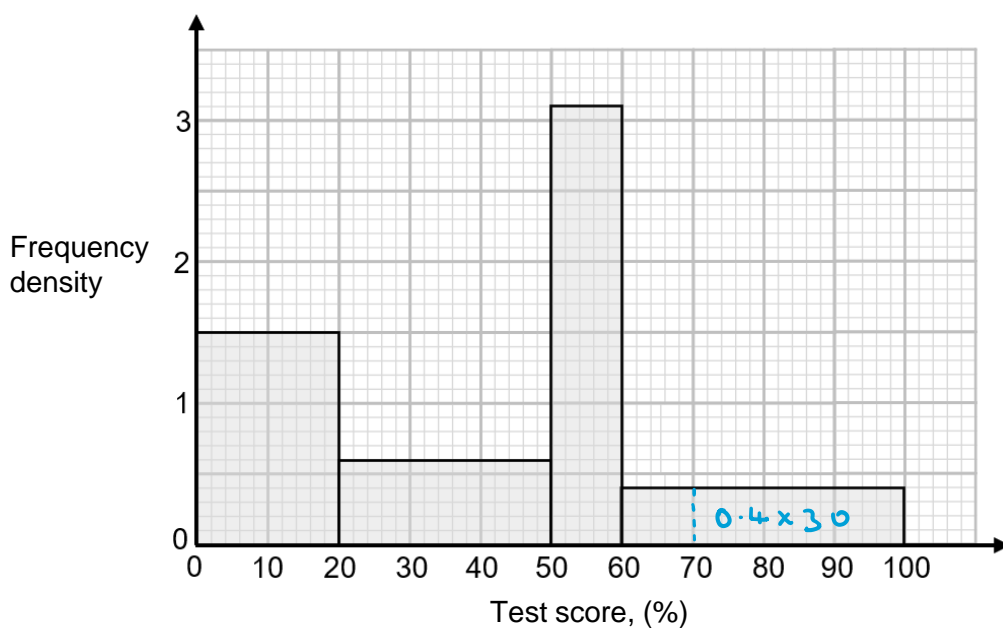# Interpreting Histograms

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

Frequency density

Test score, (%)

0·4 x 30

1 (a) Complete the frequency table for this information. **[2 marks]**

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

1 (b) Work out an estimate for the number of students who scored more than 70% in the test. **[2 marks]**
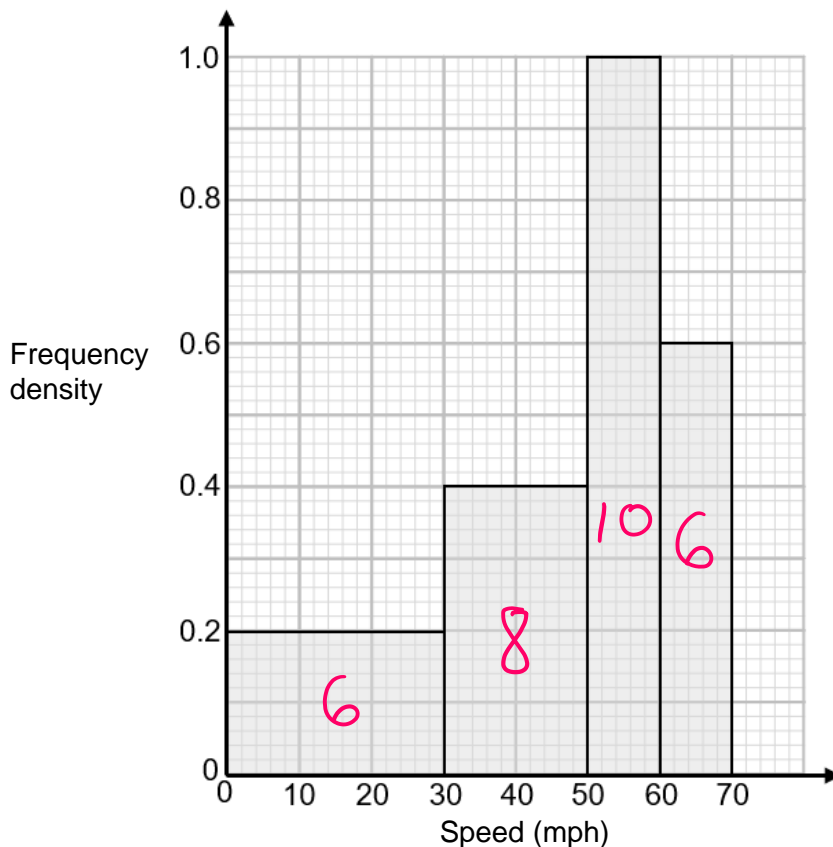
$0·4 \times 30 = 12$

