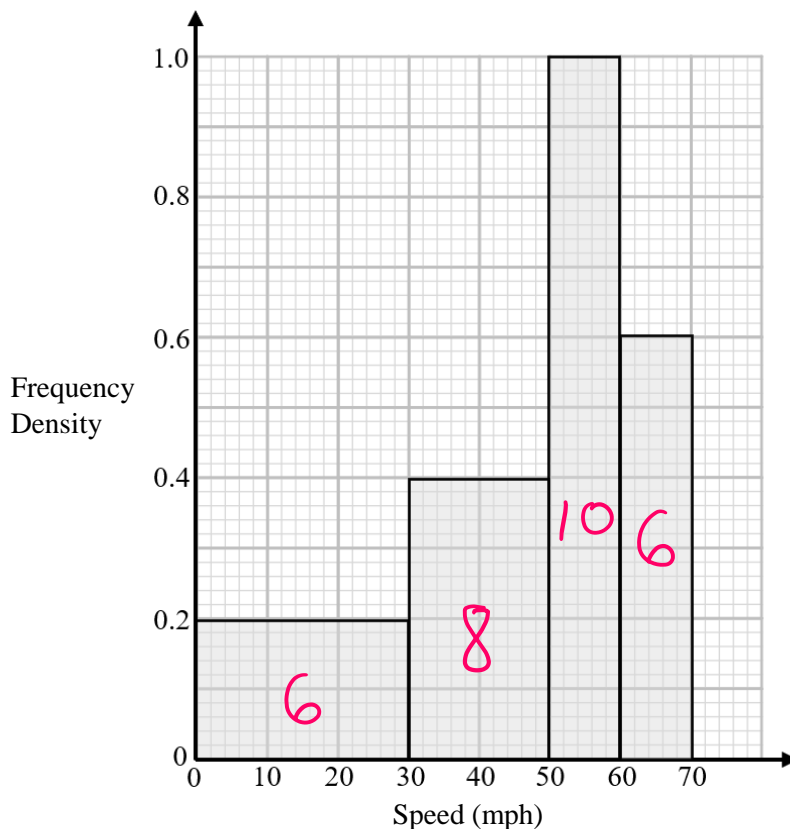
$$0.4 \times 30 = 12$$

..... 12 ..... students  
(2)

(Total for Question 1 is 4 marks)



2 The histogram shows information about the speed of 30 vehicles travelling on a road.



The speed limit on the road is 60 mph.

(a) Work out the percentage of the vehicles that were exceeding the speed limit.

$$\frac{6}{30} \times 100$$

..... 20 %  
(2)

(b) Work out an estimate for the mean speed of the 30 vehicles.

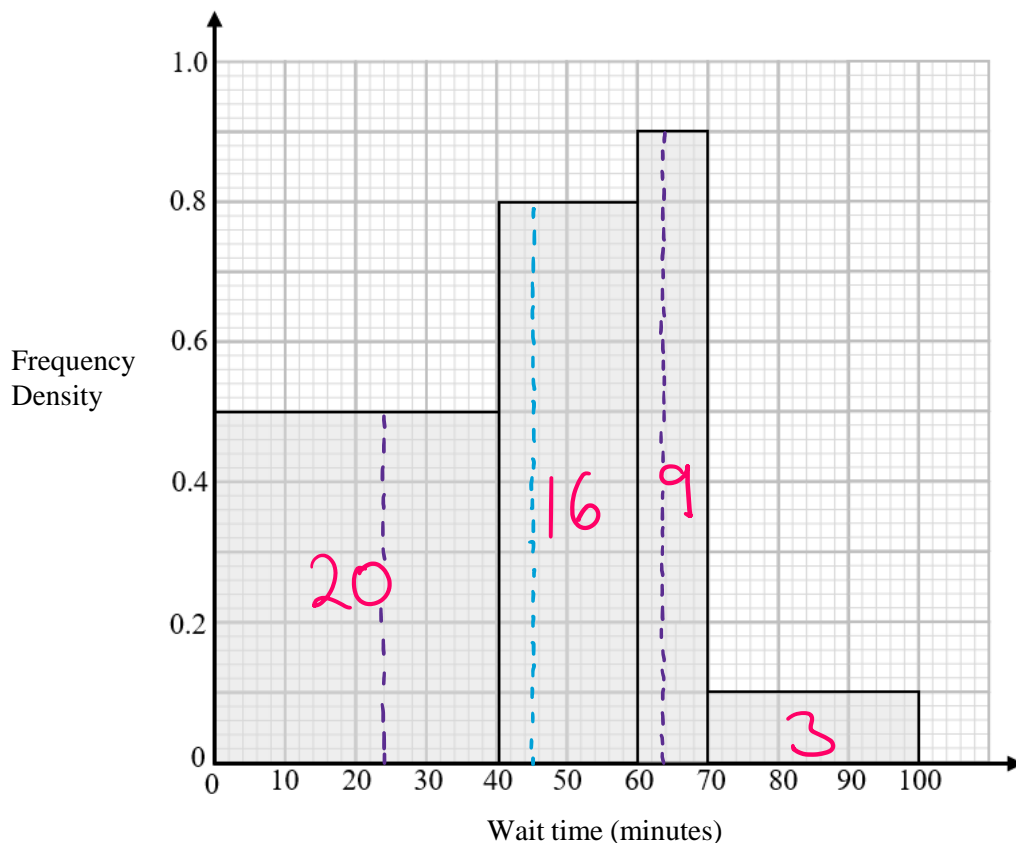
$$\begin{aligned}
 15 \times 6 &= 90 & 90 + 320 + 550 + 390 \\
 40 \times 8 &= 320 & = 1350 \\
 55 \times 10 &= 550 & \\
 65 \times 6 &= 390 & 1350 \div 30 = 45
 \end{aligned}$$

