

Higher tier unit 14a check in test

Calculator

- Q1. Mr and Mrs Jennings are planning a holiday to Italy.
They will go on holiday with their 11 year old daughter.
The table below shows some information about the prices of flights.

Flight to Italy		Flight from Italy	
Date	Price per adult (£)	Date	Price per adult (£)
28th October	282	4th November	305
29th October	283	5th November	303
30th October	282	6th November	285
31st October	272	7th November	283
Child fares			
0 to 2 years old		No charge	
Over 2 to 12 years old		75% of the adult fare	

Mr and Mrs Jennings and their daughter want to fly to Italy on 29th October.
They want to fly back from Italy on 6th November.
How much do their flights cost in total?

- Q2. The Kumar family are going to go to New York.
They will go with Highway Airlines or Jetstream Airlines.
The tables show how much it costs for each adult and each child to go with these airlines.

Highway Airlines

Date	Adult	Child
4 – 10 July	£475	£280
11 – 17 July	£488	£282
18 – 24 July	£516	£304
25 – 31 July	£506	£297
1 – 7 August	£462	£251
8 – 14 August	£430	£238
15 – 21 August	£421	£235
22 – 28 August	£399	£221

Jetstream Airlines

Date	Adult	Child
4 – 10 July	£483	£286
11 – 17 July	£493	£296
18 – 24 July	£526	£315
25 – 31 July	£519	£303
1 – 7 August	£485	£218
8 – 14 August	£429	£245
15 – 21 August	£409	£232
22 – 28 August	£401	£222

Highway Airlines give a discount of 5% of the total cost for booking online.
Jetstream Airlines give a discount of £25 per person for booking online.

The Kumar family are going to New York on 3 August.
They will buy 2 adult tickets and 1 child ticket.
They will book online.

The Kumar family want to pay the lower total cost.
Which airline should they choose?

- Q3. Nathan is doing a survey about DVDs.
He writes a questionnaire.
Nathan decides to hand out his questionnaire to the women who are inside a DVD store.
His sample is biased.

Give **two** possible reasons why.

- Q4. Mr and Mrs Jones are planning a holiday to the Majestic Hotel in the Cape Verde Islands.
The table gives information about the prices of holidays to the Majestic Hotel.

MAJESTIC HOTEL, Cape Verde Islands		
Departures	Price per adult	
	7 nights	14 nights
1 Jan – 8 Jan	£ 694	£ 825
9 Jan – 28 Jan	£ 679	£ 804
29 Jan – 5 Feb	£ 687	£ 815
6 Feb – 18 Feb	£ 769	£ 835
19 Feb – 8 Mar	£ 714	£ 817
9 Mar – 31 Mar	£ 685	£ 805
1 April – 9 April	£ 788	£ 862
10 April – 30 April	£ 748	£ 802
Price per child: 95% of adult price for 7 nights or 85% of adult price for 14 nights.		

Mr and Mrs Jones are thinking about going on holiday

on 20 February for 7 nights

on 10 April for 14 nights.

Mr and Mrs Jones have 2 children.

Compare the costs of these two holidays for the Jones family.

- Q5. Jon and Alice are planning a holiday.
They are going to stay at a hotel.
The table shows information about prices at the hotel.

	Price per person per night (£)		Dinner (£)
	Double room	Single room	per person per day
01 Nov – 29 April	59.75	118.00	31.75
30 April – 08 July	74.25	147.00	31.00
09 July – 29 Aug	81.75	161.75	31.00
30 Aug – 31 Oct	74.25	147.00	31.00
Saver Prices 5 nights for the price of 4 nights from 1st May to 4th July. 3 nights for the price of 2 nights in November.			

Jon and Alice will stay in a double room.
They will eat dinner at the hotel every day.
They can stay at the hotel for 3 nights in June or 4 nights in November.
Which of these holidays is cheaper?

- Q6. There are 1200 students at a school.
Kate is helping to organise a party.
She is going to order pizza.
Kate takes a sample of 60 of the students at the school.
She asks each student to tell her **one** type of pizza they want.
The table shows information about her results.

Pizza	Number of students
ham	20
salami	15
vegetarian	8
margherita	17

Work out how much ham pizza Kate should order.

- Q7. There are 1200 students at a school.
Kate is helping to organise a party.
She is going to order pizza.
Kate takes a sample of 60 of the students at the school.
She asks each student to tell her **one** type of pizza they want.
The table shows information about her results.

