Chapter 1 - Statistics

Data Collection

Chapter Overview

1. Populations and Samples

2. Sampling

3. Non-random Sampling

4. Types of Data

5. The Large Data Set

Topics	What students need to learn:		
	Content		Guidance
1 **Statistical sampling**	1.1	**Understand and use the terms 'population' and 'sample'.** **Use samples to make informal inferences about the population.**	**Students will be expected to comment on the advantages and disadvantages associated with a census and a sample.**
		Understand and use sampling techniques, including simple random sampling and opportunity sampling.	**Students will be expected to be familiar with: simple random sampling, stratified sampling, systematic sampling, quota sampling and opportunity (or convenience) 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.	

Populations and Samples

A **population** is –

A **sample** is –

A **census** is -

Key words:

Individual units of a population are called _____. E.g. each individual person/item

Often sampling units of a population are individually named or numbered to form a list called a _____. E.g. the list of all people/items

What are the advantages and disadvantages between taking a census and a sample?

	Advantages	Disadvantages
Census	• It should give a completely accurate result	• Time consuming and expensive • Cannot be used when the testing process destroys the item • Hard to process large quantity of data
Sample	• Less time consuming and expensive than a census • Fewer people have to respond • Less data to process than in a census	• The data may not be as accurate • The sample may not be large enough to give information about small sub-groups of the population

Example: A supermarket wants to test a delivery of avocados for ripeness by cutting them in half.

a. Suggest a reason why the supermarket should not test all the avocados in the delivery.

b. The supermarket tests a sample of 5 avocados and finds that 4 of them are ripe. They estimate that 80% of the avocados in the deliver are ripe. Suggest one way that the supermarket could improve their estimate.

Exercise 1A Page 3

Sampling

Type	How to carry out	Advantages	Disadvantages
Simple Random Sampling	**What is it :** **Method:**		

Example. There are 64 girls and 56 boys in a school. Explain briefly how you could take a random sample of 15 pupils using a simple random sample. **(3)**

Type	How to carry out	Advantages	Disadvantages
Systematic Sampling	**What is it :**		

Example. A telephone directory contains 50 000 names. A researcher wishes to select a systematic sample of 100 names from the directory. Explain in detail how the researcher should obtain such a sample. **(2)**

Type	How to carry out	Advantages	Disadvantages
Stratified Sampling	**What is it :**		

Example. A school has 15 classes and a sixth form. In each class there are 30 students. In the sixth form there are 150 students. There are equal numbers of boys and girls in each class. There are equal numbers of boys and girls in the sixth form. The head teacher wishes to obtain the opinions of the students about school uniforms. Explain how the head teacher would take a stratified sample of size 40. **(7)**

Non-random Sampling

Type	How to carry out	Advantages	Disadvantages
Quota Sampling			
Opportunity/ Convenience Sampling			

Example.

A lake contains 3 species of fish. There are estimated to be 1400 trout, 600 bass and 450 pike in the lake. A survey of the health of the fish in the lake is carried out and a sample of 30 fish is chosen.

(a) Give a reason why stratified random sampling cannot be used. **(1)**

(b) State an appropriate sampling method for the survey. **(1)**

(c) Give one advantage and one disadvantage of this sampling method. **(2)**

(d) Explain how this sampling method could be used to select the sample of 30 fish. You must show your working. **(4)**

Exercise 1C Page 8

Types of Data

Quantitative Data –

Qualitative Data –

Continuous Data –

Discrete Data –

Key Vocabulary for Grouped Data (presented in a grouped frequency table)

Classes - the groups in a table

Class boundaries - the maximum and minimum values in a class (beware of gaps between the classes)

Midpoint - the average of the class boundaries

Class width - the difference between the upper and lower class boundaries

Exercise 1D Page

Test Your Understanding

Name that sampling method

Simple Random Sampling	Systematic Sampling	Stratified Sampling	Quota Sampling	Opportunity Sampling

1. "You wish to test lightbulbs produced by a factory in a daily batch."

2. "You wish to survey consumer opinion on your new drink *FizzGuzz* released in the UK."

3. "You wish to determine students' favourite TV programmes in your school, that is fairly representative of each year group."