Identifying Population and Sample

Statistics Worksheet · Grade 6–10

Name: _____ Date: _____

Learning Objectives

- Distinguish between a population and a sample in a given scenario
- Identify the population of interest and the sample actually studied in real-world experiments
- Explain why a sample is used instead of studying the entire population

Problems

1. A teacher wants to know the favorite subject of all students at her school. She surveys 30 students from her homeroom class. Identify the population and the sample.

2. A city wants to know how residents feel about a new park. There are 50,000 residents in the city. The city mails a survey to 500 randomly chosen residents and 210 respond. Identify the population and the sample.

3. A factory produces 8,000 light bulbs per day. Quality control inspectors randomly select 80 bulbs each day and test them for defects. Identify the population and the sample.

4. Read the following scenario and fill in the table below by writing the correct population and sample.

Scenario	Population	Sample
A veterinarian surveys 50 of the 600 dogs registered at a local clinic about their diet.		
A principal asks 25 randomly chosen students out of 400 about school lunch options.		
Researchers test 15 out of 200 water samples from a lake for pollution.		

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5. An archaeologist uncovers thousands of pottery shards and stone tools at a dig site. Students classify every artifact found. The project director then randomly selects 2% of all artifacts to verify the students' work. Identify the population and the sample, and explain what the 2% represents.

6. College students writing a research paper want to know whether people their age prefer vocal or instrumental music. They decide to survey 1,000 people attending a concert. Identify the population, the sample, and state one possible problem with this sampling method.

7. A high school newspaper wants to survey local businesses about the importance of students as customers. From an alphabetical list of all local businesses, the staff randomly selects 150 businesses and mails questionnaires. Only 73 businesses return the questionnaires. Identify the population and the sample, and explain why the sample size changed.

8. A large retailer uses a machine to stuff and seal 1,000 credit card envelopes per hour. An inspector randomly pulls 40 envelopes each hour for visual inspection. Calculate what percentage of the population is being sampled, and identify the population and sample.

$$\frac{40}{1000} \times 100$$

9. A department store mails customer satisfaction surveys to people who made credit card purchases this month. A total of 45,000 people made credit card purchases. Surveys were sent to 1,000 randomly chosen customers and 137 surveys were returned. Identify the population and the sample, calculate the response rate of those surveyed, and explain whether the 137 respondents are a good representation of the 45,000 customers.

$$\frac{137}{1000} \times 100$$

10. Read each of the four scenarios below. For each one, determine whether the underlined group is the population or the sample, and justify your answer in one sentence.

Scenario	Underlined Group	Population or Sample?	Justification
A researcher studies all 3,200 fish in a lake to measure average length.	All 3,200 fish in the lake		

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Scenario	Underlined Group	Population or Sample?	Justification
A scientist randomly catches 60 fish from a lake of 3,200 to measure average length.	The 60 caught fish		
A news station calls 400 voters out of 80,000 registered voters to predict election results.	The 400 voters called		
A school board reviews test scores of every student in the district — 12,000 students.	All 12,000 students		

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Identifying Population and Sample — Answer Key

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Answer Key

1. Answer: Population: All students at the school. Sample: The 30 students in the homeroom class.

- The population is the entire group being studied — all students at the school.
- The sample is the smaller group actually surveyed — the 30 homeroom students.

2. Answer: Population: All 50,000 city residents. Sample: The 210 residents who responded.

- The population includes everyone whose opinion is of interest — all 50,000 residents.
- The sample is the group that actually participated — the 210 who responded to the survey.

3. Answer: Population: All 8,000 light bulbs produced each day. Sample: The 80 randomly selected bulbs.

- The population is all light bulbs produced that day — 8,000 bulbs.
- The sample is the 80 bulbs chosen at random for testing.

4. Answer: See completed table

Scenario	Population	Sample
A veterinarian surveys 50 of the 600 dogs registered at a local clinic about their diet.	All 600 registered dogs	The 50 surveyed dogs
A principal asks 25 randomly chosen students out of 400 about school lunch options.	All 400 students	The 25 chosen students
Researchers test 15 out of 200 water samples from a lake for pollution.	All 200 water samples	The 15 tested samples

5. Answer: Population: All artifacts found at the dig site. Sample: The 2% of artifacts chosen at random for verification.

- The population is every artifact found at the dig — pottery shards, stone tools, and other items.
- The sample is the 2% randomly chosen by the director to check the students' classification work.
- The 2% represents a smaller, manageable subset used to draw conclusions about all artifact classifications.

6. Answer: Population: All people in the students' age group. Sample: The 1,000 concert attendees surveyed. Problem: Concert attendees may not represent all people in that age group.

- The population is all people in the researchers' age group whose music preferences they want to study.
- The sample is the 1,000 people at the concert who were surveyed.

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• A problem: People who attend concerts may already prefer music more than the general population, making the sample biased.

7. Answer: Population: All local businesses. Sample: The 73 businesses that returned the questionnaire. The size changed because not all 150 who received the survey responded.

• The population is all local businesses — the full group the newspaper wants information about.
• Although 150 questionnaires were sent, only 73 were returned, so the actual sample is 73 businesses.
• The sample size changed due to non-response — some businesses chose not to return the survey.

8. Answer: Population: All 1,000 envelopes produced per hour. Sample: The 40 randomly selected envelopes. Percentage sampled: 4%

• Population = all 1,000 envelopes produced each hour by the machine.
• Sample = the 40 envelopes chosen at random for visual inspection.
• Percentage sampled = (40 / 1000) × 100 = 4%.

9. Answer: Population: All 45,000 customers. Sample: The 137 who returned the survey. Response rate: 13.7%. The sample may not represent the population well due to the low response rate.

• Population = all 45,000 people who made credit card purchases this month.
• Sample = the 137 customers who returned the survey.
• Response rate = (137 / 1000) × 100 = 13.7%.
• A 13.7% response rate is low, meaning the 137 respondents may not accurately represent all 45,000 customers due to non-response bias.

10. Answer: See completed table

Scenario	Underlined Group	Population or Sample?	Justification
A researcher studies all 3,200 fish in a lake to measure average length.	All 3,200 fish in the lake	Population	Every member of the entire group of interest is being studied.
A scientist randomly catches 60 fish from a lake of 3,200 to measure average length.	The 60 caught fish	Sample	Only a small subset of the total population of fish is being measured.
A news station calls 400 voters out of 80,000 registered voters to predict election results.	The 400 voters called	Sample	The 400 voters are a small group selected from the larger population of 80,000.
A school board reviews test scores of every student in the district — 12,000 students.	All 12,000 students	Population	The entire group of interest — all students in the district — is being reviewed.

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