..... 45 mph  
(4)

(Total for Question 2 is 7 marks)



3 The histogram shows information about the times spent waiting at an emergency department.



(a) Work out an estimate for the median time spent waiting.

$$20 + 9 + 16 + 3 = 48$$

$$48 \div 2 = 24^{\text{th}} \text{ person}$$

$$\frac{4}{16} \times 20 = 5$$

$$40 + 5 = 45$$

..... 45 minutes  
(2)

(b) Work out an estimate for the interquartile range of the times spent waiting.

$$48 \div 4 = 12^{\text{th}} \text{ person}$$

$$12 \times 3 = 36^{\text{th}} \text{ person}$$

$$\frac{12}{20} \times 40 = 24$$

$$\frac{3}{9} \times 10 = 3.3$$

$$0 + 24 = 24 \text{ (LQ)}$$

$$60 + 3.3 = 63.3 \text{ (UQ)}$$

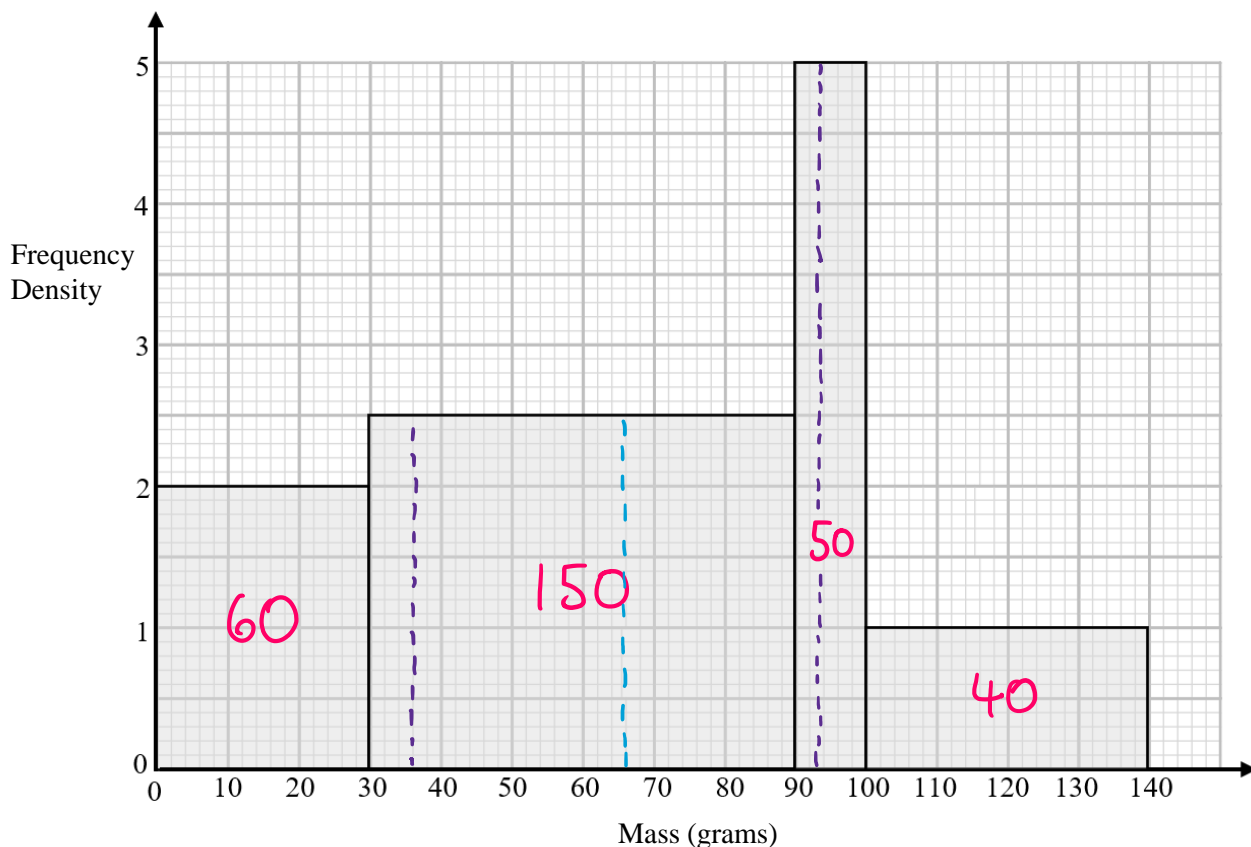
$$1 \text{ QR} = 63.3 - 24$$

..... 39.3 minutes  
(3)

(Total for Question 3 is 5 marks)



4 The histogram shows information about the masses of some apples growing in a garden.



(a) Work out an estimate for the median mass of the apples.

$$60 + 150 + 50 + 40 = 300$$

$$300 \div 2 = 150^{\text{th}} \text{ apple}$$

$$\frac{90}{150} \times 60 = 36$$

$$30 + 36 = 66$$

..... 66 ..... grams  
(2)

(b) Work out an estimate for the interquartile range of the masses of the apples.

