

Sample to Population

Use random samples to make careful estimates.

HIGH SCHOOL • HSS-IC.A.1

CCSS.Math.Content.HSS-IC.A.1 "Understand statistics as a process for making inferences about population parameters based on a random sample from that population."

NAME _____

DATE _____

FROM SAMPLE TO ESTIMATE

A population is the full group you want to know about. A random sample can give a sample proportion that estimates the population proportion, but a biased sample cannot support a reliable inference.

WORKED EXAMPLE

A random sample of 48 library visitors finds that 36 use e-books. Estimate the percentage of all library visitors who use e-books.

1. Sample proportion = $36/48$.

2. $36/48 = 3/4 = 0.75$.

3. $75 \times 100\% = 75\%$.

Answer: About 75% of all library visitors use e-books.

PRACTICE 5 problems

- 1** A school has 1,200 students and randomly surveys 28 of them. What is the population?

ANSWER _____

- 2** A counselor numbers all 900 students and uses a random-number table to choose 24 students. Is this a random sample?

ANSWER _____

- 3** In a random sample of 25 students, 17 prefer digital notes. Estimate the percentage of all students who prefer digital notes.

ANSWER _____

- 4** A website asks visitors to click a button if they support a policy. Why is this weak evidence about all students?

ANSWER _____

- 5** In a random sample of 80 students, 52 bring a water bottle daily. State the statistic and the parameter being estimated.

ANSWER _____

APPLY IT Show your work

- 1** The student council wants to estimate support for a later school start time. It randomly selects 40 students from the school roster, and 26 support the change. Estimate the percentage of all students who support a later start time.

WORK SPACE

ANSWER _____

- 2** A game club asks 18 members at its meeting whether the school should add an esports team. Fifteen say yes. Can the club use $15/18$ to estimate support among all students? Explain.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A club wants to estimate the percentage of students who watch esports. Survey A randomly selects 50 students and finds 32 who watch esports. Survey B is an Instagram poll with 200 responses, including 150 who watch esports. Which survey gives the more reliable estimate for all students? Give the estimate and explain why.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A school has 1,200 students and randomly surveys 28 of them. What is the population?	All 1,200 students at the school.
2	A counselor numbers all 900 students and uses a random-number table to choose 24 students. Is this a random sample?	Yes. Each student can be selected by the random-number process.
3	In a random sample of 25 students, 17 prefer digital notes. Estimate the percentage of all students who prefer digital notes.	$17/25 = 68\%$, so about 68%.
4	A website asks visitors to click a button if they support a policy. Why is this weak evidence about all students?	Visitors choose themselves, so it is a voluntary-response sample, not a random sample.
5	In a random sample of 80 students, 52 bring a water bottle daily. State the statistic and the parameter being estimated.	Statistic: $52/80 = 65\%$. Parameter: the true proportion of all students who bring a water bottle daily.

PART 2 • APPLY IT

- $26/40 = 65\%$, so about 65% of all students support it.** Use the sample proportion, $26/40$. Because the students were randomly selected, this proportion can estimate the population proportion.
- No. Club members are not a random sample of all students and may be more likely to support esports.** The sample is a convenience sample from the game club, not a random sample from the school. Its proportion may be biased.

CHALLENGE

Survey A. Its estimate is $32/50 = 64\%$. Survey A uses a random sample, while Survey B is a voluntary-response poll that may be biased.

Accept equivalent forms such as $13/20$, 0.65 , and 65% where appropriate. For explanation items, accept any clear statement that random selection supports inference and voluntary or convenience sampling can create bias.