Answer _____12_____

4

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

Frequency density

1.0

0.8

0.6

0.4

0.2

0

0 10 20 30 40 50 60 70

Speed (mph)

6

8

10 6

2 (a) The speed limit on the road is 60 mph.
Work out the percentage of the vehicles that were exceeding the speed limit.

[2 marks]

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

Answer _____ 20 _____ %

2 (b) Work out an estimate for the mean speed of the 30 vehicles. **[4 marks]**

$15 \times 6 = 90$ $90 + 320 + 550 + 390$

$40 \times 8 = 320$ $= 1350$

$55 \times 10 = 550$
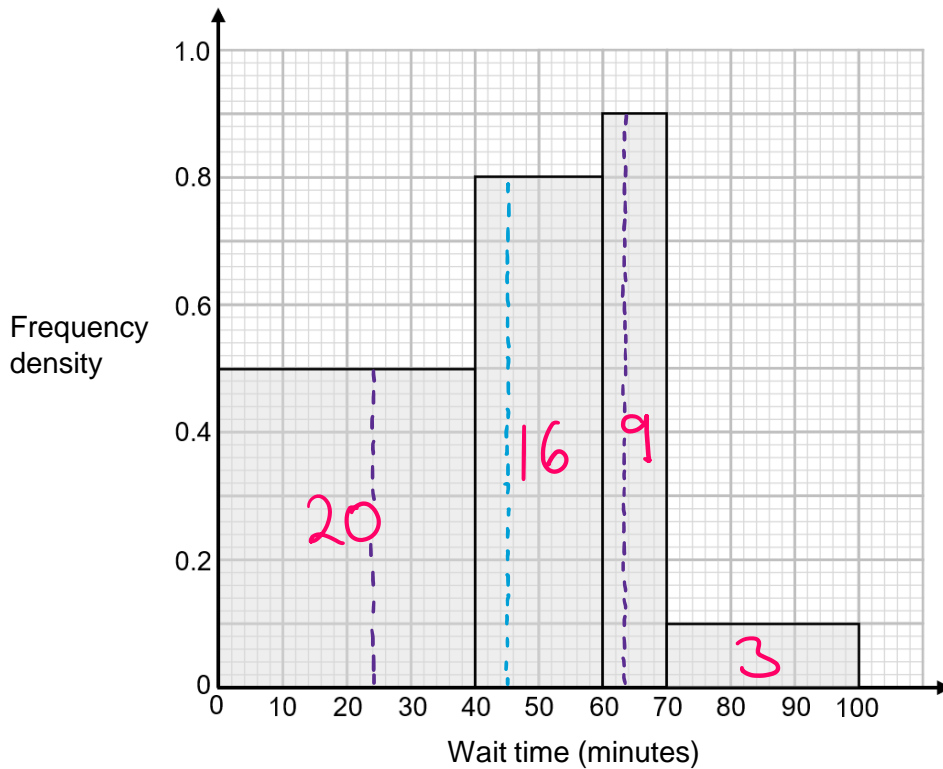
$65 \times 6 = 390$ $1350 \div 30 = 45$

Answer _____ 45 _____ mph

1st

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

Wait time (minutes)

3 (a)   Work out an estimate for the median time spent waiting.   **[2 marks]**

$20 + 9 + 16 + 3 = 48$ $\frac{4}{16} \times 20 = 5$

$48 \div 2 = 24^{th}$ person $40 + 5 = 45$

Answer _____ 45 _____ minutes

3 (b)   Work out an estimate for the interquartile range of the wait times.   **[3 marks]**

