STATISTICS

Averages

Jenny played four games of golf.
For these games her modal score was 76 and her mean score was 75.
Her range of scores was 10.

What were her scores for the four games?

$75 \times 4 = 300$

$76 \times 2 = 152$

$300 - 152 = 148$

$148 - 10 = 138$

$\frac{138}{2} = 69$

$69 + 10 = 79$

69, 76, 76, 79

Reverse Mean

a) The mean of 4 numbers is 19.3.
Three of the numbers are 17.4, 20.1 and 20.7.
What is the value of the fourth number?

$19.3 \times 4 = 77.2$

$17.4 + 20.1 + 20.7 = 58.2$

$77.2 - 58.2 = 19$

19

b) The combined pass mark for a module on Ellie's university course is 80%.
The module consists of four exams.
In her previous three exams Ellie, scored 81%, 83% and 92%.
What score does Ellie need to score to pass the module?

$80 \times 4 = 320$

$80\% = \frac{320}{400}$

$81 + 83 + 92 = 256$

$320 - 256 = 64$

64%

Averages from a Table

The table shows the ages of people at an event.

Age (years)	Frequency	
9	3	27
10	8	80
11	17	187
12	12	144
13	7	91
14	3	42
	50	571

a) Calculate the mean age of people at the event.

$\frac{571}{50} = 11\frac{21}{50} = 11.42$

11.42

b) Find the median age of people at the event.

$\frac{50+1}{2} = 25.5^{th}$ value

25^{th} value = 11

26^{th} value = 11

11

Grouped Frequency Tables

A shop records the time taken by its customers to complete a purchase on its website.
The results from one day are summarised in this table.

Time taken (t minutes)		Number of customers	
$0 < t \leq 3$	1.5	6	9
$3 < t \leq 6$	4.5	10	45
$6 < t \leq 9$	7.5	6	45
$9 < t \leq 12$	10.5	2	21
$12 < t \leq 15$	13.5	1	13.5
		25	133.5

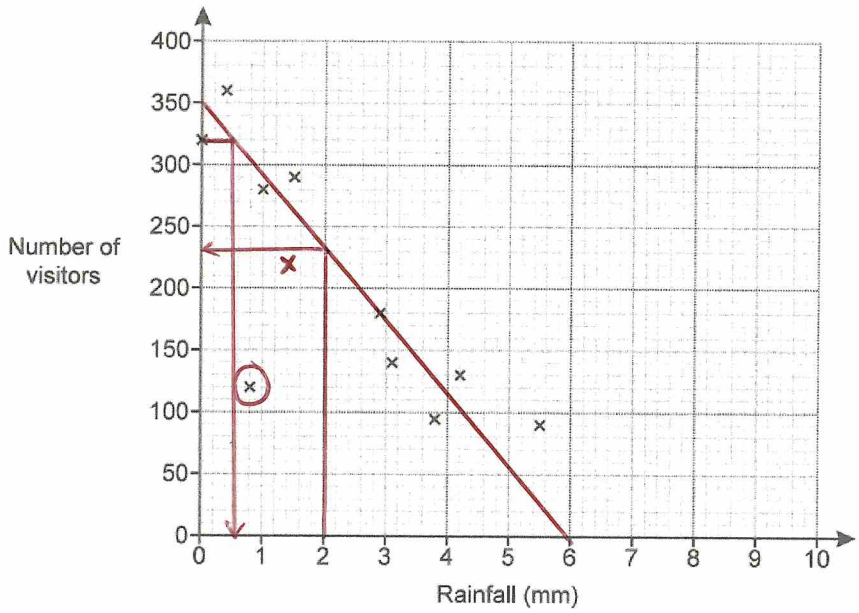
Calculate an estimate of the mean time taken.

