Populations and Samples

Apply the skill to decisions and designs

Name _____ **Date** _____ **Score** _____ / 8

QUICK REVIEW

The population is the whole target group; the sample is the group actually studied. Surveying 40 randomly chosen students from 400 samples $40/400 = 1/10$ of the population. Random selection helps avoid bias; a larger convenience sample may still be biased. No sample guarantees exact population results.

Worked example

A town has 900 households; 90 are randomly surveyed. Identify population, sample, and fraction.

1. All 900 households form the target population.
2. The 90 surveyed households form the sample.
3. Sample fraction $= 90/900 = 1/10 = 10\%$.
Answer: Population 900; sample 90; fraction $1/10$.

Practice Problems

Show your thinking.

1. Club activities: Design a random survey of 70 of 1200 students: identify the target group, sampling fraction, and how to avoid interviewing a student twice.

2. Club activities: Choose between 70 Saturday library volunteers and 70 random cardholders to represent 1200 cardholders. Explain the stronger design and who could be missed by the other.

3. Club activities: A club can contact 70 of 1200 members. Specify a numbered random selection without replacement and calculate how many members will not be contacted.

4. Club activities: A school has 600 students in each of two grades. Allocate 70 interviews equally and find the selection fraction within each grade.

5. Club activities: A budget funds either 70 or 140 random interviews from 1200 members. Compare sample fractions and select the generally more precise design; state its remaining limitation.

6. Club activities: A coach can cheaply survey 70 players, but the question concerns 1200 students. Propose a same-size random design that better matches the target, and explain why size is not the only issue.

7. Design a 96-household random survey from 960, without repeats. Find the fraction sampled and the number not contacted.

8. Design a proportional random 60-student survey from groups of $300, 200, 100$. Give group allocations and how to select within groups.

Answer Key

1. Population 1200; sample 70; sampled fraction $\frac{7}{120}$. Draw distinct student IDs and interview each once.
2. Population 1200; sample 70; sampled fraction $\frac{7}{120}$. Prefer random cardholders; Saturday visitors may have different availability.
3. 1130 unselected. Draw 70 distinct numbers from the full list.
4. 35 per grade, 70 total; within-grade fraction $\frac{7}{120}$.
5. Fractions $\frac{7}{120}$ and $\frac{7}{60}$; larger random sample is generally more stable, not guaranteed exact.
6. Population 1200; sample 70; sampled fraction $\frac{7}{120}$. No; players or volunteers can have different preferences from nonparticipants.
7. Population 960, sample 96, sampled $1/10$, not contacted 864 $(9/10)$. Use distinct random household numbers, not volunteers.
8. Allocations $30, 20, 10$; total 60. Select randomly within each group.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Use the full roster of 1200 students as the target population. Give each student one unique ID from 1 to 1200.
2. Draw 70 IDs randomly without replacement, so no ID can be drawn twice. Interview each selected ID once, crossing it off the interview list after the interview.
3. The sample has 70 distinct students. The sampling fraction is $70/1200 = \frac{7}{120}$.

Problem 2

1. The target population has 1200 members, with $1200 - 70 = 1130$ outside the intended sample.
2. The sample has 70 distinct members; fraction $70/1200 = \frac{7}{120}$.
3. A random sample from the whole list gives all members a selection chance; a convenience group can miss systematically different members.

Problem 3

1. Give each of the 1200 members one unique number from 1 to 1200. The full list is in the draw, so every member is eligible.
2. Draw 70 different numbers without replacement. With replacement, duplicate draws could count the same person twice.
3. Exactly 70 people are contacted, leaving $1200 - 70 = 1130$ unselected.

Problem 4

1. Split the 70 interviews into two equal random groups: $70/2 = 35$ per grade. Check $35 + 35 = 70$.
2. Each grade has $1200/2 = 600$ students.
3. Within-grade fraction $35/600 = \frac{7}{120}$ is the same in both grades.

Problem 5

1. The target population has 1200 members, with $1200 - 70 = 1130$ outside the intended sample.
2. The sample has 70 distinct members; fraction $70/1200 = \frac{7}{120}$.
3. Larger fraction $140/1200 = \frac{7}{60}$ reduces typical sampling variation but cannot eliminate it.

Problem 6

1. The target population has 1200 members, with $1200 - 70 = 1130$ outside the intended sample.
2. The sample has 70 distinct members; fraction $70/1200 = \frac{7}{120}$.
3. A random sample from the whole list gives all members a selection chance; a convenience group can miss systematically different members.

Problem 7

1. The whole target is all 960 households; sample fraction $96/960 = 1/10$.
2. Not surveyed $960 - 96 = 864$; fraction $864/960 = 9/10$.
3. Number households 1 through 960 and select 96 distinct random numbers; volunteer selection does not give everyone the same chance.

Problem 8

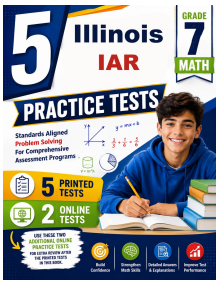
1. Population total $300 + 200 + 100 = 600$; sample rate $60/600 = 1/10$.
2. Group counts $300/10 = 30$, $200/10 = 20$, $100/10 = 10$.
3. Check $30 + 20 + 10 = 60$; each group has the same 10% sampling rate when members are selected randomly.

TESTINAR

Keep Building Grade 7 Math Skills

Choose the practice book matched to your state assessment and turn worksheet practice into a complete test-prep plan.

All Grade 7 books



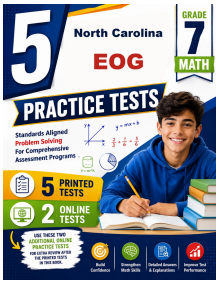
ILLINOIS IAR

5 Full-Length Math Practice Tests

Build Grade 7 accuracy, confidence, and test stamina with 5 printable practice tests.

Printable eBook • Instant PDF access

View eBook



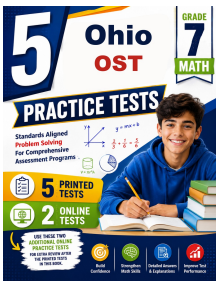
NORTH CAROLINA EOG

5 Full-Length Math Practice Tests

Build Grade 7 accuracy, confidence, and test stamina with 5 printable practice tests.

Printable eBook • Instant PDF access

View eBook



OHIO OST

5 Full-Length Math Practice Tests

Build Grade 7 accuracy, confidence, and test stamina with 5 printable practice tests.

Printable eBook • Instant PDF access

View eBook

Need a different state?
Testinar has Grade 7 math practice books for state assessments across the country.

TESTINAR.COM/GRADES/7