Pizza	Number of students
ham	20
salami	15
vegetarian	8
margherita	17

Kate orders 400 pizzas.

Write down any assumptions Kate has made **and** explain how these could affect her order.

- Q8. A farmer wants to estimate the number of rabbits on his farm.
On Monday he catches 120 rabbits.
He puts a tag on each rabbit.
He then lets the rabbits run away.
On Tuesday the farmer catches 70 rabbits.
15 of these rabbits have a tag on them.

Work out an estimate for the total number of rabbits on the farm.
You must write down any assumptions you have made.

- Q9. Clive wants to estimate the number of bees in a beehive.
Clive catches 50 bees from the beehive.
He marks each bee with a dye.
He then lets the bees go.
The next day, Clive catches 40 bees from the beehive.
8 of these bees have been marked with the dye.

Work out an estimate for the total number of bees in the beehive.
Write down any assumptions you have made.

- Q10. Toga wants to estimate the number of termites in a nest.
On Monday Toga catches 80 termites.
He puts a mark on each termite.
He then puts all 80 termites back in the nest.
On Tuesday Toga catches 60 termites.
12 of these termites have a mark on them.

Work out an estimate for the total number of termites in the nest.
You must write down any assumptions you have made.

Topics listed in objectives

Decide what data to collect and what analysis is needed

Understand primary and secondary sources

Consider fairness

Understand what is meant by a sample and a population

Understand how different sample sizes may affect the reliability of conclusions drawn

Identify possible sources of bias and plan to eliminate them

Answers

Q1. $283 + 283 + 212.75 + 285 + 285 + 213.75 = \text{£}1562.50$

Q2. Highway $\text{£}1116.25$, Jetstream $\text{£}1113$, so Jetstream cheaper by $\text{£}3.25$

Q3. Nathan only asked females, and only in one store

Q4. Feb: $714 + 714 + 678.3 + 678.3 = 2784.60$, April: $802 + 802 + 681.7 + 681.7 = 2967.40$, so Feb holiday is cheaper by $\text{£}182.80$, but April holiday is cheaper per day 211.96 against 397.80

Q5. June: $74.25 \times 6 + 31 \times 6 = 631.50$, Nov: $59.75 \times 6 + 31.75 \times 8 = 612.50$, so Nov holiday cheaper by $\text{£}19.00$

Q6. 400

Q7. Kate is assuming sample is representative of population and everyone goes to the party

Q8. $(120/70) \times 15 = 560$, assuming sample is random, population hasn't changed overnight

Q9. $(50/8) \times 40 = 250$, assuming sample is random, fixed population

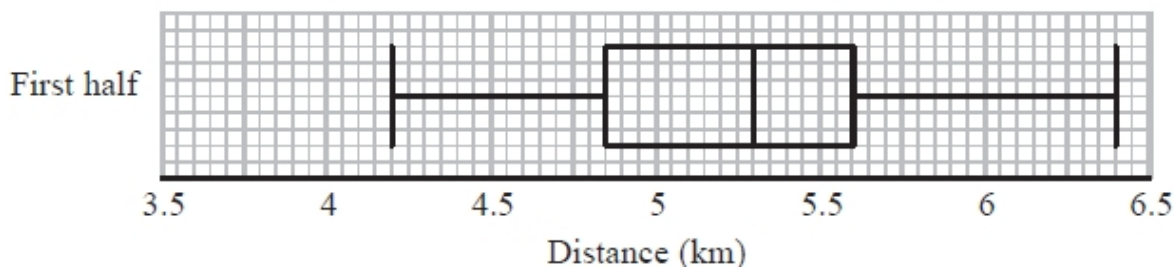
Q10. $(80/12) \times 60 = 400$, assuming sample is random, population hasn't changed overnight