$\frac{133.5}{25} = 5\frac{8.5}{25} = 5\frac{17}{50}$

5.34 minutes

Scatter Diagrams

a) The owner of a tourist attraction records the amount of rainfall, in millimetres, and the number of visitors each day.
The results for 10 days are shown in the scatter diagram.



i) On the 11th day there was 1.4mm of rain, and 220 visitors went to the tourist attraction. Plot this point on the scatter diagram.

ii) Circle the outlier on the scatter diagram.

iii) The owner claimed that he would expect around 320 visitors on a day with 2mm of rainfall. Does the scatter diagram support his statement?
Explain your reasoning.

No. Using my line of best fit, the scatter diagram suggests that there would be 320 visitors on a day with 0.5mm, and 230 guests on a day with 2mm of rainfall.

iv) Explain why the scatter diagram should not be used to estimate the number of visitors on a day with 9mm of rain.

The data doesn't extend beyond 5.5mm of rain, so using this data to estimate the number of visitors on a day with 9mm of rain would be unreliable.

Sampling and Bias

a) George is the manager of a shoe shop.
He samples 50 of his customers and asks them about the one style of shoe they would buy next.
The table shows his results.

Style of Shoe	Number of Customers
Laced shoes	18
Boots	15
Sandals	8
Trainers	5
Other	4

George buys 1000 pairs of shoes with the number of each style based on his survey results.

How many pairs of sandals should he buy?
Write down any assumption you make about his sample.

$\frac{8}{50} = \frac{160}{1000}$

The assumption made is that the sample is representative of his customer base.

160

b) Edeston village has a population of 3500 people.
A new road is planned.
In a survey, school pupils are asked if they are for or against the new road.

	Number of Pupils
For	36
Against	24

Hugo assumes responses from the whole village will be in the same proportion as those from the pupils.
Explain why the responses from the whole village may not be in the same proportion as the responses from the pupils.

Children have a different perspective on life to adults.

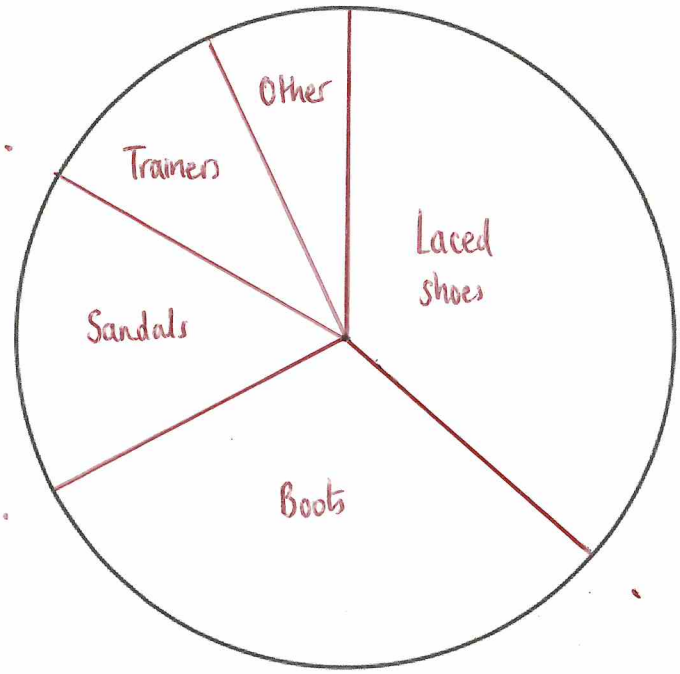
Pie Charts

a) Show this information in a pie chart:

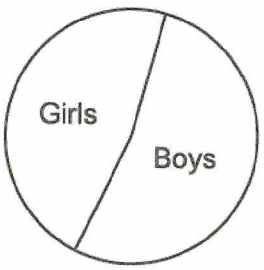
Style of Shoe	Number of Customers
Laced shoes	18
Boots	15
Sandals	8
Trainers	5
Other	4
	50

$18 \times 7.2^\circ = 129.6^\circ$
$15 \times 7.2^\circ = 108^\circ$
$8 \times 7.2^\circ = 57.6^\circ$
$5 \times 7.2^\circ = 36^\circ$
$4 \times 7.2^\circ = 28.8^\circ$

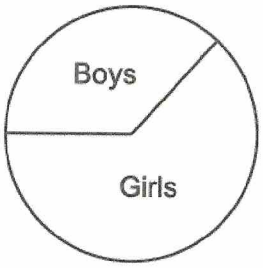
$\frac{360^\circ}{50} = 7.2^\circ$



b) The pie charts shows the proportion of boys and girls at two schools.



