Teaching guide: Averages

Mathematics for GCSE Science

This resource helps you to deliver the mathematical requirements that students are required to demonstrate in the new GCSE Science specifications. It consists of a teaching guide and PowerPoint presentation.

2. Handling data

Science GCSE subject criteria Maths skill: 2b. Find arithmetic means

1. Brief explanation	- Arithmetic mean is the sum of the numbers divided by the number of numbers. - There are other types of mean that are beyond the scope of GCSE level Maths.
2. Statement of coverage from: KS3 Mathematics programme of study (POS) KS4 Mathematics programme of study (POS)	• Describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete, continuous and grouped data; and appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers) Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: • appropriate measures of central tendency (including modal class) and spread {**including quartiles and inter-quartile range**}
3. Maths introduction and development	- Students will learn to make mean calculations of discrete data during KS3. - Later they will learn to calculate the mean of larger sets of ungrouped data from a frequency table. - During KS4 they will be introduced to the differences between discrete and continuous data. From that they will learn to group the data (discrete first and then continuous) and make estimations of the mean.
4.Ref AQA All About Maths AQA All About Maths Statistical measures	**Lesson 1** – This lesson introduces key terminology. It provides sampling information including the limitations. **Lesson 2** – This lesson covers calculating averages and spread from a list of data. **Lesson 3** – This lesson covers calculating averages and spread from a frequency table. **Lesson 4** – This lesson covers calculating averages from a grouped frequency table. **Lesson 5** – This lesson focuses on applying the skills developed so far to compare data from lists and tables. **Lesson 6** – This lesson is a collation of the skills acquired over the previous 5 lessons and develop the idea of understanding a sample enough to discuss the limitations of it and what properties you

	can use to compare with other data.
5. Misconceptions	With groups of data they will sometimes divide by how many groups there are rather than the total frequency.
6. Some examples of where it is applied in science	**Biology** Levels of organisation

2. Handling data

Science GCSE subject criteria Maths skill: 2f. Understand the terms mean, mode and median

1. Brief explanation	• Mean, median and mode are all measures of central tendency. They are used to summarise sets of data. Mean and median require quantitative data, the mode can be used with qualitative data. • (Arithmetic) mean is the sum of the numbers divided by the number of numbers. (It can be skewed by outliers in the data set.) • Median is the middle value in an ordered data set. (It is unaffected by outliers in the data set, but can be affected by an unevenly distributed data set.) • Mode is the most commonly occurring value.
2. Statement of coverage from: KS3 Mathematics programme of study (POS) KS4 Mathematics programme of study (POS)	• Describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete, continuous and grouped data; and appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers) Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: • appropriate measures of central tendency (including modal class) and spread {**including quartiles and inter-quartile range**}
3. Maths introduction and development	• Students will learn to make mean, median and mode calculations during KS3. • During KS4 they will be introduced to the differences between discrete and continuous data. From that they will learn to group the data and make estimations of the mean. • They will learn to extend the knowledge of median to measures of spread with quartiles and the interquartile range.
4.Ref AQA All About Maths AQA All About Maths Statistical measures	**Lesson 1** – This lesson introduces key terminology. It provides sampling information including the limitations. **Lesson 2** – This lesson covers calculating averages and spread from a list of data. **Lesson 3** – This lesson covers calculating averages and spread from a frequency table. **Lesson 4** – This lesson covers calculating averages from a grouped frequency table. **Lesson 5** – This lesson focuses on applying the skills developed so far to compare data from lists

	and tables.
	Lesson 6 – This lesson is a collation of the skills acquired over the previous 5 lessons and develop the idea of understanding a sample enough to discuss the limitations of it and what properties you can use to compare with other data.
5. Misconceptions	Students sometimes assume that because the mean is often the hardest average to calculate, that it must be the most useful. With groups of data they will sometimes divide by how many groups there are rather than the total frequency.
	When calculating the median, they may forget to put the data in order first and may confuse the answer for the median with its position in the sequence.
6. Some examples of where it is applied in science	**Biology** Levels of organisation **Physics** Speed Factors affecting braking distance