Random sampling and bias

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. Define the population and variable in a study of weekly bus trips by Year 12 students at one school. [2 marks]

Match the group to the claim.

Identify the numerical measurement for each selected student.

Answer: All Year 12 students at that school; each student’s weekly trip count.

2. A college has 420 day and 180 evening students. Allocate a proportional sample of 40. [2 marks]

Total 600; $40\left(\frac{420}{600}\right)=28$ and $40\left(\frac{180}{600}\right)=12$.

Answer: 28 day; 12 evening.

3. Describe a simple random sample of 15 from a complete list of 200 items. [2 marks]

Every fixed-size selection must have the same chance.

Redraw duplicate labels rather than substituting a convenient item.

Answer: Number items 1-200 and choose 15 distinct random labels.

4. A list repeats machines A, B, C, D. Why might every fourth item be unsuitable? [2 marks]

The interval matches the list’s period.

Randomise the order or deliberately sample across machine types.

Answer: The sampling interval may repeatedly select one machine type.

5. Households are contacted only once at 2 pm on a weekday. Identify a likely bias. [2 marks]

Availability can relate to the measured characteristic.

Use repeat contacts at varied times and report residual non-response.

Answer: Non-response associated with being away at work or study.

6. Rewrite “Should our excellent new timetable remain?” neutrally. [2 marks]

Remove the value judgement “excellent”.

Offer balanced choices without suggesting a preferred answer.

Answer: Should the new timetable remain, be changed, or be replaced?