Statistical Sampling Methods

Use this key to check answers and read the explanations.

1. A pottery studio checks 18 of its 240 mugs for surface flaws. What is the sample?
   - A. The 18 mugs checked
   - B. All 240 mugs
   - C. Only the mugs with flaws
   - D. The percentage of mugs with flaws

   Correct answer: A. The 18 mugs checked

   The sample is the group of mugs inspected. The studio wants to draw a conclusion about all 240.

2. A museum plans to randomly select members using its membership directory. What is the directory in this study?
   - A. The response rate
   - B. The selected sample
   - C. The sampling frame
   - D. A census result

   Correct answer: C. The sampling frame

   A sampling frame identifies the units that can be selected. The directory lists members eligible for the draw.

3. A co-op measures the floor area of every one of its 34 apartments. What kind of data collection is this for the co-op?
   - A. A sample of five groups
   - B. A census
   - C. A voluntary response survey
   - D. An experiment

   Correct answer: B. A census

   Every apartment in the population of interest is measured, so this is a census of that population.

4. An art supply company asks for opinions from the employees who happen to be in the break room when a researcher arrives. What sampling method is being used?
   - A. Systematic random sampling
   - B. Stratified random sampling
   - C. Simple random sampling
   - D. Convenience sampling

   Correct answer: D. Convenience sampling

   The researcher chooses people who are easy to reach at that moment. No random selection step is described.

5. A city posts a public link asking residents to rate a park. Anyone who sees it can choose whether to respond. How are the responses collected?

A. Through a census of all residents
B. Through voluntary response
C. Through cluster sampling
D. Through stratified random sampling

Correct answer: B. Through voluntary response
People select themselves by choosing whether to respond. The people who volunteer may differ from those who do not.

6. A beekeeper randomly picks three of 12 apiaries and inspects every hive at those three apiaries. Which sampling plan does this illustrate?

A. One-stage cluster sampling
B. Stratified sampling
C. Systematic sampling
D. A simple random sample of individual hives

Correct answer: A. One-stage cluster sampling
The apiaries are clusters. The beekeeper randomly chooses some clusters and includes every hive within each chosen cluster.

7. A survey team divides an artist directory into three groups by medium. It randomly chooses 12 artists from each group. What is this plan?

A. Convenience sampling
B. One-stage cluster sampling
C. A census of all artists
D. Stratified random sampling

Correct answer: D. Stratified random sampling
The team samples within every group. It does not choose whole groups and discard the others.

8. An archivist randomly chooses one of the first nine catalogue entries and then selects every ninth entry after that. What is this method?

A. One-stage cluster sampling
B. Stratified random sampling
C. Systematic random sampling
D. Voluntary response sampling

Correct answer: C. Systematic random sampling
Systematic sampling selects at a regular interval after choosing the starting point at random.

9. An association wants to survey all members, but the sampling list omits everyone who joined this year. What is the main problem with the list?

A. Undercoverage of new members
B. Measurement error on every response
C. A low response rate among selected members
D. Repeated selection of the same member

Correct answer: A. Undercoverage of new members
New members have no way to be chosen from the list. The sampling frame leaves out part of the intended population.

10. A researcher draws one badge at random, records its color, and returns it to the box before the next draw. What does returning the badge allow?

A. The population becomes smaller than the sample after the first draw
B. Each badge must appear exactly once
C. The number of badges in the box decreases
D. The same badge can be selected again

Correct answer: D. The same badge can be selected again
Sampling with replacement puts each selected unit back into the pool before the next selection.

11. A checklist repeats the order red, blue, green, yellow. An inspector starts at a randomly chosen position from 1 to 4 and selects every fourth item. What can go wrong in one inspection?

A. The starting position is always 1
B. No checked item can have a color
C. Every selected item can be the same color
D. The selected items will contain all four colors equally

Correct answer: C. Every selected item can be the same color
The sampling interval equals the length of the color cycle. The start varies across repetitions, but each single inspection keeps landing on the same color.

12. One pottery class has 60 students and another has 20. A researcher randomly chooses 10 students from each class. Who has the higher chance of being chosen?

A. A student in the class of 60
B. A student in the class of 20
C. Both classes have the same chance per student
D. A student in the larger class only if the classes reply at different rates

Correct answer: B. A student in the class of 20
Each student in the smaller class has chance 10/20 = 1/2. Each student in the larger class has chance 10/60 = 1/6.

13. A random sample is selected correctly, but a faulty sensor adds 2 degrees to every recorded temperature. What type of error does the sensor produce?

A. Nonresponse
B. Random sampling variation
C. Undercoverage
D. Nonsampling measurement error

Correct answer: D. Nonsampling measurement error
The error comes from inaccurate measurements after selection. Even a census would have this problem if it used the same sensor.

14. Town A is 60% of a region’s population and Town B is 40%. Sample support for a proposal is 35% in A and 55% in B. What is the population-weighted estimate for the region?

A. 43%
B. 45%
C. 47%
D. 90%

Correct answer: A. 43%
Weight each rate by the town’s population share. Compute $0.60 \times 35\% + 0.40 \times 55\% = 43\%$.

15. A school wants feedback from all students, but its online form is shared only with the choir. What is still true if 300 choir members reply?

A. The survey has become a census of all students
B. The result becomes representative just because there are 300 responses
C. The sample still excludes students outside the choir
D. Sampling methods only matter when fewer than 30 people reply

Correct answer: C. The sample still excludes students outside the choir
More replies from the choir cannot give students outside it a chance to be included. The coverage gap remains.