$$300 \div 4 = 75^{\text{th}} \text{ apple}$$

$$\frac{15}{150} \times 60 = 6$$

$$30 + 6 = 36 \text{ (LQ)}$$

$$75 \times 3 = 225^{\text{th}} \text{ apple}$$

$$\frac{15}{50} \times 10 = 3$$

$$90 + 3 = 93 \text{ (UQ)}$$

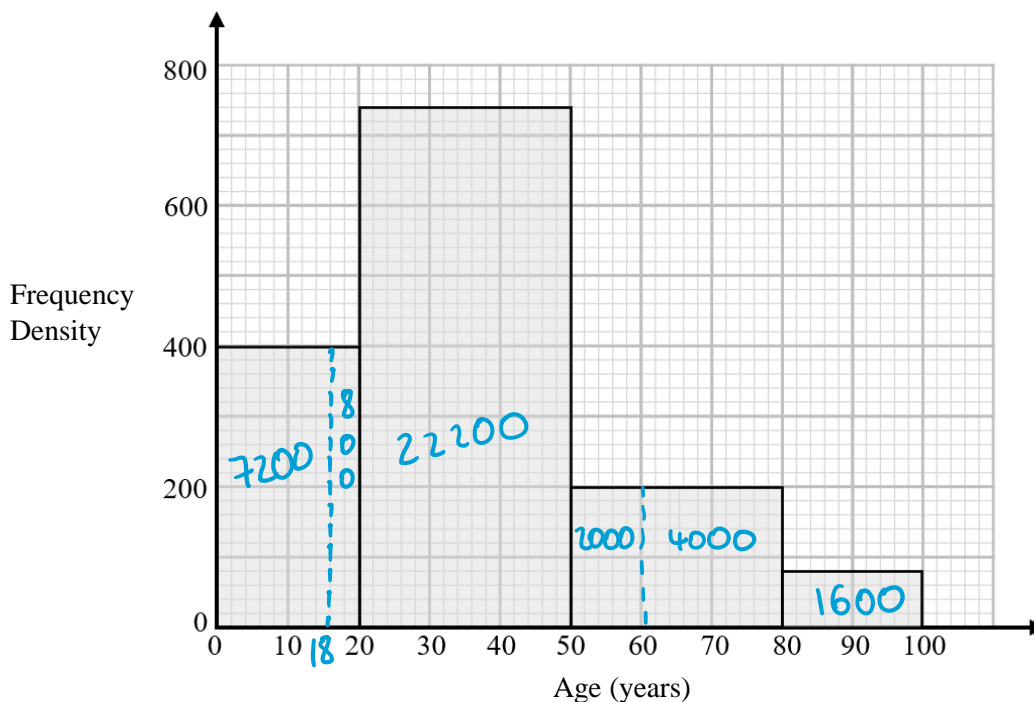
$$IQR = 93 - 36$$

..... 57 ..... grams  
(3)

(Total for Question 4 is 5 marks)



5 The histogram shows information about the ages of people attending a football match.



The table below shows the ticket prices for the football match.

Child (18 years or under)	Adult	Senior (60 years or over)
£20	£35	£25

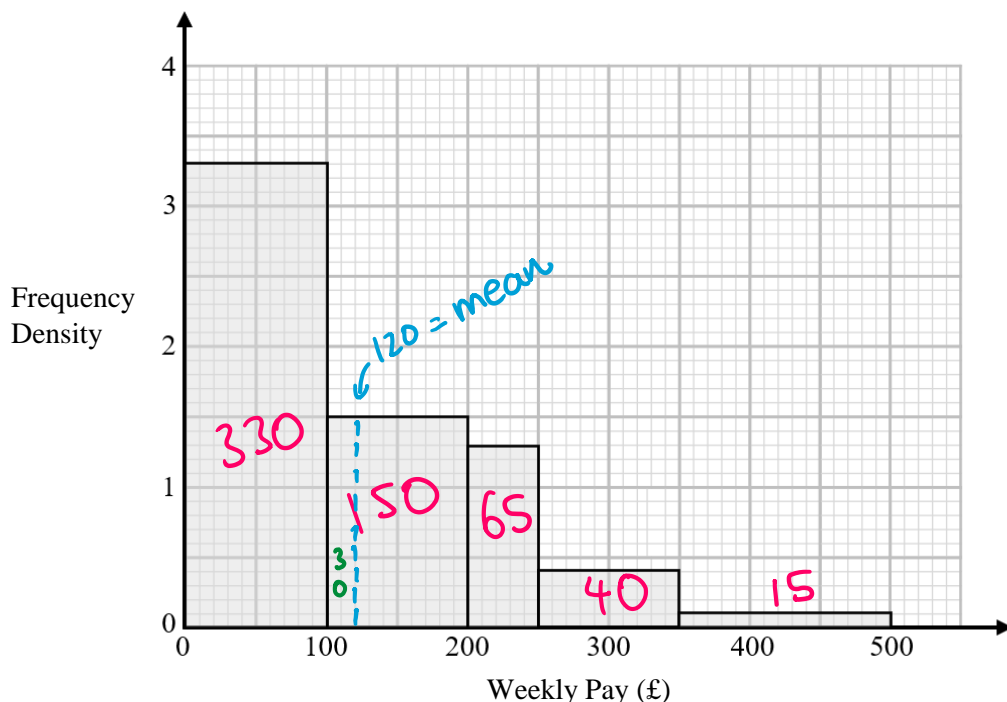
Work out how much money the football club received for ticket sales for this match.

$$\begin{aligned}
 7200 \times £20 &= £144000 \\
 25000 \times £35 &= £875000 \\
 5600 \times £25 &= \underline{£140000} \\
 &£1,159,000
 \end{aligned}$$

£ 1,159,000  
 (Total for Question 5 is 4 marks)



6 The histogram shows information about the weekly pay of 600 workers at a company.



One of the employees makes the following claim:

“60% of the workers at the company earn less than the mean weekly pay”

(a) By working out an estimate for the mean, show that the employee could be correct.

