Knowledge Organiser: Averages and Range

What you need to know:

Two Way Tables

This **two way table** gives information on how 100 students travelled to school.
Complete the two way table

	Walk	Car	Other	Total
Boy	15	25	14	54
Girl	22	8	16	46
Total	37	33	30	100

Total Boys

Total Girls

Total number of people

Stem and Leaf Diagrams

A stem and leaf diagram can be used for large data sets. You can then interpret the data including finding averages and range.

Girls		Boys
5	14	
7, 5, 5, 5, 4	15	3, 8, 9
8, 4, 2, 1, 0	16	2, 5, 7, 7, 7, 8, 8, 9
9, 8, 7, 6, 6, 4, 2, 1, 1, 0, 0	17	0, 2, 3, 6, 6, 7, 7
	18	0, 1, 4, 5

Order from smallest to biggest

Smallest girl = 145cm Smallest Boy = 153cm

Tallest girl = 179cm Tallest Boy = 185cm

Key 17|0 = 170cm

Always include a key

Reverse Mean

A hockey team scored the following number of goals in 6 games:

2	3	4	1	0	1

The mean of the goals scored in seven games was 2. How many goals were scored in the seventh game?

Mean = add all together divide by how values

$$\frac{2+3+4+1+0+1+x}{7} = 2 \rightarrow \frac{11+x}{7} = 2 \rightarrow x = 3$$

Solve the equation to find the missing value

Advantages and Disadvantages

Average	Advantage	Disadvantage
Mode	Can be used for qualitative data Easy to obtain	There can be more than one mode or even no mode
Median	Not affected by very large or small values	Can be time consuming when there is a lot of data
Mean	Takes into account all of the data	Very small or very large values affects the mean

Key Terms:

Frequency - the number of pieces of data we have.

Grouped Data - If we have a large spread of data, we put it into categories (classes) to make the data easier to display or analyse

Hegarty maths clip numbers

Collecting Data: 392 – 403

Two way Tables: 422 – 424

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You need to be able to:

- Recognise types of data
- Design and use two way tables
- Calculate the mean, mode, median and range
- Construct and interpret stem and leaf diagrams
- Know the advantages and disadvantages of averages
- Interpret and find averages from frequency tables
- Find the range, modal class, interval containing the median and estimate the mean from grouped data

Reminder:

Mean - Add up the values you are given and divide by the number of values you have.
Median - The median is the middle value, when your data is in order.
Mode - It is the value or item there is the most of.
Range - This is the difference between the largest and smallest values.

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What you need to know:

Averages from Frequency Tables

a) Find the mean of this data

Goals Scored (x)	Frequency (f)	fx
0	2	0 x 2 = 0
1	2	1 x 2 = 2
2	5	2 x 5 = 10
3	1	3 x 1 = 3
Total	10	15

Step 1: calculate the total frequency
Step 2: calculate $f \times x$
Step 4: calculate the mean

Mean = $\frac{Total\ fx}{Total\ f}$

$$\frac{Total\ fx}{Total\ f} = \frac{15}{10} = 1.5 \text{ goals}$$

b) Find the mode

The mode is the one with the highest frequency

Highest frequency = 5 Mode = 2 goals

c) Find the median

Median value = $\frac{Total\ frequency + 1}{2}$

$$\frac{11}{2} = 5.5th\ value$$

add the frequency column until you reach the value in-between the 5th and 6th value

Median = 2 goals

d) Find the range

Highest number of goals = 3 Range = 3 – 0 = 3
Smallest number of goals = 0

Averages from Grouped Data

a) Estimate the mean of this data

Length (L cm)	Frequency (f)	Midpoint (x)	fx
$0 < L \leq 10$	10	5	10 × 5 = 50
$10 < L \leq 20$	15	15	15 × 15 = 225
$20 < L \leq 30$	23	25	23 × 25 = 575
$30 < L \leq 40$	7	35	7 × 35 = 245
Total	55		1095

Step 1: calculate the total frequency
Step 2: find the midpoint of each group
Step 3: calculate $f \times x$
Step 4: calculate the mean

Mean = $\frac{Total\ fx}{Total\ f}$

$$\frac{Total\ fx}{Total\ f} = \frac{1095}{55} = 19.9\text{cm}$$

b) Identify the modal class from this data set

Modal class = the group that has the highest **frequency**

Modal Class is $20 < L \leq 30$

c) Identify the group in which the median would lie

Median value = $\frac{Total\ frequency + 1}{2}$

$$\frac{56}{2} = 28th\ value$$

add the frequency column until you reach the 28th value

Median is in the group $20 < x \leq 30$

Tip

For grouped data, the mean can only be an estimate as we do not know the exact values in each group..

Types of data

Qualitative data: data collected that is described in words **not** numbers.
e.g. race, hair colour, ethnicity.

Quantitative data: this is the collection of numerical data that is either discrete or continuous.

Discrete data: numerical data that is categorised into a finite number of classifications.
e.g. number of siblings in a family, shoe size, .

Continuous data: numerical data that can take any value. This data is usually measured on a large number scale.
e.g. height, weight, time, capacity.