Beechfield



Kenwood

Neil says

"The pie charts show that there are more girls at Kenwood than at Beechfield."

Explain why Neil may be wrong.

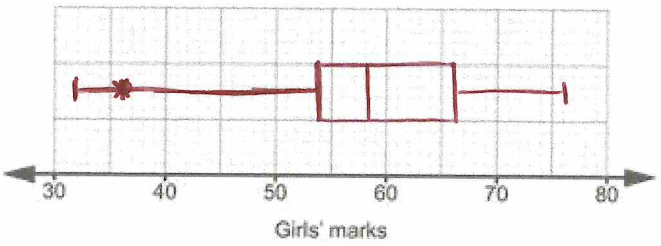
The pie charts show proportions, not numbers of pupils

The number of pupils at Beechfield could be much greater, resulting in more girls at beechfield.

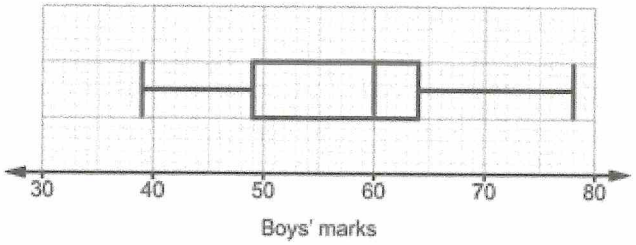
Box Plots

a) The marks for some girls in the same test are summarised below.
median = 58, lowest mark = 32, range = 44, upper quartile = 66, interquartile range = 12

Draw a box plot to show the distribution of the marks scored by the girls.



b) The box plot shows the distribution of the marks scored by some boys in the same test.



Jevic says

"The boys did better, on average, in the test as they had a better IQR."

Jevic has got confused. What comparisons did he mean to make?

On average the boys outperformed the girls, as they had a higher median.

The girls were more consistent than the boys, as they had a smaller IQR.

Cumulative Frequency Diagrams

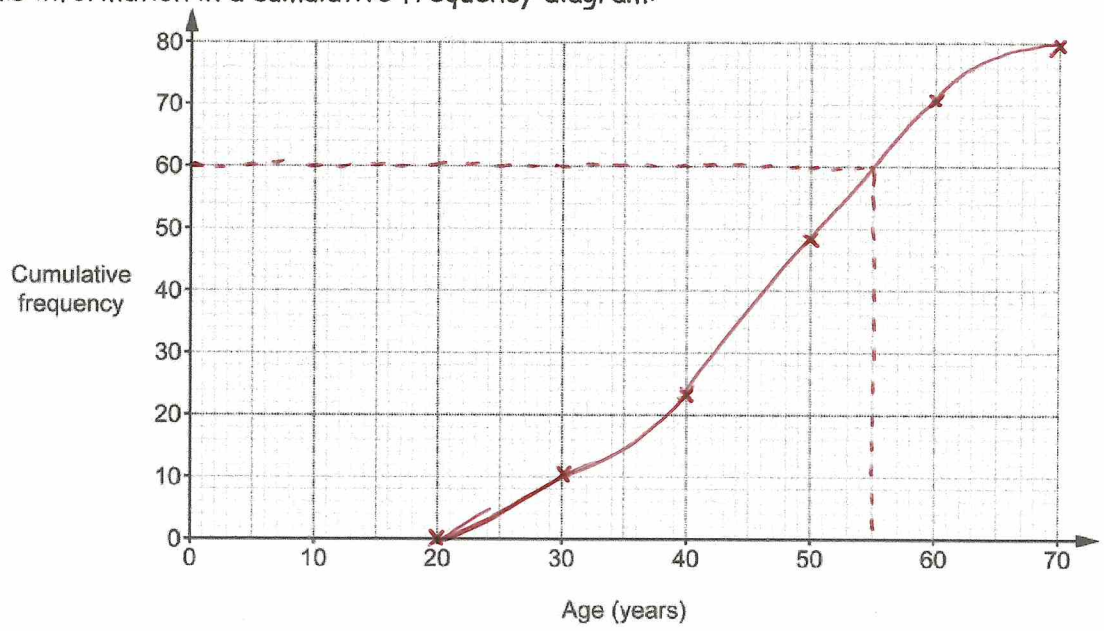
a) The table summarises the ages of the 80 employees of a company.