$50 \times 330 = 16500$	$72000 \div 600 = 120 \text{ (mean)}$
$150 \times 150 = 22500$	$20 \times 1.5 = 30$
$225 \times 65 = 14625$	$330 + 30 = 360$
$300 \times 40 = 12000$	$\frac{360}{600} \times 100 = \underline{\underline{60\%}}$
$425 \times \frac{15}{600} = \frac{6375}{72000}$	

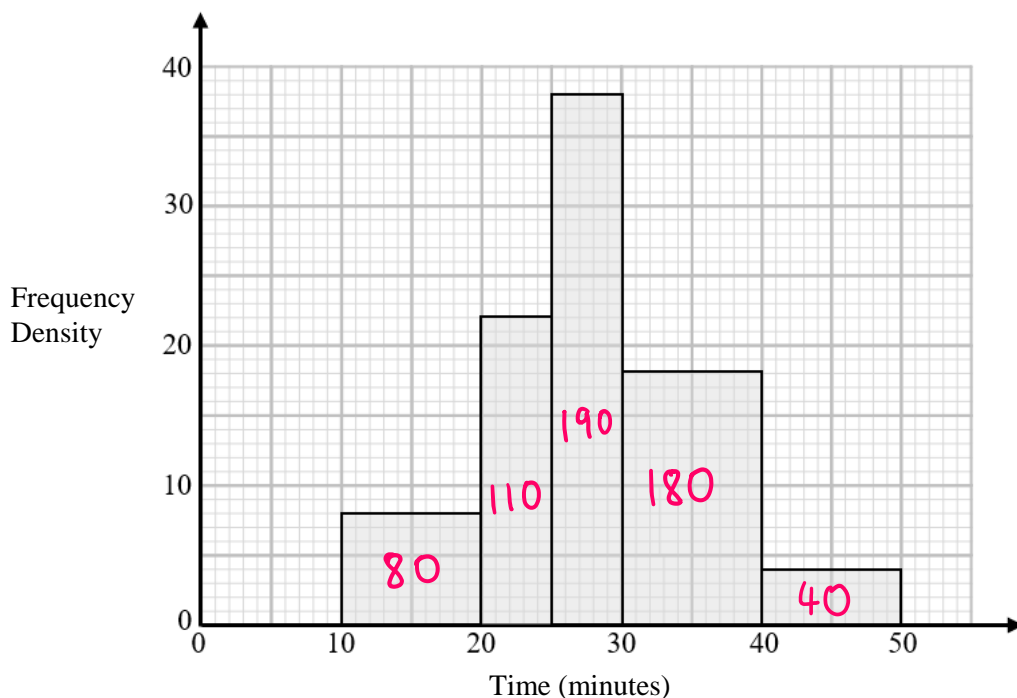
(4)

(b) Explain why your answer to part (a) does not guarantee that the employee is correct.

The mean was an estimate. The true mean could be higher or lower



7 The histogram shows information about the finish times of some runners at a 5 km race.



- (a) Runners who ran faster than the qualifying time win entry to the next race. 10% of the runners ran faster than the qualifying time.

Use the histogram to work out an estimate for the qualifying time.

$$80 + 110 + 190 + 180 + 40 = 600$$

$$10\% \text{ of } 600 = 60$$

$$\frac{60}{80} \times 10 = 7.5$$

$$10 + 7.5$$

$$\underline{\hspace{1cm} 17.5 \hspace{1cm}} \text{ minutes}$$

(4)

- (b) Sam was the 102<sup>nd</sup> person to complete the race.

Use the histogram to work out an estimate for Sam's average speed in metres per second. Give your answer to 3 significant figures.

