UNIT 1: Statistical sampling

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SPECIFICATION REFERENCES

1.1 Understand and use the terms 'population' and 'sample'
Use samples to make informal inferences about the population
Understand and use sampling techniques, including simple random sampling and opportunity sampling.
Select or critique sampling techniques in the context of solving a statistical problem, including understanding that different samples can lead to different conclusions about the population

PRIOR KNOWLEDGE

GCSE (9–1) in Mathematics at Higher Tier

S1 Infer properties of populations or distributions from a sample, while knowing the limitations of sampling

S5 Apply statistics to describe a population

KEYWORDS

Population, census, sample, sampling unit, sampling frame, simple random sampling, stratified, systematic, quota, opportunity (convenience) sampling.

1a. Introduction to sampling terminology; Advantages and disadvantages of sampling (1.1)

Teaching time
1 hour

OBJECTIVES

By the end of the sub-unit, students should:

- understand and be able to use the terms ‘population’ and ‘sample’;
- know how to use samples to make informal inferences about the population;
- be able to describe advantages and disadvantages of sampling compared to census.

TEACHING POINTS

This section is a great opportunity to introduce the large data set to look at a population of data and discuss reasons for sampling from it.

Students will be expected to be able to comment on the advantages and disadvantages associated with a census and a sample.

Discuss in context the meanings of populations and samples. Look at data from populations and samples, initially using data from the sample to make inferences about the population before then checking the data for the population.

Discuss the advantages and disadvantages of sampling making sure to include time, cost etc.

Ensure students are given the opportunity, and are able, to give full and thorough answers within the context of the question.

OPPORTUNITIES FOR PROBLEM SOLVING/MODELLING

The biggest opportunity here is introducing students to the large data set and starting to get them familiar with the data included in it.

COMMON MISCONCEPTIONS/EXAMINER REPORT QUOTES

Some students confuse sample sizes and population sizes, but the recurring problem is not giving answers in context. Candidates need to be clear about the difference between sample sizes and population sizes.

1b. Understand and use sampling techniques; Compare sampling techniques in context (1.1)	Teaching time 2 hours

OBJECTIVES

By the end of the sub-unit, students should:

- understand and be able to use sampling techniques;
- be able to describe advantages and disadvantages of sampling techniques;
- be able to select or critique sampling techniques in the context of solving a statistical problem;
- understand that different samples can lead to different conclusions about the population.

TEACHING POINTS

Students will also be expected to be familiar with different types of sampling including simple random, stratified, systematic, quota and opportunity (convenience) sampling.

Students will gain a more thorough understanding of the types of sampling if the advantages and disadvantages alongside the method used for each type are understood. They will then be more able to select an appropriate technique for a given statistical problem and be able to critique a technique which has been used.

Give students the opportunity to use the techniques they learn about on the large data set.

OPPORTUNITIES FOR PROBLEM SOLVING/MODELLING

Again, this is a perfect opportunity to use the large data set and discuss how different samples from the same data set could lead to different conclusions.

COMMON MISCONCEPTIONS/ EXAMINER REPORT QUOTES

Students need to be able to describe the sampling techniques clearly and will lose marks if they are not sufficiently precise.

As always, answers must be given using the context of the question and not simply be quoted from text books in a general form.