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Calculator

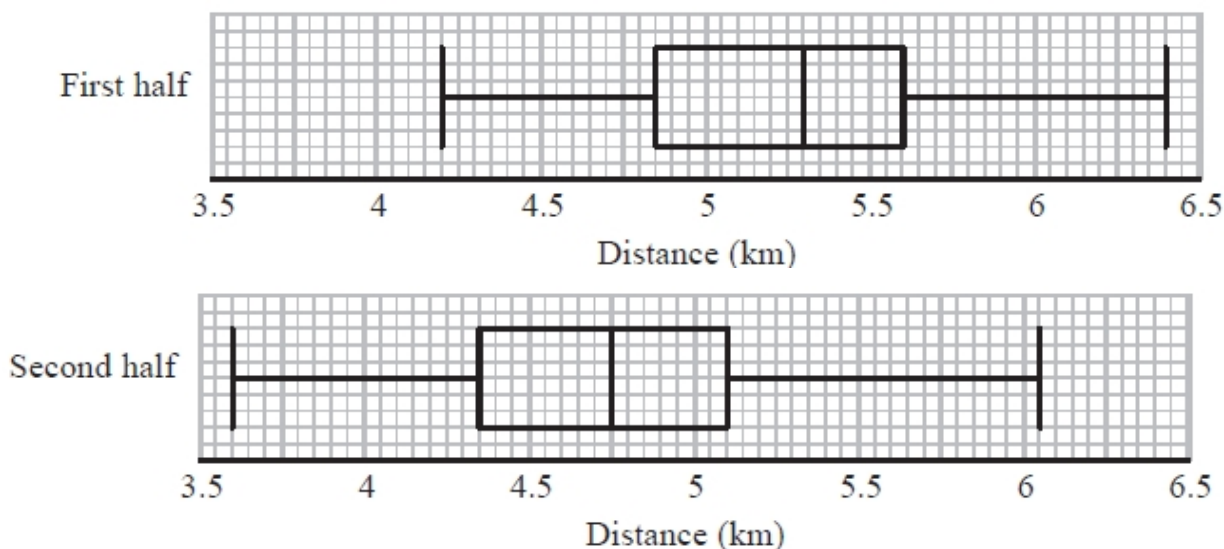
[Q1–3 linked]

- Q1. Colin took a sample of 80 football players.
He recorded the total distance, in kilometres, each player ran in the first half of their matches on Saturday.
Colin drew this box plot for his results.



Work out the interquartile range.

- Q2. Using the box plot in question 1, work out the number of players who ran a distance of more than 5.6 km in the first half.
- Q3. Colin then recorded the total distance, in kilometres, each player ran in the second half of their matches on Saturday.
Colin drew these box plots for his results for each half.