$$\frac{22}{110} \times 5 = 1$$

$$\text{Distance} = 5000 \text{ m}$$

$$\text{Time} = 21 \times 60 = 1260 \text{ secs}$$

$$20 + 1 = 21 \text{ mins}$$

$$\text{Speed} = \frac{5000}{1260}$$

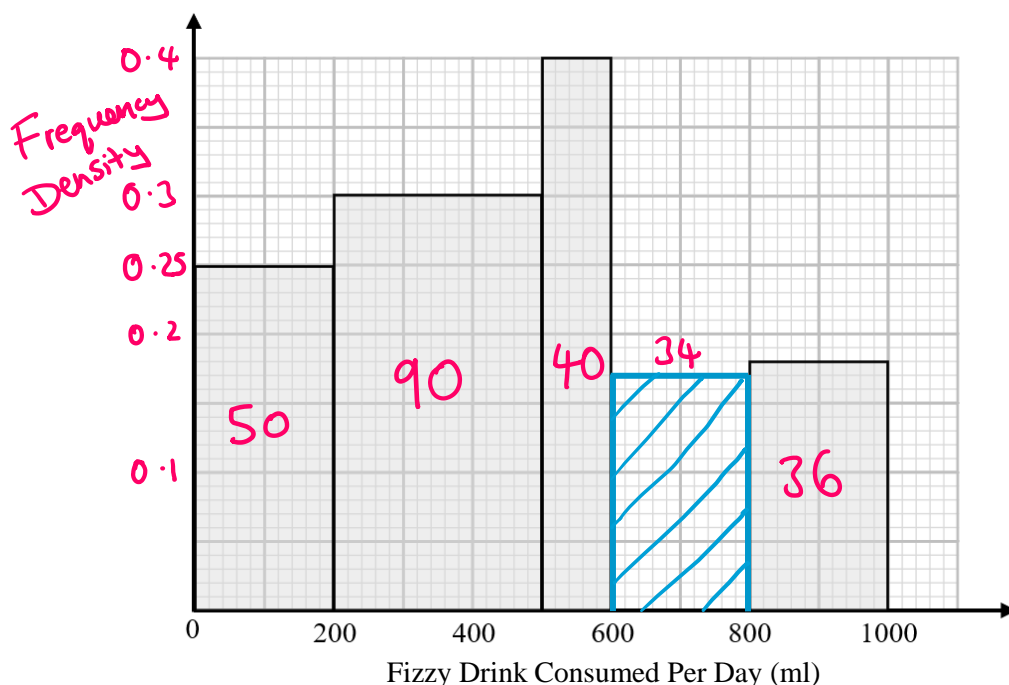
$$\underline{\hspace{1cm} 3.97 \hspace{1cm}} \text{ m/s}$$

(4)

(Total for Question 7 is 8 marks)



8 The histogram shows information about the amount of fizzy drink consumed per day by some Year 9 students in a particular city.



- (a) 50 students consumed between 0 and 200 ml of fizzy drinks per day.  
 34 students consumed between 600 and 800 ml of fizzy drinks per day.  
 No students consumed more than 1000 ml of fizzy drinks per day.  
 Complete the histogram.

$$FD = \frac{50}{200} = 0.25$$

$$FD = \frac{34}{200} = 0.17$$

(3)

- (b) In the city there are 12,000 Year 9 students.  
 Use the histogram to estimate how many of the students in the city consume more than 800 ml of fizzy drink per day.

$$50 + 90 + 40 + 34 + 36 = 250$$

$$\frac{36}{250} \times 12000 = 1728$$

1728

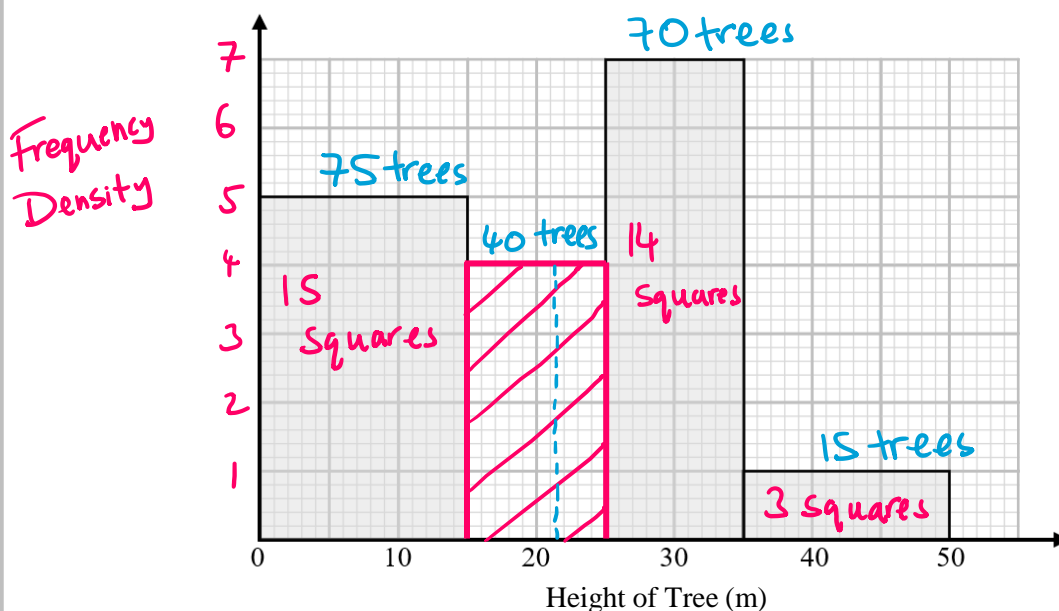
(3)

(Total for Question 8 is 6 marks)





- 9 The histogram shows information about the heights of 200 trees in a park. The histogram is incomplete.