$48 \div 4 = 12^{th}$ person $12 \times 3 = 36^{th}$ person

$\frac{12}{20} \times 40 = 24$ $\frac{3}{9} \times 10 = 3.\dot{3}$

$0 + 24 = 24$ (LQ) $60 + 3.\dot{3} = 63.\dot{3}$ (UQ)

$IQR = 63.\dot{3} - 24$

$39.\dot{3}$

Answer _____ 39.3 _____ minutes

11

Turn over ▶

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

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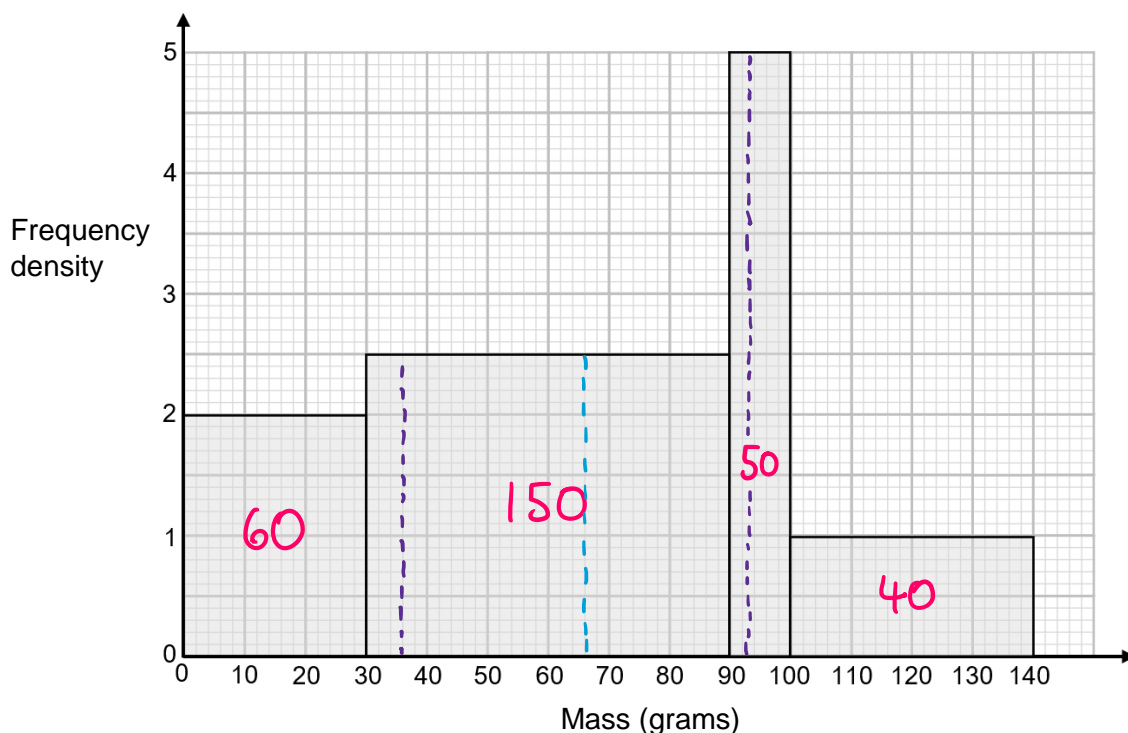
4 (a) Work out an estimate for the median mass of the apples.

[2 marks]

$60 + 150 + 50 + 40 = 300$ $\frac{90}{150} \times 60 = 36$

$300 \div 2 = 150^{th}$ apple $30 + 36 = 66$

Answer   **66**   grams

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

[3 marks]