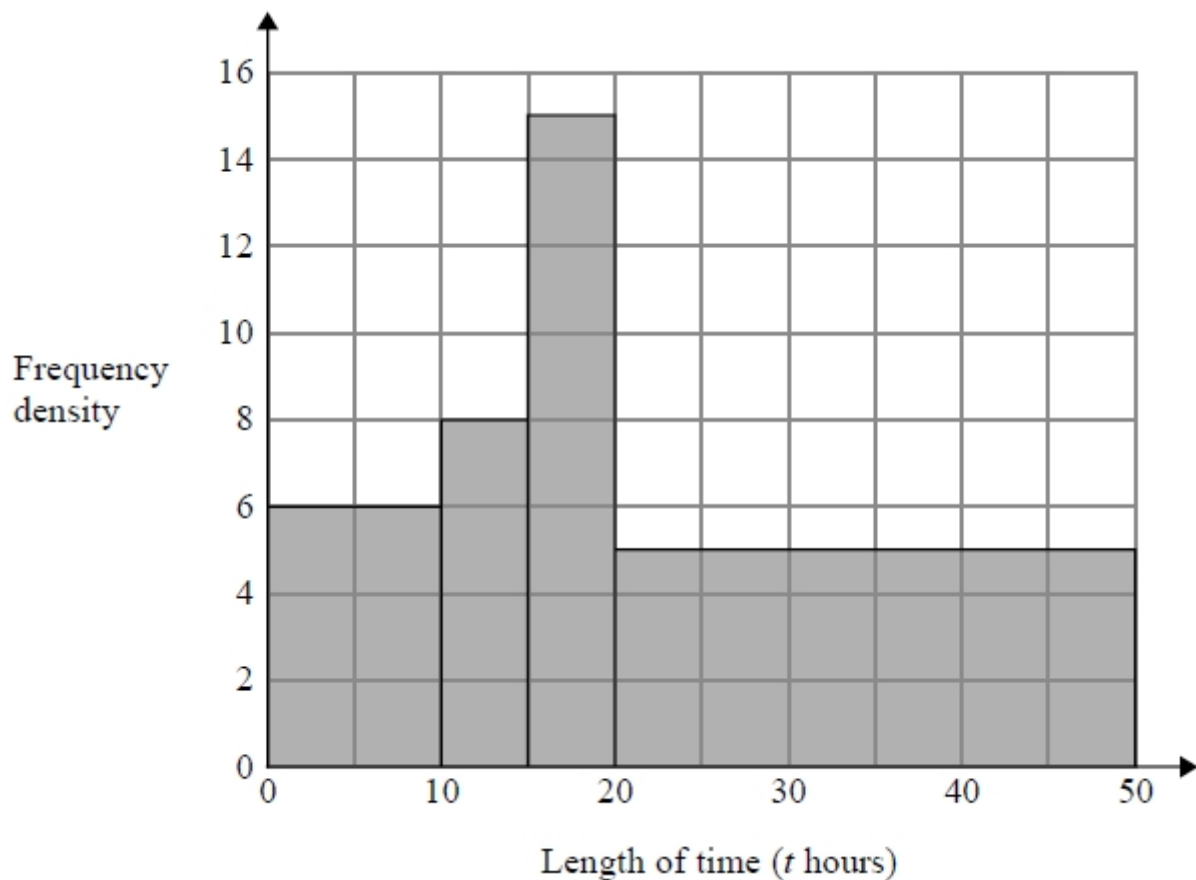


Compare the distribution of the distances run in the first half with the distribution of the distances run in the second half.

- Q4. 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

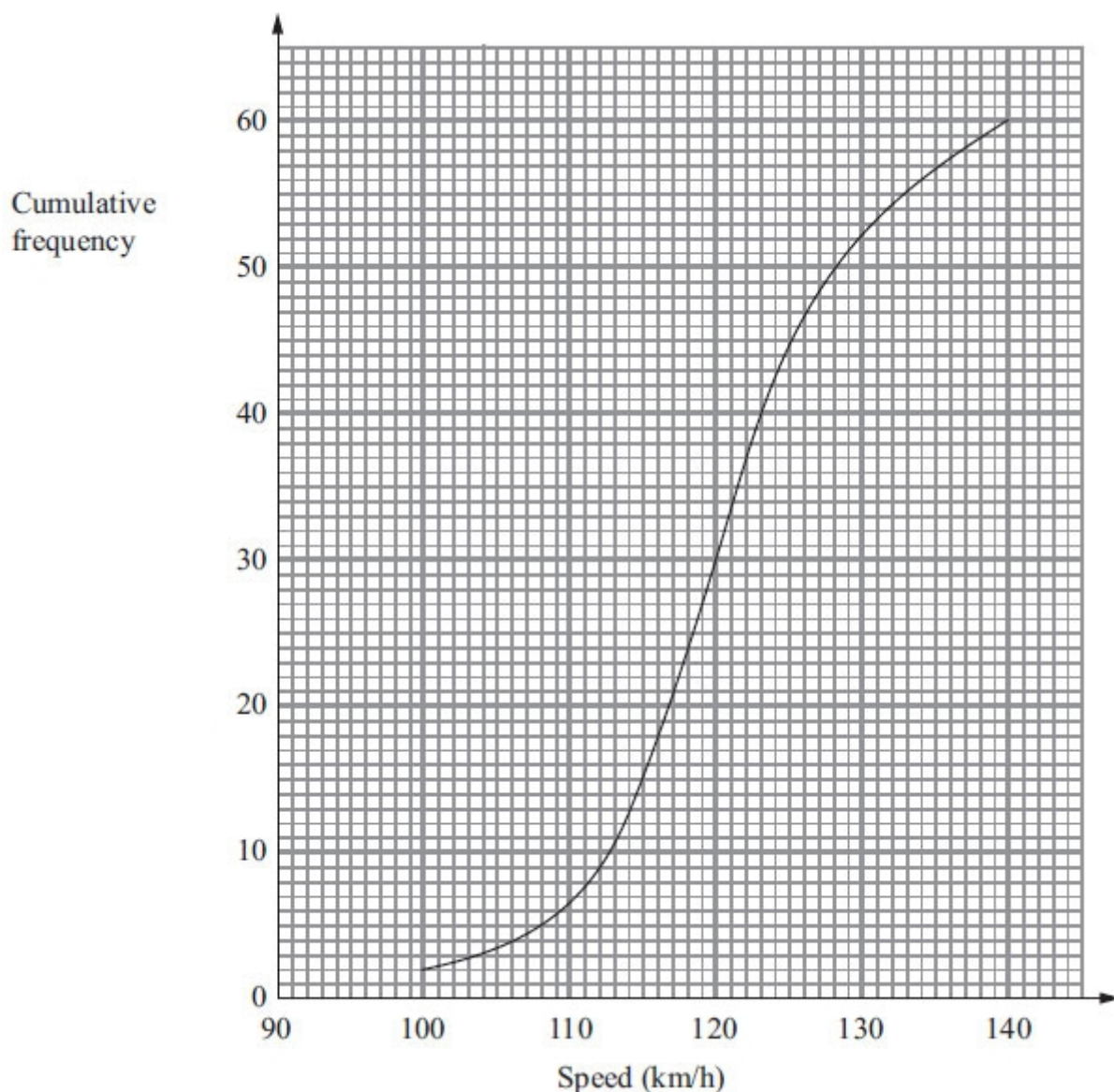
Bhavna made some mistakes when she drew a histogram for this information.



