LESSON MAKER PRO

Estimate the Unknown

Build and interpret 95% confidence intervals

HIGH SCHOOL · S.DA.5.1

S.DA.5.1 "Construct and interpret confidence intervals for the mean of a normally distributed population and for a population proportion."

NAME _____ DATE _____

TWO INTERVAL RULES

For a random sample from a normal population with known population SD, an approximate 95% confidence interval for the mean is sample mean ± 2(SD)/sqrt(n). For a random sample proportion p, use p ± 2sqrt(p(1 - p)/n). Use the proportion rule when at least 10 people are in each group.

WORKED EXAMPLE

The table summarizes a random sample from a normal population. Find an approximate 95% confidence interval for its mean.

SAMPLE SUMMARY

Sample mean	Sample size	Population SD
64	25	10

1. Find the margin: 2(10)/sqrt(25) = 4.
2. Subtract and add: 64 - 4 = 60 and 64 + 4 = 68.

Answer: 60 to 68

PRACTICE 4 problems

1 A random sample from a normal population has mean 50, n = 16, and population SD = 8. Find the approximate 95% confidence interval for the mean.

ANSWER _____

2 A random sample from a normal population has mean 80, n = 36, and population SD = 9. Find the approximate 95% confidence interval for the mean.

ANSWER _____

3 In a random sample of 100 students, 50 choose a later lunch. Find the approximate 95% confidence interval for the population proportion.

ANSWER _____

4 In a random sample of 48 students, 12 ride a bike to school. Find the approximate 95% confidence interval for the population proportion.

ANSWER _____

APPLY IT Show your work

1 A random sample of 9 teens records daily screen time. The sample mean is 180 minutes. Assume screen times are normally distributed with population SD 30 minutes. Find an approximate 95% confidence interval for the mean.

WORK SPACE

ANSWER _____

2 A random poll of 400 students gives the results shown. Find an approximate 95% confidence interval for the proportion of students who prefer digital tickets. Interpret your interval.

TICKET PREFERENCE

Preference	Students
Digital tickets	200
Other tickets	200

ANSWER _____

CHALLENGE One step up

In a random poll of 300 students, 75 prefer a later school start. Find an approximate 95% confidence interval for the population proportion. Does 1/3 fall inside it? Explain.

WORK SPACE AND ANSWER

ANSWER KEY

Estimate the Unknown

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A random sample from a normal population has mean 50, n = 16, and population SD = 8. Find the approximate 95% confidence interval for the mean.	**46 to 54**
2	A random sample from a normal population has mean 80, n = 36, and population SD = 9. Find the approximate 95% confidence interval for the mean.	**77 to 83**
3	In a random sample of 100 students, 50 choose a later lunch. Find the approximate 95% confidence interval for the population proportion.	**0.40 to 0.60**
4	In a random sample of 48 students, 12 ride a bike to school. Find the approximate 95% confidence interval for the population proportion.	**1/8 to 3/8**

PART 2 · APPLY IT

1. **160 to 200 minutes** The margin is 2(30)/sqrt(9) = 20 minutes. Add and subtract 20 from 180.
2. **0.45 to 0.55. We are about 95% confident that 45% to 55% of all students prefer digital tickets.** The sample proportion is 200/400 = 0.5, and the margin is 2sqrt(0.5(0.5)/400) = 0.05.

CHALLENGE

1/5 to 3/10. No, 1/3 is greater than 3/10, so it is outside the interval.

Accept equivalent fractions, decimals, or percentages. These intervals use 2 as an approximation for the 95% critical value.