LESSON MAKER PRO

Poll Precision

Explore what changes a poll's margin of error.

HIGH SCHOOL · S.DA.5.3

S.DA.5.3 "Explain how changes in the sample size, confidence level, and standard error affect the margin of error of a confidence interval."

NAME _____ DATE _____

THE MARGIN RULE

Use ME = z × SE, where z=2 for 95% confidence and z=2.6 for 99% confidence; these give estimated margins of error. If sample size is multiplied by 4 and variation stays similar, SE and ME are each halved. A higher confidence level or a larger SE increases ME when the other factors stay fixed.

WORKED EXAMPLE

A poll has a standard error of 7 percentage points. Estimate its margin of error at 95% confidence.

1. For 95% confidence, use z=2.
2. ME = z × SE = 2 × 7 = 14.

Answer: The estimated margin of error is 14 percentage points.

PRACTICE 6 problems

1 A poll has a standard error of 4 percentage points. Estimate its margin of error at 95% confidence.

ANSWER _____

2 A poll has a standard error of 10 percentage points. Estimate its margin of error at 99% confidence.

ANSWER _____

3 A poll has a standard error of 6 percentage points. Find its estimated margin of error at 95% confidence and at 99% confidence.

ANSWER _____

4 A poll of 50 students has a standard error of 6 percentage points. If a similar poll surveys 200 students, find its new standard error and its estimated margin of error at 95% confidence.

ANSWER _____

5 A poll has a standard error of 4 percentage points at 99% confidence. If its sample size is multiplied by 4 and variation stays similar, what is its new estimated margin of error?

ANSWER _____

6 At 95% confidence, a poll has a standard error of 9 percentage points. By what factor must its sample size grow to cut its estimated margin of error in half, assuming similar variation?

ANSWER _____

APPLY IT Show your work

1 A student news team polls 64 students about a proposed later start time. The standard error is 6 percentage points. Estimate the margin of error at 95% confidence. If the team instead polls 256 students with similar variation, what is the new estimated margin of error?

WORK SPACE

ANSWER _____

2 A school club surveys students about a concert. Its standard error is 10 percentage points. If the club changes from 99% confidence to 95% confidence without changing the sample, by how many percentage points does its estimated margin of error drop?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A school compares three plans for a student poll. Use the table to find each plan's estimated margin of error. Which plan has the smallest margin of error? Explain why Plan C has a smaller margin of error than Plan A despite its higher confidence level.

STUDENT POLL PLANS

Plan	Sample size	Confidence level	SE (percentage points)
A	25	95%	10
B	100	95%	5
C	100	99%	5

WORK SPACE AND ANSWER

ANSWER KEY

Poll Precision

HIGH SCHOOL · S.DA.5.3

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A poll has a standard error of 4 percentage points. Estimate its margin of error at 95% confidence.	**8 percentage points**
2	A poll has a standard error of 10 percentage points. Estimate its margin of error at 99% confidence.	**26 percentage points**
3	A poll has a standard error of 6 percentage points. Find its estimated margin of error at 95% confidence and at 99% confidence.	**95%: 12 percentage points; 99%: 15.6 percentage points**
4	A poll of 50 students has a standard error of 6 percentage points. If a similar poll surveys 200 students, find its new standard error and its estimated margin of error at 95% confidence.	**New SE: 3 percentage points; estimated ME: 6 percentage points**
5	A poll has a standard error of 4 percentage points at 99% confidence. If its sample size is multiplied by 4 and variation stays similar, what is its new estimated margin of error?	**5.2 percentage points**
6	At 95% confidence, a poll has a standard error of 9 percentage points. By what factor must its sample size grow to cut its estimated margin of error in half, assuming similar variation?	**The sample size must be multiplied by 4.**

PART 2 · APPLY IT

1. **Original ME: 12 percentage points; new ME: 6 percentage points** At 95% confidence, 2 × 6 = 12. Polling four times as many students halves the standard error, so the new margin of error is 2 × 3 = 6 percentage points.
2. **6 percentage points** The estimated margins of error are 2.6 × 10 = 26 and 2 × 10 = 20 percentage points. The drop is 26 - 20 = 6 percentage points.

CHALLENGE

A: 20 percentage points; B: 10 percentage points; C: 13 percentage points. Plan B has the smallest margin of error. Plan C's smaller standard error more than offsets its larger confidence multiplier when compared with Plan A.

Accept equivalent wording that distinguishes percentage points from percentages. Margins of error use the rounded confidence multipliers given in the concept box.