$300 \div 4 = 75^{th}$ apple $75 \times 3 = 225^{th}$ apple

$\frac{15}{150} \times 60 = 6$ $\frac{15}{50} \times 10 = 3$
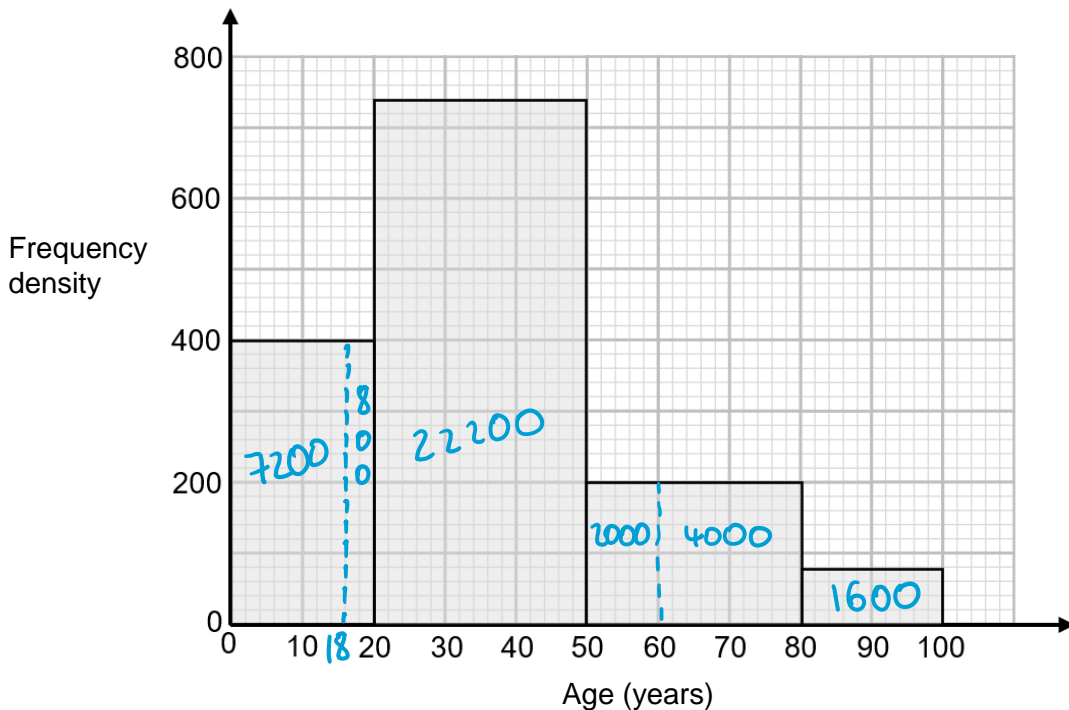
$30 + 6 = 36 \, (LQ)$ $90 + 3 = 93 \, (UQ)$

$IQR = 93 - 36$

Answer   **57**   grams

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

Frequency density

Age (years)

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.

[4 marks]

$7200 \times £20 = £144\,000$
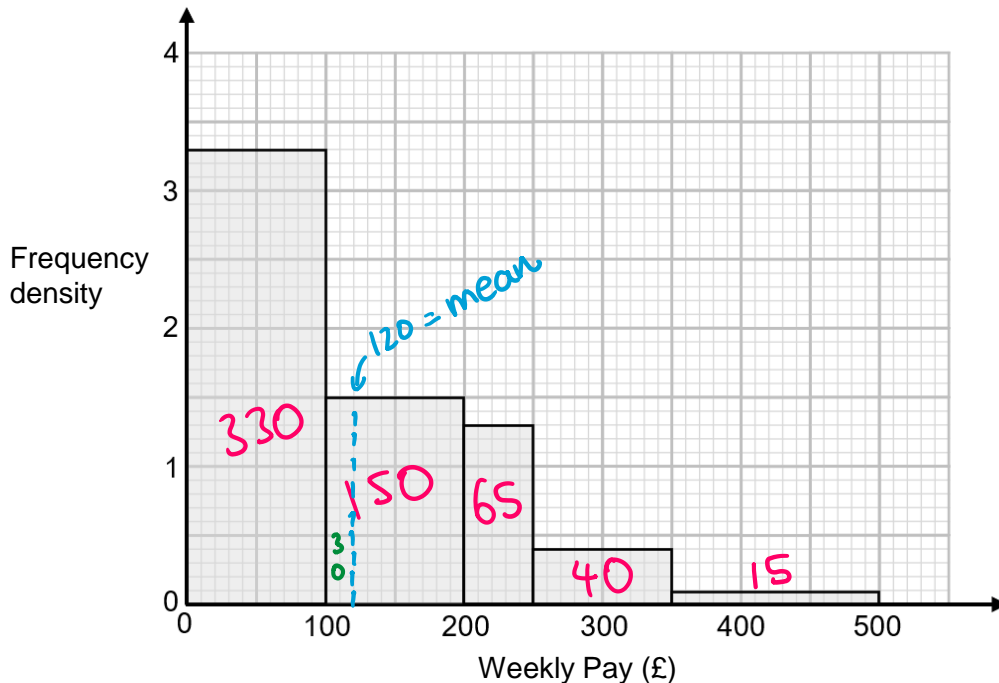
$25000 \times £35 = £875\,000$