Age, y years	$20 < y \leq 30$	$30 < y \leq 40$	$40 < y \leq 50$	$50 < y \leq 60$	$60 < y \leq 70$
Frequency	10	14	24	23	9

Complete the cumulative frequency table:

Age, y years	$y \leq 20$	$y \leq 30$	$y \leq 40$	$y \leq 50$	$y \leq 60$	$y \leq 70$
Cumulative frequency	0	10	24	48	71	80

Show this information in a cumulative frequency diagram:



Ruby says,

"One quarter of the employees of the company are over 55"

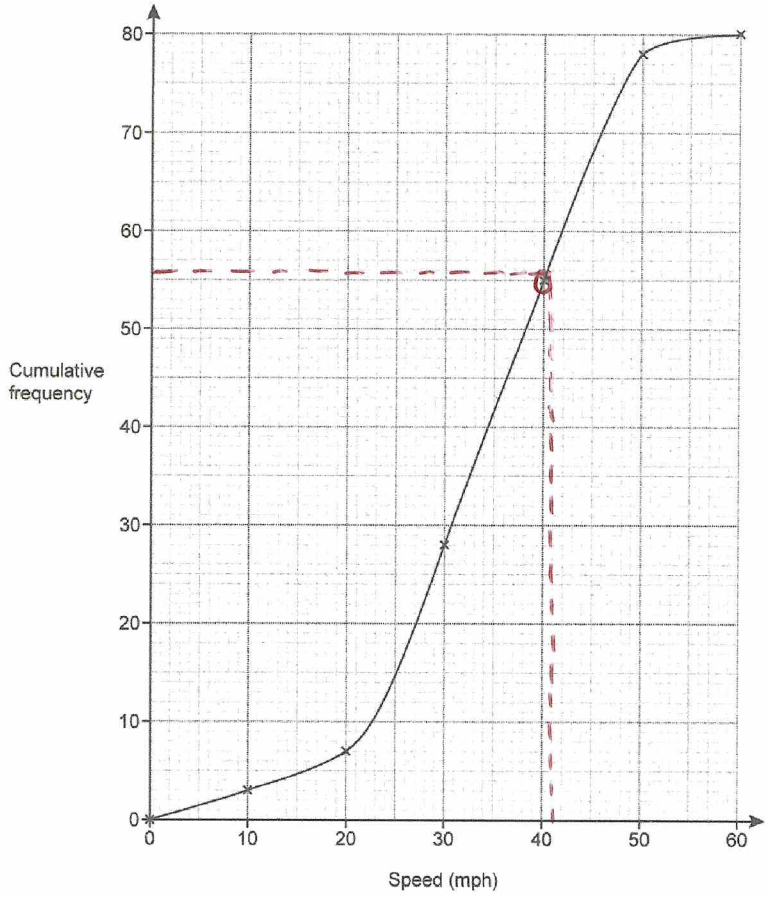
Use the cumulative frequency diagram to comment on whether or not Ruby is correct.

The chart shows that 60 employees are below 55, or 55, years of age.

$\frac{60}{80} = \frac{3}{4} = 75\%$ are 55 and under.

25% are over 55. Ruby is correct.

b) The cumulative frequency graph shows the speeds, in miles per hour (mph), of vehicles passing a 40 mph speed limit sign on a road.



