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| **UNIT 14: Statistics and sampling, cumulative frequency and histograms** |

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**SPECIFICATION REFERENCES**

S1 infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling apply statistics to describe a population

S3 **interpret and construct diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and cumulative frequency graphs, and know their appropriate use**

S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through:

* Appropriate graphical representation involving discrete, continuous and grouped data, **including box plots**
* appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers, **quartiles and inter-quartile range)**

S5 apply statistics to describe a population

**PRIOR KNOWLEDGE**

Students should understand the different types of data: discrete/continuous.

Students should have experience of inequality notation.

Students should be able to multiply a fraction by a number.

Students should understand the data handling cycle.

**KEYWORDS**

Sample, population, fraction, decimal, percentage, bias, stratified sample, random, cumulative frequency, box plot, histogram, frequency density, frequency, mean, median, mode, range, lower quartile, upper quartile, interquartile range, spread, comparison, outlier

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| **14a. Collecting data**  (S1) | **Teaching time**  5–7 hours |

**OBJECTIVES**

By the end of the sub-unit, students should be able to:

* Specify the problem and plan:
* decide what data to collect and what analysis is needed;
* understand primary and secondary data sources;
* consider fairness;
* Understand what is meant by a sample and a population;
* Understand how different sample sizes may affect the reliability of conclusions drawn;
* Identify possible sources of bias and plan to minimise it;
* Write questions to eliminate bias, and understand how the timing and location of a survey can ensure a sample is representative (see note);

**POSSIBLE SUCCESS CRITERIA**

Explain why a sample may not be representative of a whole population.

Carry out their own statistical investigation and justify how sources of bias have been eliminated.

**OPPORTUNITIES FOR REASONING/PROBLEM SOLVING**

When using a sample of a population to solve contextual problem, students should be able to justify why the sample may not be representative the whole population.

**NOTES**

Emphasise the difference between primary and secondary sources and remind students about the difference between discrete and continuous data.

Discuss sample size and mention that a census is the whole population (the UK census takes place every 10 years in a year ending with a 1 – the next one is due in 2021).

Specifying the problem and planning for data collection is not included in the programme of study, but is a prerequisite to understanding the context of the topic.

Writing a questionnaire is also not included in the programme of study, but remains a good topic for demonstrating bias and ways to reduce bias in terms of timing, location and question types.