- (a) 40 of the trees were between 15 metres and 25 metres in height. None of the trees had a height of more than 50 metres. Complete the histogram.

$$200 - 40 = 160$$

$$32 \text{ squares} = 160 \text{ trees}$$

$$8 \text{ squares} = 40 \text{ trees}$$

(3)

- (b) Work out an estimate for the median height of the 200 trees.

$$200 \div 2 = 100^{\text{th}} \text{ tree}$$

$$\frac{25}{40} \times 10 = 6.25$$

$$15 + 6.25 = 21.25$$

$$\underline{\underline{21.25}} \text{ m}$$

(2)

- (c) Trees that are taller than 40 metres are deemed to be too tall. The park ranger arranges for the trees taller than 40 metres to be trimmed so that they are exactly 35 metres tall.

How does the trimming of these trees affect your answer to part (b)?

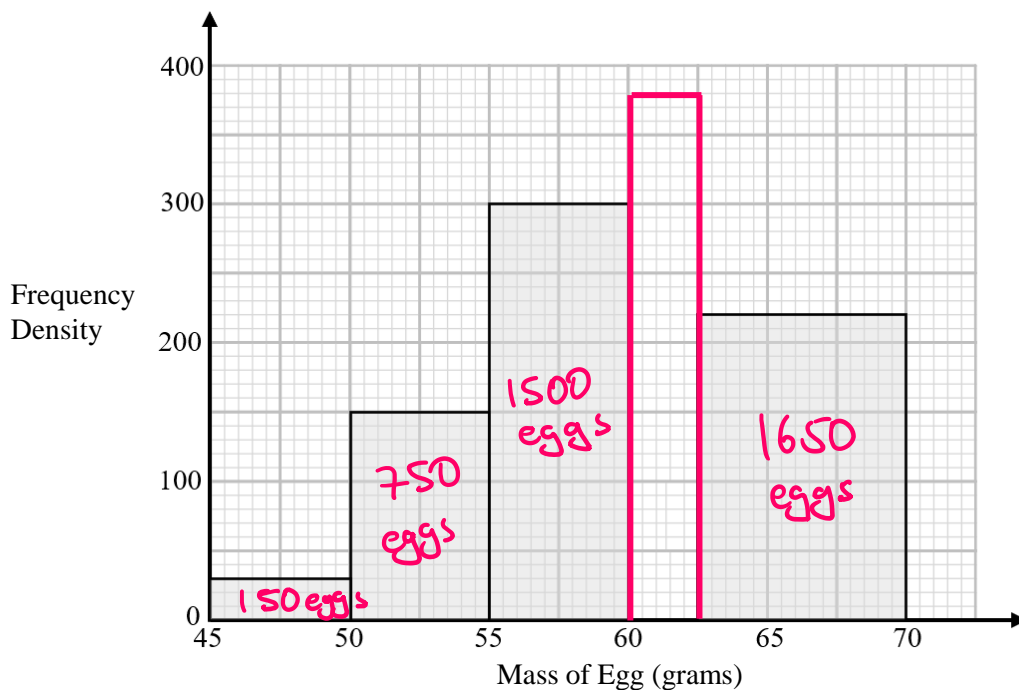
There is no change.  
The median is still 21.25m

(1)

(Total for Question 9 is 6 marks)



10 The histogram shows information about the masses of some eggs produced on a farm during a year.



- (a) 30% of the eggs produced had a mass between 55g and 60g.  
None of the eggs produced had a mass greater than 70g or less than 45g.  
Complete the histogram.

$$\begin{aligned}
 300 \times 5 &= 1500 \text{ eggs} & 150 + 750 + 1500 \\
 30\% &= 1500 \text{ eggs} & \quad + 1650 = 4050 \\
 100\% &= 5000 \text{ eggs} & 5000 - 4050 = 950 \\
 & & 950 \div 2.5 = \underline{380} \quad (3)
 \end{aligned}$$

- (b) Eggs that have a mass of between 55g and 70g are sold at a market.  
Work out the percentage of the eggs produced on the farm that were sold at the market.

