Summarising data: measures of centre

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⭐ By the end of the lesson I would hope that you have the knowledge and understanding for the following points:
- Remember how to find the :
    ◦ Mean,
    ◦ Median,
    ◦ Mode, and
    ◦ Range of a set of data
- Reverse the process of finding the mean, to help us find missing values

RECAP:

We have spent a lot of time looking at data.
We have looked at why we need to collect data and the ways we can process it (or manipulate it) to help us draw some conclusions.
We have also looked at how we can represent the data to make it more visual and easy to read:
- Bar charts
- Line graphs
- Pie charts
- Stem-and-leaf plots
- Dot plots
- Histograms

We return to recap the work on finding the Mean, Median and Mode.

Measures of Centre: Mean, Median and Mode

Do you notice that there is something missing?
Yup! The **Range**.

Statistics talks about data in terms of **centre** and **spread**.

Measures of centre are:
- Mean
- Median
- Mode

These describe data in terms of trying to find some sort of middle value.

Then we have the Measures of Spread:
- Range
- Interquartile Range (IQR)

Finding the Mode:
We remember that this is finding the "most common" data.
It's not a great measure of centre as it's unlikely the mode will be the centre value, but it tells us something about the data.

Example:
Extracted from the Cambridge Essentials Textbook Series:

Find the mode of: 5 2 4 10 6 1 2 9 6

Bi-modal

1 2 2 4 5 6 6 9 10

Mode = 2 and 6

Finding the Median:
We remember that the Median is the middle number in an **ordered list** of numbers.
This seems to be a better measure of centre as it seems to be the number in the middle.

Note: The median is not badly affected by any outliers.

Example:
Extracted from the Cambridge Essentials Textbook Series:

Find the median of: 5 ~~2~~ ~~4~~ 10 ~~6~~ ~~1~~ ~~2~~ 9 ~~6~~

$$1 \quad 2 \quad 2 \quad 4 \quad \boxed{5} \quad 6 \quad 6 \quad 9 \quad 10$$

$$\text{Median} = \boxed{5}$$

Finding the Mean:
This is the value which we use the most often in Mathematics.
It's the closest Mathematical measure of the centre of the data.
This is where we add all the numbers together and divide by the total number of numbers.

Example:
Extracted from the Cambridge Essentials Textbook Series:

Find the mean of: 5   2   4   10   6   1   2   9   6

$$\text{Mean} = \frac{1 + 2 + 2 + 4 + 5 + 6 + 6 + 9 + 10}{9} = \frac{45}{9}$$

$$= \boxed{5}$$

Comparing the Mean, Median and Mode

If we now look at the values we have gained above, for the same set of numbers, what we do have?

Mean: 5

Median: 5

Mode: 2 and 6

Measure of centre $\approx$ 5

What does it tell me?

Doing it all backwards

We spend a lot of time as teachers showing you how to do Mathematics.
We also try and help you understand why things are the way they are.
We're not very good at helping you try and learn the way to do things backwards.

One type of question which is used in exams all the time might be shown below:

Example:
Extracted from the Cambridge Essentials Textbook Series:

The hours a shop assistant spends cleaning the store in eight successive weeks are:

8, 9, 12, 10, 10, 8, 5, 10, x

1. Calculate the mean for this set of data.
2. How many hours would the shop assistant need to clean in the ninth week for the mean to equal 10?

$$\text{Mean} = \frac{8 + 9 + 12 + 10 + 10 + 8 + 5 + 10}{8}$$

$$= \frac{72}{8}$$

$$= 9$$

$$\text{Mean} = \frac{8 + 9 + 12 + 10 + 8 + 5 + 10 + x}{9}$$

$$\text{Mean} = \frac{72 + x}{9}$$

$$\times 9 \quad 10 = \frac{72 + x}{9} \quad \times 9$$

$$-72 \quad 90 = 72 + x \quad -72$$

$$18 = x$$

The important thing to know is:
- When you are given a new mean, it means you have to add one number to the total number of numbers
- You also have to choose a new pronumeral to stand for the number you are adding, but don't know the size!