Making Inferences from Random Samples

Explore ideas and representations

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

QUICK REVIEW

Estimate population count = population size times random sample fraction. If 12 of 20 sampled students walk, estimate $(12/20)500 = 300$ walkers among 500. Different random samples can yield different estimates; do not promise exactness.

Worked example

A random sample has 12 walkers of 20. Estimate walkers among 500.

1. Sample fraction $12/20 = 3/5$.
2. Projected count $500(3/5) = 300$.
3. Projected nonwalkers $500 - 300 = 200$; both are estimates.

Answer: About 300.

Practice Problems

Show your thinking.

1. In a random sample of 30 students, 18 prefer art. Estimate the count among 600 students.

2. Write a proportion for 28 supporters of 40 sampled households; estimate supporters among 800.

3. Two random samples of 25 have 15 and 17 bus riders. Estimate both population counts among 500 and explain why they can differ.

4. A random sample has 36 yes responses of 60. Find the yes percent and projected NO count among 1200.

5. A random sample of 40 has 24 participants. Estimate participants in 1000 and explain why this is not a census.

6. Using sample rate $21/35$, find projected counts for populations 700 and 1400.

7. In a random sample, 72 of 120 residents support a park. Estimate supporters among 1500 residents.

8. Two nonoverlapping random samples from the same town have 3 supporters of 10 and 12 of 20. Pool counts and estimate supporters among 500 people.

Answer Key

1. Estimated yes 360; no 240; yes rate 60%.
2. Estimated yes 560; no 240; yes rate 70%.
3. Estimates 300 and 340; variation between samples, not guaranteed bounds.
4. Estimated yes 720; no 480; yes rate 60%.
5. Estimated yes 600; no 400; yes rate 60%.
6. 420 then 840; extra 420.
7. About 900 supporters.
8. Pooled rate $1/2$; about 250 supporters.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. Sample rate $= 18/30 = \frac{3}{5}$.
2. Estimated count $= 600(\frac{3}{5}) = 360$.
3. Complement $= 600 - 360 = 240$; these are estimates, not a census.

Problem 2

1. Sample rate $= 28/40 = \frac{7}{10}$.
2. Estimated count $= 800(\frac{7}{10}) = 560$.
3. Complement $= 800 - 560 = 240$; these are estimates, not a census.

Problem 3

1. Sample rate $= 15/25 = \frac{3}{5}$.
2. Estimated count $= 500(\frac{3}{5}) = 300$.
3. Second estimate $= 500(17/25) = 340$; random samples can yield different rates.

Problem 4

1. Sample rate $= 36/60 = \frac{3}{5}$.
2. Estimated count $= 1200(\frac{3}{5}) = 720$.
3. Complement $= 1200 - 720 = 480$; these are estimates, not a census.

Problem 5

1. Sample rate $= 24/40 = \frac{3}{5}$.
2. Estimated count $= 1000(\frac{3}{5}) = 600$.
3. Complement $= 1000 - 600 = 400$; these are estimates, not a census.

Problem 6

1. Sample rate $= 21/35 = \frac{3}{5}$.
2. Estimated count $= 700(\frac{3}{5}) = 420$.
3. New count $= 1400(\frac{3}{5}) = 840$; difference 420.

Problem 7

1. Sample rate $72/120 = 3/5$.
2. Use that rate for the whole population: $1500/5 = 300$ people per fifth.
3. Three fifths gives $3(300) = 900$ estimated supporters, not an exact census count.

Problem 8

1. Pooled supporters $3 + 12 = 15$, sample size $10 + 20 = 30$.
2. Pooled rate $15/30 = 1/2$.
3. Apply the pooled rate to all 500: $500(1/2) = 250$ supporters.

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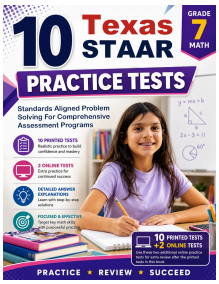

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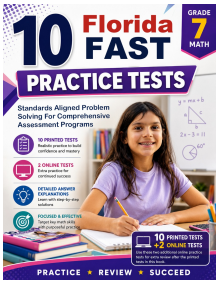

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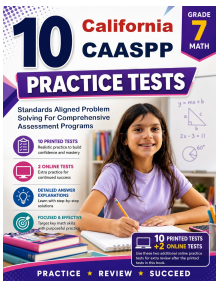

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