A speed camera will be installed if more than 30% of vehicles go over the speed limit of 40 mph.
Use information from the graph to decide if a speed camera should be installed.

30% going over = 70% not going over.

70% of 80 = 56

55 are 'clocked' at 40mph or below.

56 41mph or below.

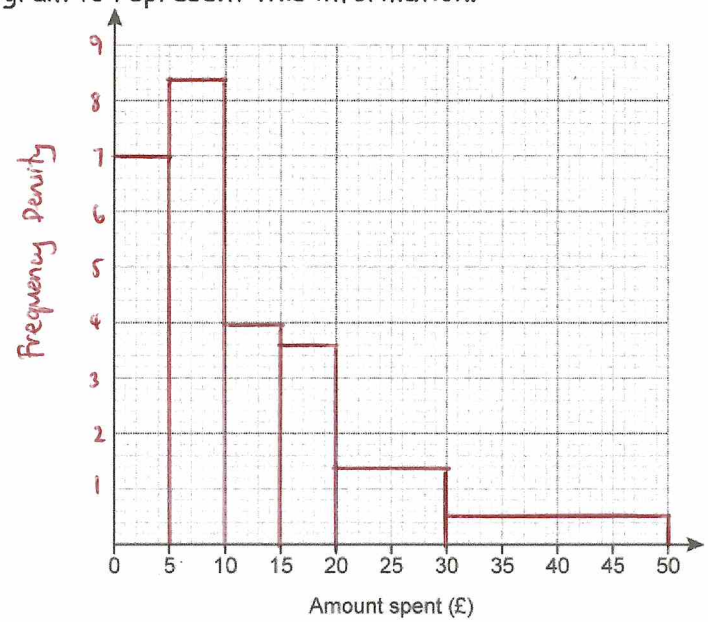
Using the chart, a speed camera needn't be installed.

Histograms

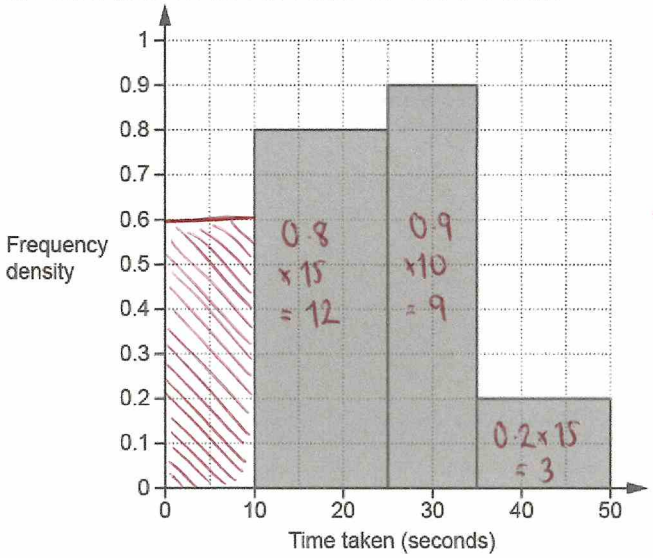
a) Ana records the amount of money spent by 140 customers in her shop on one day.

Amount Spent (£a)	Frequency	FD
$0 < a \leq 5$	35	35 ÷ 5 = 7
$5 < a \leq 10$	42	42 ÷ 5 = 8.4
$10 < a \leq 15$	20	20 ÷ 5 = 4
$15 < a \leq 20$	18	18 ÷ 5 = 3.6
$20 < a \leq 30$	14	14 ÷ 10 = 1.4
$30 < a \leq 50$	11	11 ÷ 20 = 0.55

Draw a histogram to represent this information.



b) 30 students completed a puzzle and their times were recorded.
All of the students completed the puzzle in less than 50 seconds.
The histogram shows information about some of their times.



12 + 9 + 3 = 24

30 − 24 = 6

$\frac{6}{10} = 0.6$

Complete the histogram for those completing the puzzle in less than 10 seconds.

END OF QUESTIONS