$5600 \times £25 = £140\,000$

$£1{,}159{,}000$

Answer £ ____1,159,000____

9

Turn over ▶

© 1stclassmaths

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

6 (a) One of the employees makes the following claim:

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

By working out an estimate for the mean, show that the employee may be correct.

[4 marks]

$50 \times 330 = 16500$ $72000 \div 600 = 120 \, (\text{mean})$

$150 \times 150 = 22500$ $20 \times 1.5 = 30$

$225 \times 65 = 14625$ $330 + 30 = 360$

$300 \times 40 = 12000$ $\dfrac{360}{600} \times 100 = \underline{\underline{60\%}}$

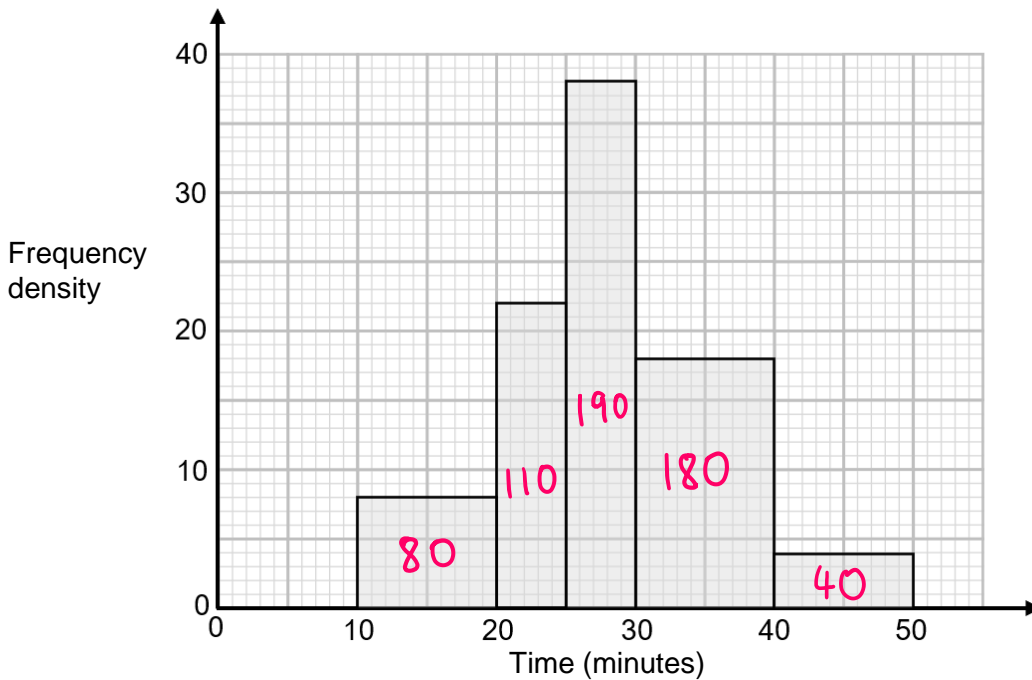$425 \times 15 = \dfrac{6375}{600} \quad \dfrac{}{72000}$

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

[1 mark]

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

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

7 (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.
Work out an estimate for the qualifying time. **[4 marks]**

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

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

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

17.5

Answer _____ 17.5 _____ minutes

7 (b) Sam was the 102nd person to complete the race.
Work out an estimate for Sam's average speed in metres per second.
Give your answer to 3 significant figures. **[4 marks]**

