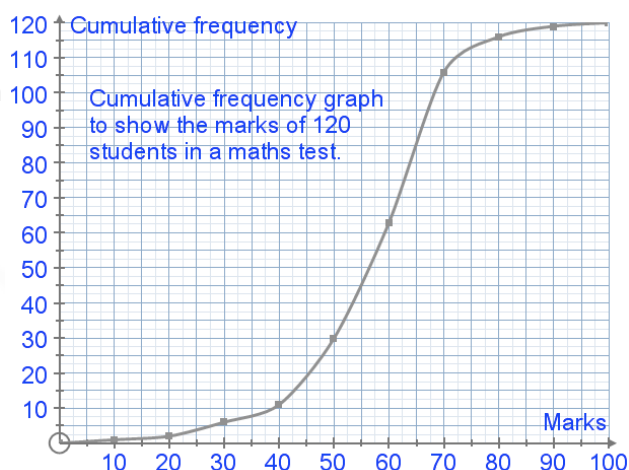


Statistical diagrams

Starter

1. **(Review of GCSE material)**
 Consider the cumulative frequency for the number of marks gained by a year group in a maths exam.
- Estimate the median.
 - Estimate the interquartile range.
 - Calculate the percentage of students who scored between 45 and 75 marks



- Working:**
- There are 120 students so $n = 120$
 Median, $Q_2 = \frac{1}{2}n$ th value = 60th value
 Draw a horizontal line at 60, then down to the horizontal axis
 Median, $Q_2 \approx 59$ marks *(58 or 59 would be correct)*
 - Lower quartile, $Q_1 = \frac{1}{4}n$ th value = 30th value
 Draw a horizontal line at 30, then down to the horizontal axis
 Lower quartile, $Q_1 = 50$ marks *(must be exact as plotted point)*

 Upper quartile, $Q_3 = \frac{3}{4}n$ th value = 90th value
 Draw a horizontal line at 90, then down to the horizontal axis
 Upper quartile, $Q_3 \approx 66$ marks *(± 1 mark would be correct)*
 IQR = $66 - 50 = 16$ *(± 2 marks would be correct)*
 - 45 marks is about 18 students.
 75 marks is about 113 students.
 % between 45 & 75 marks = $\frac{113 - 18}{120} \times 100\% = 79.2\%$ (3 s.f.)

- E.g. 1** (a) The weights of a group of students were recorded as:
55, 67, 43, 46, 51, 81, 64, 52, 74, 57, 63, 68, 57, 77
Express this data points in a stem and leaf diagram.
(b) State the value of the mode for the data.
(c) Use your diagram to state the median for the data.

Working: (a)

Weights of students (kg)

4	3	6				
5	1	2	5	7	7	
6	3	4	7	8		
7	4	7				
8	1					

Key: 4 | 3 means 43

- (b) The mode is 57 kg.
(c) The two middle numbers are 57 and 63 so the median is 60 kg.

Year 8					Year 9				
7	6	3	0	15	9	9			
8	5	4	4	16	1	3	8		
	7	5	2	17	0	3	4	7	9
			0	18	2	5	6	8	
				19	2				

Key: 15 | 9 means 159

E.g. 2 Answer these questions on the back-to-back stem and leaf diagram above.

- (a) State the height of the largest student in Year 9.
(b) State the height of the smallest student in Year 8
(c) Comment on how the table would look different if samples of Year 12 and Year 13 students were taken. Think of two ways it could be different. Give a reason for your answer.

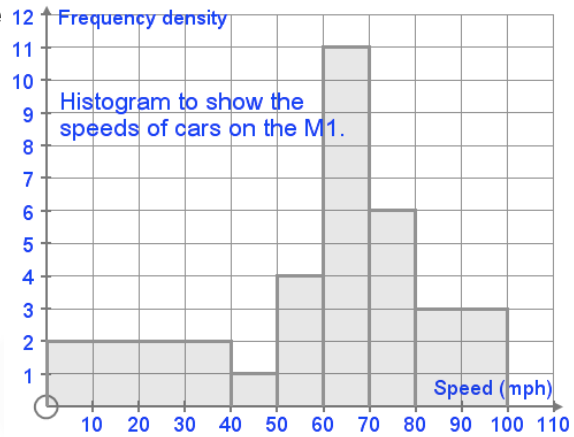
Working: (a) 192 cm \equiv 1.92 m

(b) 150 cm \equiv 1.5 m

- (c) 1st way: the values would be higher as the students are older
2nd way: the values would be similar since many students would have stopped growing.

E.g. 3 Consider the histogram to the right showing the speeds of cars on the M1.

- Calculate the number of cars that were travelling between 50 and 60 mph.
- Calculate the percentage of cars that were breaking the speed limit of 70 mph.
- Calculate the percentage of cars that were travelling less than 50 mph.
- Calculate an estimate for the mean of the data.



Working:

- Frequency = area of bar
Frequency between 50 and 60 mph = $4 \times 10 = 40$
- Frequency between 0 and 40 mph = $2 \times 40 = 80$
Frequency between 40 and 50 mph = $1 \times 10 = 10$
Frequency between 60 and 70 mph = $11 \times 10 = 110$
Frequency between 70 and 80 mph = $6 \times 10 = 60$
Frequency between 80 and 100 mph = $3 \times 20 = 60$
Total number of cars = $80 + 10 + 40 + 110 + 60 + 60 = 360$
%age breaking speed limit = $\frac{60 + 60}{360} \times 100\% = 33.3\%$ (3 s.f.)
- %age travelling less than 50 mph = $\frac{90}{360} \times 100\% = 25\%$
- Mean = $\frac{20 \times 80 + 45 \times 10 + 65 \times 110 + 75 \times 60 + 90 \times 60}{360}$
 $= \frac{955}{18} = 53.0\dot{5}$

Video: [Stem and leaf diagrams](#)

Video: [Box and whisker plots](#)

Video: [Histograms](#)

Video: [Histograms - finding the height of a bar](#)

Video: [Median, quartiles & IQR for discrete data](#)

Video: [Cumulative frequency curves](#)

Video: [How to interpret class intervals](#)

Exam questions: [Box and whisker plots](#)

Exam questions: [Stem and leaf & box and whisker plots](#)

Exam questions: [Histograms](#)

Exam questions: [Histograms - finding the height of a bar](#)

Exam questions: [Median, quartiles & IQR for discrete data](#)

Exam questions: [Estimating the median from a histogram](#)

[Solutions to Starter and E.g.s](#)

Exercise

p329 16A Qu 1A, 2i, 3-10, (11 red)