Write down **two** mistakes Bhavna made.

[Q5–6 linked]

Q5. The cumulative frequency graph shows information about the speeds of 60 cars on a motorway one Sunday morning.



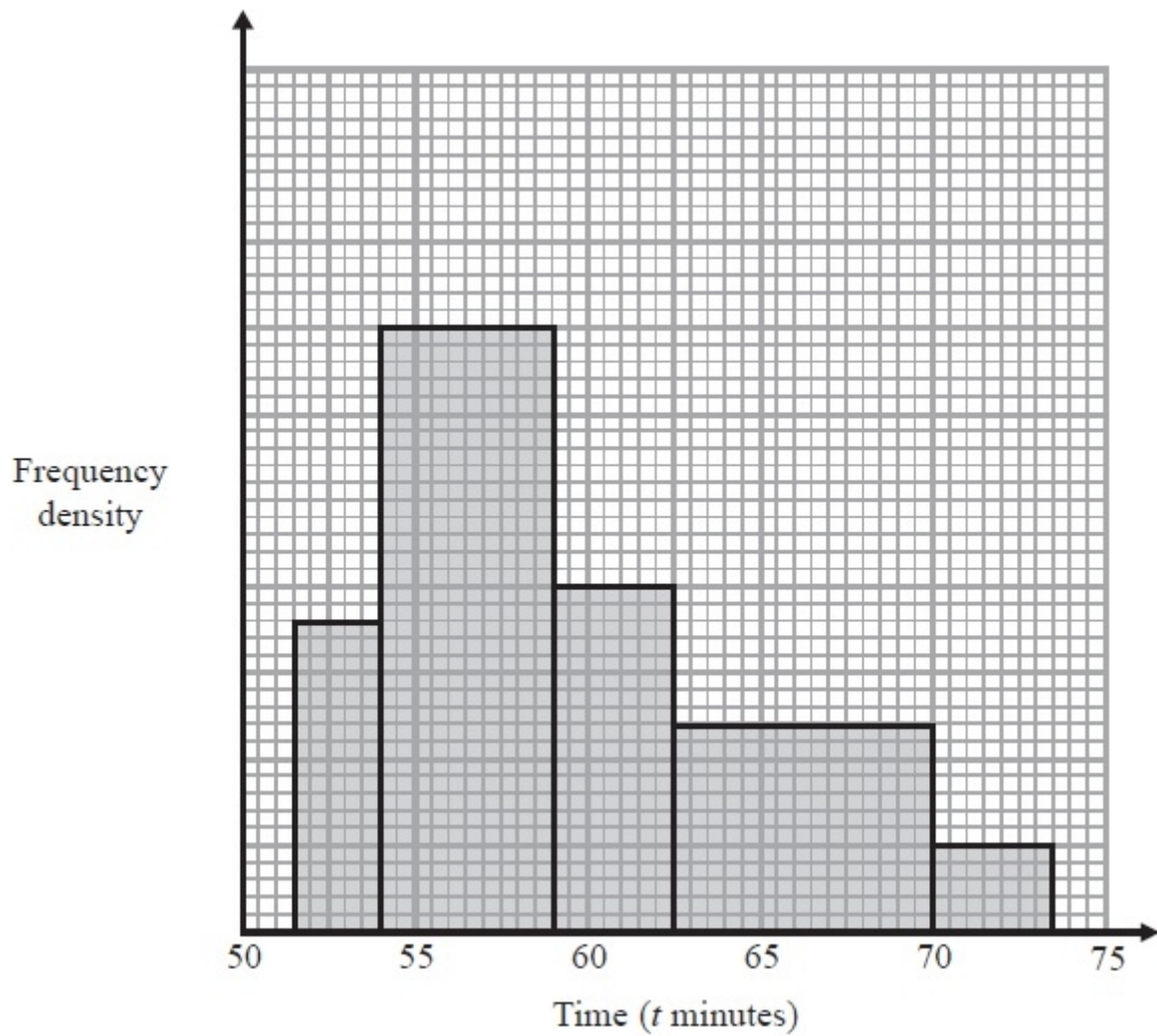
Use the graph to find an estimate for the median speed.

