

Survey Signal

Estimate a population, then test the estimate with simulations.

HIGH SCHOOL • MA.912.DP.1.4

MA.912.DP.1.4 "Estimate a population total, mean or percentage using data from a sample survey; develop a margin of error through the use of simulation."

NAME _____

DATE _____

SAMPLE TO POPULATION

Use the sample percentage as an estimate of the population percentage. Simulate samples of the same size, then use the greatest distance between a simulated percentage and your estimate as the margin of error.

WORKED EXAMPLE

In a survey of 32 students, 20 choose option A. A simulation of same-size surveys gives 56%, 59%, 65%, and 69%. Estimate the percentage and margin of error.

1. $20/32 = 0.625 = 62.5\%$.
2. Compare each simulated percentage to 62.5%.
3. The greatest distance is 6.5 percentage points.
4. Use $62.5\% \pm 6.5\%$.

Answer: 62.5% +/- 6.5%, or 56% to 69%

PRACTICE 5 problems

- 1** A sample of 40 students includes 14 who ride a bus to school. Estimate the population percentage.

ANSWER _____

- 2** A sample of 50 students includes 18 who buy lunch at school. The school has 900 students. Estimate how many buy lunch.

ANSWER _____

- 3** A survey estimate is 48%. Simulated estimates are 43%, 46%, 51%, and 55%. Find the margin of error and interval.

ANSWER _____

- 4** A sample of 30 students includes 21 who use a streaming service. The school has 600 students. Estimate how many use one.

ANSWER _____

- 5** A survey estimate is 72%. Simulated estimates are 68%, 75%, and 77%. Find the margin of error and interval.

ANSWER _____

APPLY IT Show your work

- 1** An esports club surveys 80 students, and 48 say they would attend a tournament. The school has 1,200 students. Simulated survey percentages are 57%, 58%, 61%, and 63%. Estimate the number who would attend and give a margin of error range.

WORK SPACE

ANSWER _____

- 2** Student council surveys 75 students, and 30 prefer more outdoor lunch seating. The school has 1,500 students. Simulated survey percentages are 35%, 38%, 42%, and 44%. Estimate the number who prefer outdoor seating and give a margin of error range.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Survey A has 200 students, with 110 answering yes. Its simulated percentages are 50%, 53%, 54%, 55%, and 57%. Survey B has 40 students, with 22 answering yes. Its simulated percentages are 45%, 49%, 55%, 60%, and 66%. Which survey has the smaller margin of error? Explain using the simulations.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A sample of 40 students includes 14 who ride a bus to school. Estimate the population percentage.	35%
2	A sample of 50 students includes 18 who buy lunch at school. The school has 900 students. Estimate how many buy lunch.	324 students
3	A survey estimate is 48%. Simulated estimates are 43%, 46%, 51%, and 55%. Find the margin of error and interval.	7 percentage points; 41% to 55%
4	A sample of 30 students includes 21 who use a streaming service. The school has 600 students. Estimate how many use one.	420 students
5	A survey estimate is 72%. Simulated estimates are 68%, 75%, and 77%. Find the margin of error and interval.	5 percentage points; 67% to 77%

PART 2 • APPLY IT

- Estimate: 720 students. Margin of error: 3 percentage points. Range: 684 to 756 students.** The sample estimate is $48/80 = 60\%$, so 60% of 1,200 is 720. The greatest simulated distance from 60% is 3%, giving 57% to 63% of the school.
- Estimate: 600 students. Margin of error: 5 percentage points. Range: 525 to 675 students.** The sample estimate is $30/75 = 40\%$, so 40% of 1,500 is 600. The greatest simulated distance is 5%, giving 35% to 45% of the school.

CHALLENGE

Survey A. Both estimates are 55%, but Survey A has a margin of error of 5 percentage points and Survey B has a margin of error of 11 percentage points. Survey A's simulated estimates are less spread out.

Accept equivalent percentage, fraction, or decimal calculations when they lead to the stated estimate. Margins of error should be stated in percentage points, and population ranges should use the matching lower and upper percentages.