$\frac{22}{110} \times 5 = 1 \qquad$ Distance $= 5000\,m$

$\qquad$ Time $= 21 \times 60 = 1260\,secs$

$20 + 1 = 21\,mins \qquad$ Speed $= \frac{5000}{1260}$

3.97

Answer _____ 3.97 _____ m/s

13

Turn over ▶

© 1stclassmaths

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

Fizzy Drink Consumed Per Day (ml)
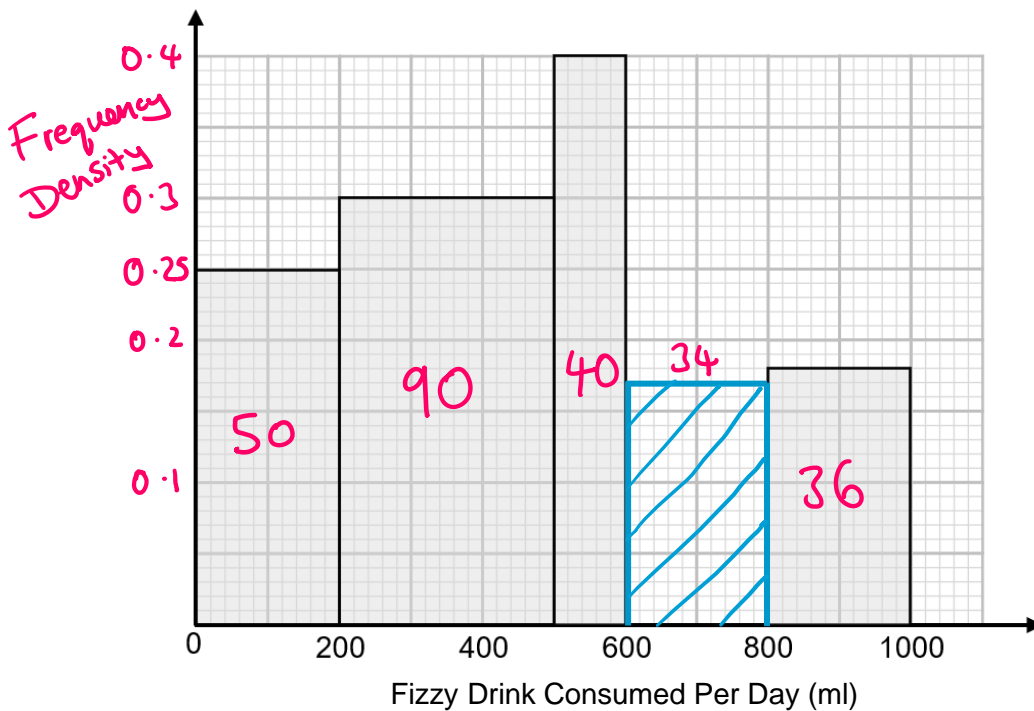
8 (a)   50 students consumed between 0 and 200 ml of fizzy drinks per day.
34 students consumed between 600 and 800 ml of fizzy drinks per day.
No students consumed more than 1000 ml of fizzy drinks per day.
Complete the histogram.   **[3 marks]**

$$FD = \frac{50}{200} \qquad FD = \frac{34}{200}$$

$$= 0.25 \qquad = 0.17$$

8 (b)   In the city there are 12,000 Year 9 students.
Estimate how many of the students in the city consume more than 800 ml of fizzy drink per day.   **[3 marks]**
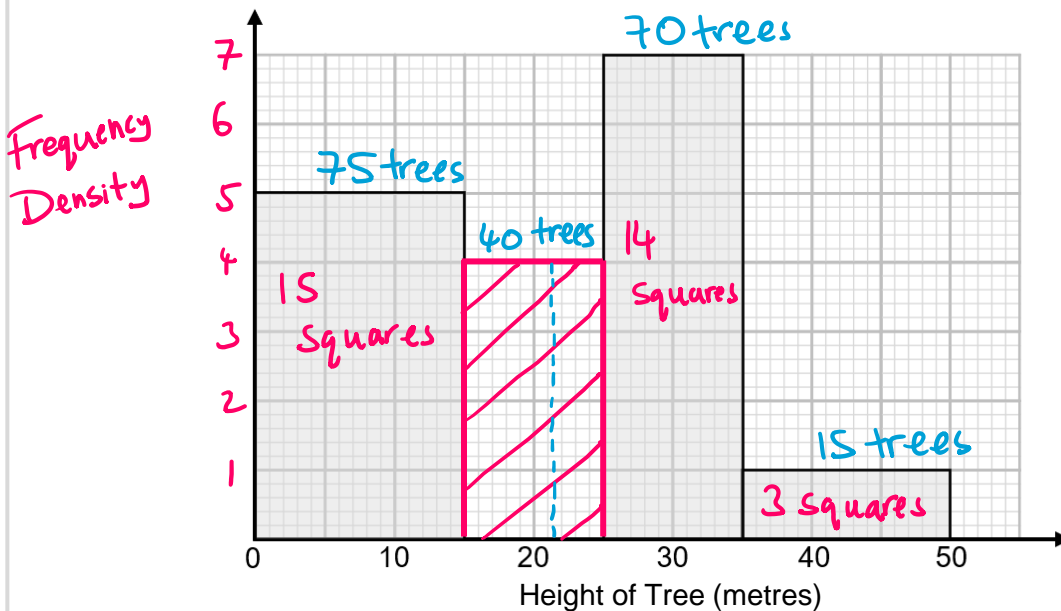
$$50 + 90 + 40 + 34 + 36 = 250$$