Q6. The speed limit on the motorway in question 5 is 130 km/h.

The traffic police say that more than 20% of cars travelling on the motorway break the speed limit.

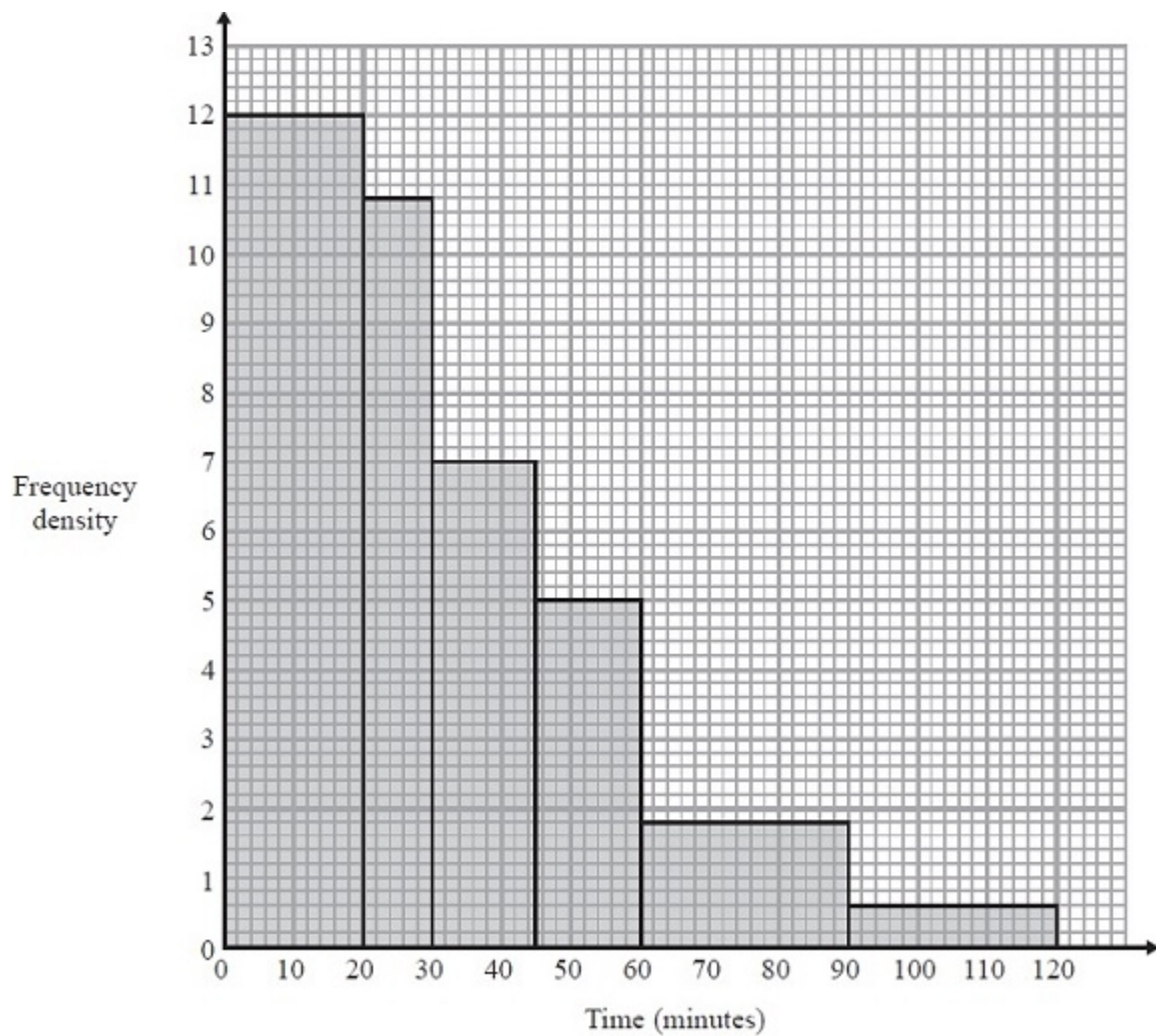
Comment on what the traffic police say.

