LESSON MAKER PRO

Claims and Intervals

Build 95% confidence intervals and test claims.

HIGH SCHOOL · S.DA.5

S.DA.5 "Make statistical inferences and evaluate claims from studies. Construct and interpret confidence intervals for the mean of a normally distributed population and for a population proportion..."

NAME _____ DATE _____

BUILD AN INTERVAL

For this worksheet, use 2 as the multiplier for an approximate 95% confidence interval. Start with the sample mean or sample proportion, then add and subtract the margin of error. For a mean, the margin is 2 × known population SD / sqrt(sample size). For a proportion, it is 2 × sqrt(sample proportion × (1 - sample proportion) / sample size). A claimed population value is consistent with the data if it falls inside the interval.

WORKED EXAMPLE

Use the sample information to find an approximate 95% confidence interval for the population mean.

SAMPLE INFORMATION

Measure	Value
Sample mean	72
Known population SD	9
Sample size	81

1. sqrt(81) = 9.
2. Margin of error = 2 × 9 / 9 = 2.
3. Subtract and add 2: 72 - 2 = 70 and 72 + 2 = 74.

Answer: The approximate 95% confidence interval is 70 to 74.

PRACTICE 4 problems

1 A sample of 25 has a mean of 50. The known population SD is 10. Find the approximate 95% confidence interval for the population mean.

ANSWER _____

2 A sample of 16 has a mean of 120. The known population SD is 8. Find the approximate 95% confidence interval for the population mean.

ANSWER _____

3 In a sample of 100 people, 50 choose option A. Find the approximate 95% confidence interval for the population proportion.

ANSWER _____

4 A sample of 36 has a mean of 34 and a known population SD of 6. Find the approximate 95% confidence interval. Is a claimed population mean of 30 consistent with it?

ANSWER _____

APPLY IT Show your work

1 Students at a school estimate their daily music-listening time. A sample of 25 has a mean of 45 minutes, and the known population SD is 15 minutes. Find an approximate 95% confidence interval for the school mean. Is a claim of 40 minutes consistent with it?

WORK SPACE

ANSWER _____

2 In a random sample of 100 students, 20 say they bike to school. Find an approximate 95% confidence interval for the proportion of students who bike to school. Is a claim of 30% consistent with it?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Two random samples from the same population each have a mean of 80. The known population SD is 20. One sample has 25 people; the other has 100. Find both approximate 95% confidence intervals. Explain how sample size changes the margin of error.

WORK SPACE AND ANSWER

ANSWER KEY

Claims and Intervals

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A sample of 25 has a mean of 50. The known population SD is 10. Find the approximate 95% confidence interval for the population mean.	**46 to 54**
2	A sample of 16 has a mean of 120. The known population SD is 8. Find the approximate 95% confidence interval for the population mean.	**116 to 124**
3	In a sample of 100 people, 50 choose option A. Find the approximate 95% confidence interval for the population proportion.	**40% to 60%**
4	A sample of 36 has a mean of 34 and a known population SD of 6. Find the approximate 95% confidence interval. Is a claimed population mean of 30 consistent with it?	**32 to 36; no, 30 is outside the interval.**

PART 2 · APPLY IT

1. **39 to 51 minutes; yes, 40 minutes is inside the interval.** The margin is 2 × 15 / sqrt(25) = 6 minutes. Add and subtract 6 from 45.
2. **12% to 28%; no, 30% is outside the interval.** The sample proportion is 0.20, and the margin is 2 × sqrt(0.20 × 0.80 / 100) = 0.08.

CHALLENGE

For 25 people, the interval is 72 to 88, with a margin of 8. For 100 people, it is 76 to 84, with a margin of 4. Quadrupling the sample size halves the margin of error.

Accept intervals written with brackets or in words. These 95% intervals are approximate because the worksheet uses 2 as the multiplier.