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

Answer _____ 17 28 _____

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

70 trees

Frequency Density

75 trees

40 trees 14 Squares

15 Squares

15 trees

3 squares

Height of Tree (metres)

9 (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.

[3 marks]

$200 - 40 = 160$

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

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

9 (b) Work out an estimate for the median height of the 200 trees. **[2 marks]**

$200 \div 2 = 100^{th} \text{ tree}$ $\frac{25}{40} \times 10 = 6.25$

$15 + 6.25 = 21.25$

Answer _____ 21.25 _____ metres

9 (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 the median height?
Tick one box. **[1 mark]**

☐ Median height increases   ☐ Median height decreases
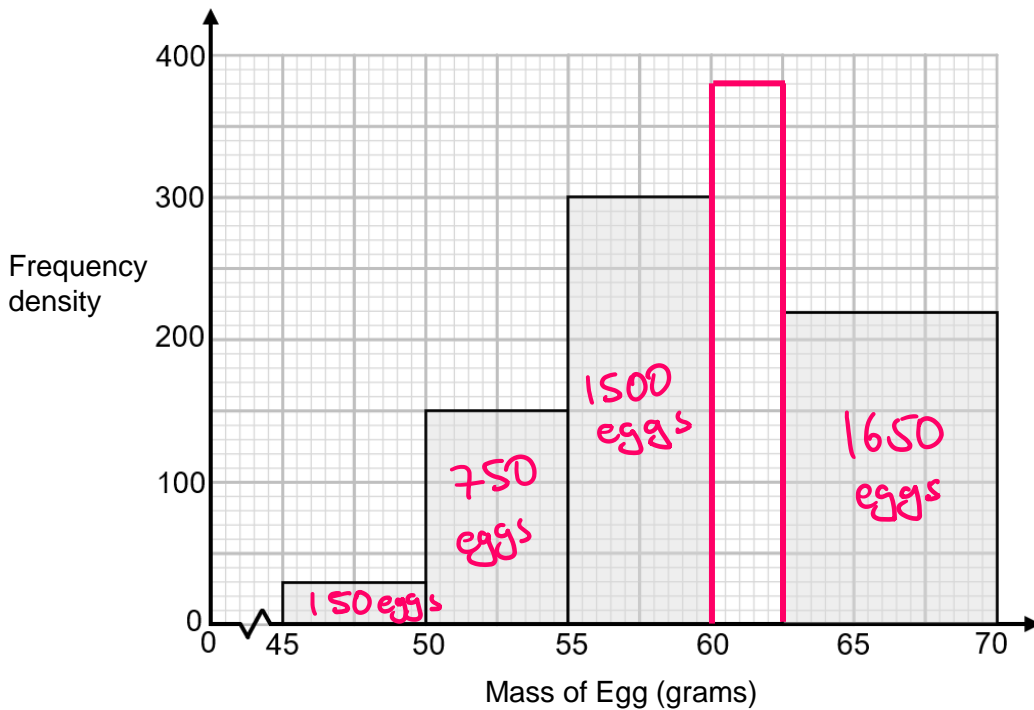
☑ Median height is unchanged   ☐ It is not possible to tell

12

Turn over ►

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

Frequency density

Mass of Egg (grams)

Handwritten annotations on histogram: 150 eggs, 750 eggs, 1500 eggs, 1650 eggs

10 (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.

