LESSON MAKER PRO

Intervals That Inform

Build and explain confidence intervals

HIGH SCHOOL · S.DA.5.2

S.DA.5.2 "Explain how a sample statistic and a confidence level are used in the construction of a confidence interval."

NAME _____ DATE _____

CENTER AND SPREAD

A sample statistic estimates a population value and sits at the center of a confidence interval. Find the margin of error by multiplying the standard error by a confidence multiplier, then subtract and add that margin to the statistic. For this worksheet, use these approximate multipliers: 90% = 1.65, 95% = 2, and 99% = 2.6. Higher confidence gives a wider interval when the statistic and standard error stay the same.

WORKED EXAMPLE

A sample mean is 78, and its standard error is 10. Use the 95% multiplier to build a confidence interval.

1. Use 2 as the 95% multiplier.
2. Find the margin of error: 2 × 10 = 20.
3. Find the endpoints: 78 - 20 = 58 and 78 + 20 = 98.

Answer: The approximate 95% confidence interval is [58, 98].

PRACTICE 6 problems

1 A sample mean is 50, with a standard error of 10. Build a 95% confidence interval.

ANSWER _____

2 A sample mean is 60, with a standard error of 20. Build a 90% confidence interval.

ANSWER _____

3 A sample mean is 80, with a standard error of 10. Build a 99% confidence interval.

ANSWER _____

4 A survey gives a sample statistic of 44 and a 95% margin of error of 8. A student reports [44, 52]. Write the correct interval and explain the error.

ANSWER _____

5 A 95% confidence interval is [65, 85]. Find the sample statistic at its center and the standard error used to build it.

ANSWER _____

6 A sample mean is 100, with a standard error of 20. Build both a 90% and a 99% confidence interval. Which is wider?

ANSWER _____

APPLY IT Show your work

1 Students survey a random sample at their school about a proposed lunch option. In the sample, 60% want it. The standard error is 10 percentage points. Build a 95% confidence interval for the percentage of all students at the school who want the option. Explain what the 95% confidence level means.

WORK SPACE

ANSWER _____

2 A student group estimates that the mean trip to school takes 24 minutes, with a standard error of 5 minutes. Build 95% and 99% confidence intervals. Which interval should the group use if it wants greater confidence that its method captures the true mean?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A 95% confidence interval is [40, 60]. Using the multipliers on this page and the same sample statistic and standard error, build a 99% confidence interval. Explain how you found the statistic and standard error from the first interval.

WORK SPACE AND ANSWER

Intervals That Inform

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A sample mean is 50, with a standard error of 10. Build a 95% confidence interval.	**[30, 70]**
2	A sample mean is 60, with a standard error of 20. Build a 90% confidence interval.	**[27, 93]**
3	A sample mean is 80, with a standard error of 10. Build a 99% confidence interval.	**[54, 106]**
4	A survey gives a sample statistic of 44 and a 95% margin of error of 8. A student reports [44, 52]. Write the correct interval and explain the error.	**[36, 52]. The student used 44 as the lower endpoint instead of subtracting 8 from 44.**
5	A 95% confidence interval is [65, 85]. Find the sample statistic at its center and the standard error used to build it.	**Sample statistic: 75. Standard error: 5.**
6	A sample mean is 100, with a standard error of 20. Build both a 90% and a 99% confidence interval. Which is wider?	**90%: [67, 133]. 99%: [48, 152], which is wider.**

PART 2 · APPLY IT

1. **[40%, 80%]. If the school repeated this sampling method many times, about 95% of the intervals it produced would contain the true percentage of students who want the option.** The margin of error is 2 × 10 = 20 percentage points. Subtract and add 20 percentage points to the sample statistic of 60%.
2. **95%: [14, 34] minutes. 99%: [11, 37] minutes. Use the 99% interval for greater confidence.** The margins of error are 2 × 5 = 10 minutes and 2.6 × 5 = 13 minutes. The 99% interval is wider because it uses a larger confidence multiplier.

CHALLENGE

The 99% interval is [37, 63]. The center of [40, 60] is 50, so the sample statistic is 50. Its margin of error is 10, and 10 ÷ 2 = 5 gives the standard error. For 99% confidence, the margin is 2.6 × 5 = 13.

Accept intervals written as endpoints or with brackets. Confidence describes the long-run success rate of the interval-building method, not the probability that a fixed interval contains the population value.