Samples and populations

6 questions | 16 marks

Equivalent correct methods earn the corresponding marks.

1. A factory tests 40 bulbs from a day's output of 8,000. Identify population and sample. [2 marks]

Match the intended production group to the subset measured.

Answer: Population: the 8,000 bulbs; sample: the 40 tested.

2. Explain one advantage and one limitation of a census. [3 marks]

Full coverage avoids sampling variation only if observations are complete and accurate.

Answer: It aims to include everyone, but it can be costly and still suffer non-response or error.

3. A random sample of 80 is needed from 500 members. Describe a valid selection method. [3 marks]

Each member is in the frame and has an equal chance.

Do not allow repeated selections.

Answer: Number the members 1-500, then use a random generator to select 80 distinct numbers.

4. There are 240 weekday and 160 weekend members. Allocate a proportional sample of 60. [2 marks]

$\frac{240}{400} \times 60 = 36$; the remaining 24 are weekend members.

Answer: 36 weekday and 24 weekend members.

5. A website asks visitors to vote on school lunch quality. Explain two limits on a school-wide conclusion. [3 marks]

The sampling frame excludes some students.

Voluntary response can distort the sample.

Answer: Students who do not visit cannot respond; those with strong opinions may be more likely to vote.

6. A sample finds 28 of 70 students cycle. Calculate the sample proportion and explain why it is not automatically the population proportion. [3 marks]

$\frac{28}{70} = 0.4$.

The statistic estimates an unknown population quantity.

Answer: 0.40, or 40%; a different random sample may give a different result.