- Q7. Ulrika recorded the times some people took to run a race.
The histogram gives information about these times.



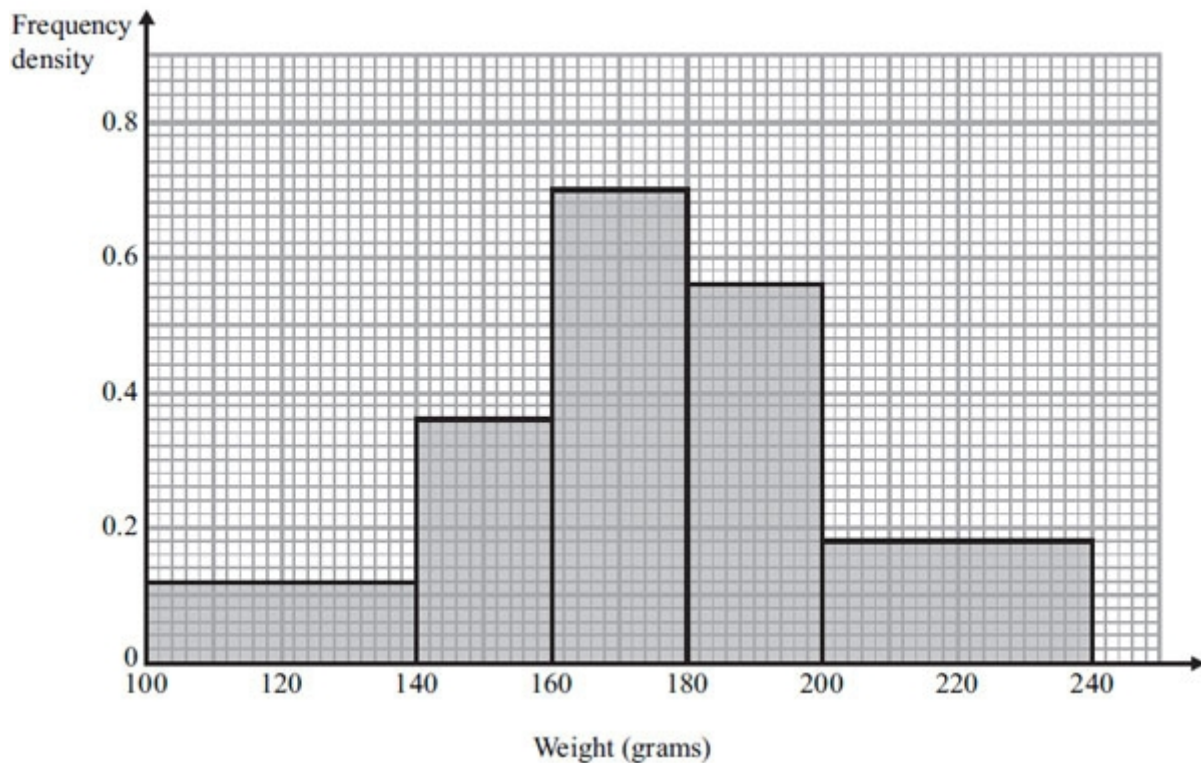
25% of the people took a time less than T minutes.
Work out an estimate for T .

Q8. The histogram shows information about the times, in minutes, that some passengers had to wait at an airport.



