Your notes

GCSE Statistics: revision notes

Populations and sampling

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Populations, censuses and samples

- The **population** is everything or everyone you want to find out about. A **census** collects data from the whole **population**; a sample collects data from part of it.
- A **census** is accurate and complete, but slow and expensive, and impossible if items are destroyed by testing. A sample is quicker and cheaper, but may not represent the **population**.
- A **sampling frame** is a list of everyone in the **population**, such as a school register. Each member is a sampling unit.
- **Bias** means the results lean one way and don't fairly represent the **population**. Larger, well-chosen samples reduce the effect of chance.

Random methods

- Simple random sampling: every member has an equal chance. Number the **sampling frame** and use a random number generator, ignoring repeats.
- Systematic sampling: choose every kth member from a list, after a random start. k = **population** size ÷ sample size. For 500 people and a sample of 25, k = 20.
- Stratified sampling: split the **population** into groups (strata), such as year groups, and sample each in proportion to its size. Number from a stratum = stratum size ÷ **population** size × sample size. Then choose randomly within each stratum.
- Cluster sampling: split the **population** into clusters (such as schools), randomly choose some clusters and sample within them. It is cheaper but may be less representative.

Non-random methods

- Quota sampling: the interviewer chooses a set number of people from each group, such as 20 men and 20 women. It is quick but not random, so it can be biased.

- Convenience (opportunity) sampling: using whoever is easiest to reach. It is quick but very likely to be biased.
- Judgement sampling: the researcher picks people they think are representative.

Capture-recapture

- The Petersen method estimates the size of an animal **population**. Catch and mark a sample (M), release them, then catch a second sample (C) and count how many are marked (R).
- Estimate N = M × C ÷ R. If 40 fish are marked, and a later catch of 50 has 10 marked, N = 40 × 50 ÷ 10 = 200.
- It assumes the **population** doesn't change, marks aren't lost, marked animals mix back in and every animal is equally likely to be caught.

Key terms

Population	Everyone or everything you want to find out about.
Census	Collecting data from the whole population.
Sampling frame	A list of every member of the population.
Simple random sample	A sample where every member has an equal chance of being chosen.
Systematic sample	Choosing every kth member from a list after a random start.
Stratified sample	Sampling each group in proportion to its size.
Quota sample	Choosing a set number from each group, not randomly.
Bias	When results don't fairly represent the population.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. What is a census?
2. What is a sampling frame?
3. What is a disadvantage of a census?
4. A school has 1,200 students and 300 are in Year 7. How many Year 7 students should be in a stratified sample of 80?
5. A list has 600 names and a sample of 30 is needed. What is k for a systematic sample?
6. Which sampling method gives every member an equal chance?
7. Which sampling method is most likely to be biased?
8. 30 birds are ringed. Later, 40 are caught and 6 have rings. Estimate the population.

Your notes

Answers

1. Data collected from the whole population
2. A list of every member of the population
3. It is slow and expensive
4. 20
5. 20
6. Simple random sampling
7. Convenience sampling
8. 200

What to do next

Practise 10 questions on this topic

Try 3 exam questions, with mark schemes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.

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