[3 marks]

$300 \times 5 = 1500$ eggs

$30\% = 1500$ eggs

$100\% = 5000$ eggs

$150 + 750 + 1500 + 1650 = 4050$

$5000 - 4050 = 950$

$950 \div 2.5 = \underline{380}$

10 (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.

[3 marks]

$950 + 1650 = 2600$

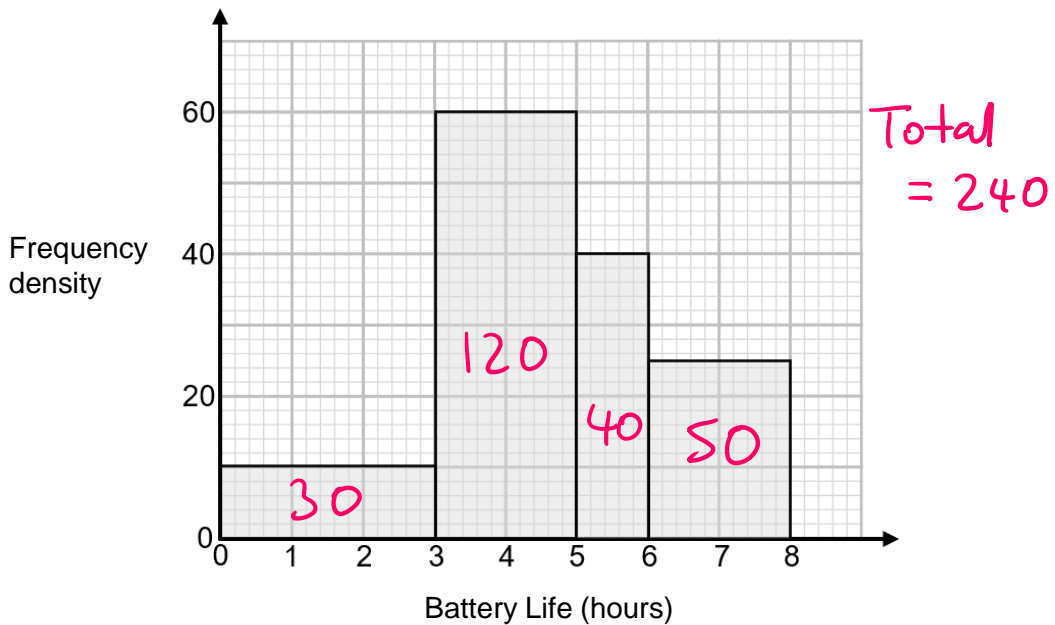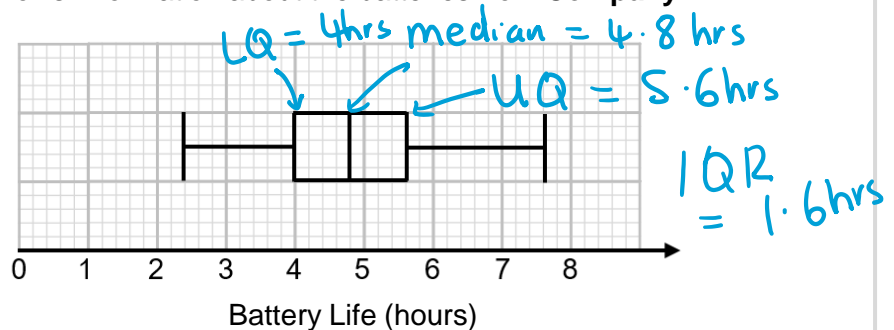$\dfrac{2600}{5000} \times 100 = 52\%$

Answer _____ **52** _____ %

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**.

Frequency density (vertical axis)
Battery Life (hours) (horizontal axis)

Total = 240

30　120　40　50

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

LQ = 4hrs　median = 4.8 hrs
UQ = 5.6hrs
IQR = 1.6hrs

Battery Life (hours)

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

[7 marks]

LQ = 60th　Median = 120th　UQ = 180th　IQR
= 3.5hrs　= 4.5 hrs　= 5.75hrs　= 2.25hrs

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

13