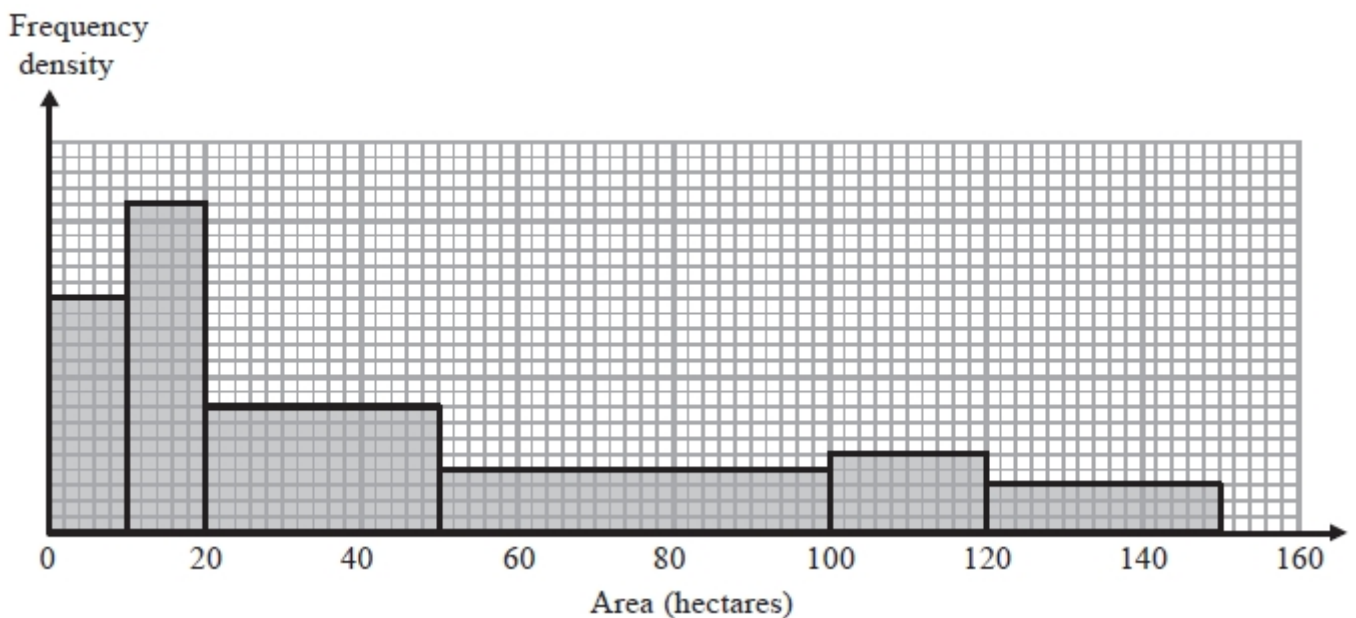
Work out the percentage of the passengers who had to wait for more than one hour.

Q9. The histogram shows some information about the weights of a sample of apples.



Work out the proportion of apples in the sample with a weight between 140 grams and 200 grams.

Q10. The histogram shows information about the areas of some farms.



90 of the farms have an area of 10 hectares or less.

60% of the farms with an area of 100 hectares or less are arable farms.

$\frac{1}{2}$ of the farms with an area of more than 100 hectares are arable farms.

Work out an estimate for the total number of arable farms.

Topics listed in objectives

- Use statistics found in all graphs/charts in this unit to describe a population;
- Know the appropriate uses of cumulative frequency diagrams;
- Construct and interpret cumulative frequency tables, cumulative frequency graphs/diagrams and from the graph:
 - estimate frequency greater/less than a given value;
 - find the median and quartile values and interquartile range;
- Compare the mean and range of two distributions, or median and interquartile range, as appropriate;
- Interpret box plots to find median, quartiles, range and interquartile range and draw conclusions;
- Produce box plots from raw data and when given quartiles, median and identify any outliers;
- Know the appropriate uses of histograms;
- Construct and interpret histograms from class intervals with unequal width;
- Use and understand frequency density;
- From histograms:
 - complete a grouped frequency table;
 - understand and define frequency density;
- Estimate the mean and median from a histogram with unequal class widths or any other information from a histogram, such as the number of people in a given interval.

Answers

- Q1. $5.6 - 4.85 = 0.75$
Q2. $80 \div 4 = 20$
Q3. greater range and lower median in the second half, same IQR in each half
Q4. frequencies used for heights instead of frequency density, final bar of wrong width
Q5. 120 km/h
Q6. claim not true, since $8 < 20\%$ of 60
Q7. $T = 55 - 56$
Q8. 12%
Q9. 0.73
Q10. freq: 90, 126, 144, 120, 60, 54 = 594; 60% of 288 + 50% of 114 = 345