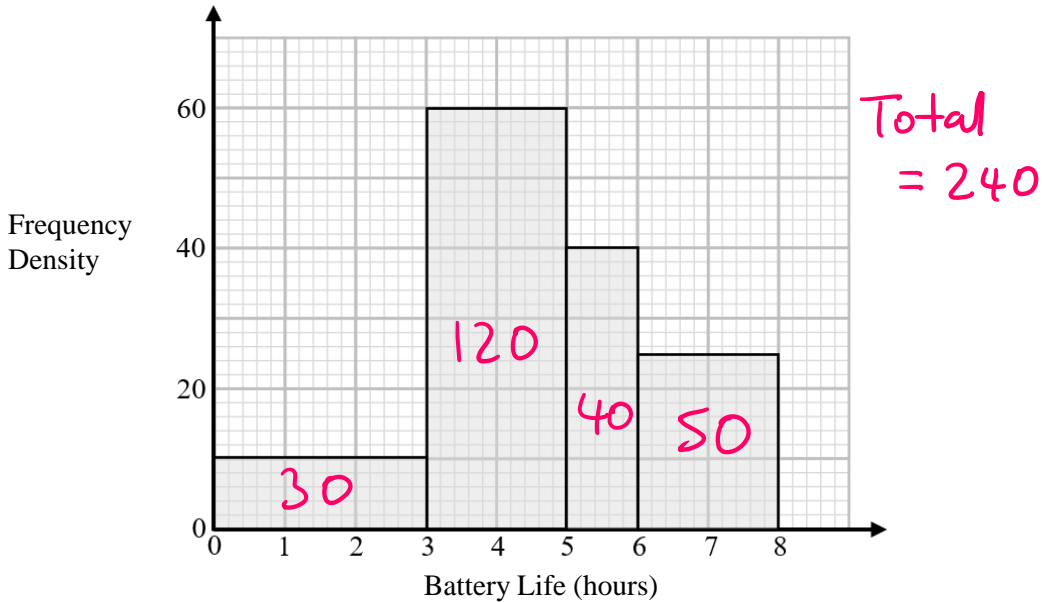
$$\begin{aligned}
 950 + 1650 &= 2600 \\
 \frac{2600}{5000} \times 100 &= 52\%
 \end{aligned}$$

..... 52 ..... %  
(3)

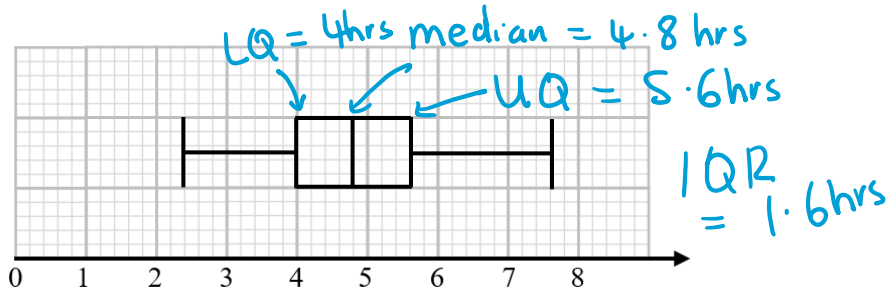
(Total for Question 10 is 6 marks)



11 Steve tested two different types of mobile phone battery to see how long they lasted on one charge. He tested 240 batteries from **Company A** and 240 batteries from **Company B**. The histogram shows information about the batteries from **Company A**.



The box plot shows information about the batteries from **Company B**.



Compare the distribution of battery lives from **Company A** and **Company B**.

$LQ = 60^{th} = 3.5 \text{ hrs}$     
  $Median = 120^{th} = 4.5 \text{ hrs}$     
  $UQ = 180^{th} = 5.75 \text{ hrs}$     
 IQR = 2.25 hrs    
 [7 marks]

Batteries from company B lasted longer on average as they had a higher median

The battery life of company B's batteries was more consistent as they had a lower Interquartile range.

(Total for Question 11 is 7 marks)

