LESSON MAKER PRO

Sample Mean Check

Use repeated samples to see how close sample means stay.

GRADE 7 · 7.PAR.4.12

7.PAR.4.12 "Use data from repeated random samples to evaluate how much a sample mean is expected to vary from a population mean. Simulate multiple samples of the same size."

NAME _____ DATE _____

COMPARE SAMPLE MEANS

A random sample mean may be above or below the population mean. Repeat samples of the same size, then compare each sample mean with the population mean. Small differences mean the sample means are staying close to the population mean.

WORKED EXAMPLE

A population has mean 50. Five random samples of size 6 have means 48, 51, 50, 49, and 52. How much do the sample means vary from the population mean?

1. Find each distance from 50: 2, 1, 0, 1, 2.
2. The sample means run from 48 to 52.
3. Each sample mean is no more than 2 from 50.

Answer: The sample means vary from 0 to 2 away from the population mean.

PRACTICE 4 problems

1 A population has mean 24. Four random samples of size 5 have means 23, 25, 24, and 26. What is the greatest difference between a sample mean and the population mean?

ANSWER _____

2 A population has mean 18. Four random samples of size 3 have means 17, 18, 19, and 18. List the differences from 18. Then state the greatest difference.

ANSWER _____

3 A population has mean 16. Three random samples of size 2 are {8, 24}, {12, 16}, and {16, 20}. Find the three sample means. What is the greatest difference from 16?

ANSWER _____

_____

4 A population has mean 40. Sample Set A, with samples of size 2, has means 38, 42, 40, and 38. Sample Set B, with samples of size 8, has means 39, 40, 41, and 40. Which set shows less variation? Give the range of each set.

ANSWER _____

_____

APPLY IT Show your work

1 An animation club knows the mean length of all its posted videos is 16 minutes. Members repeatedly choose random samples of 4 videos. Use the table. What is the greatest difference between a sample mean and 16? What does this simulation suggest?

RANDOM VIDEO SAMPLES

Sample	Sample mean, minutes
1	15
2	17
3	16
4	15
5	17

ANSWER _____

2 A game club knows that the population mean score is 12 points. It simulates three random samples of 3 game rounds: {10, 11, 12}, {11, 12, 13}, and {12, 13, 14}. Find the three sample means. What is the greatest difference from 12?

WORK SPACE

ANSWER _____

3 Carry out a random-sampling simulation with teacher support. Make five identical cards labeled 8, 12, 16, 20, and 24; their population mean is 16. Place them in an opaque container and mix. Draw one card, record its value, replace it, and mix again. Do this three times for one sample. Repeat to collect five samples, always of size 3. Complete the table from your actual draws. On separate paper, show each mean, the range of your five means, and the greatest distance from 16. Describe the variation you observed.

YOUR FIVE RANDOM SAMPLES

Sample	Three drawn values	Sample mean	Distance from 16
1	_____	_____	_____
2	_____	_____	_____
3	_____	_____	_____
4	_____	_____	_____
5	_____	_____	_____

ANSWER _____

CHALLENGE One step up

A population has mean 35. Set X contains sample means 32, 34, 36, and 38 from samples of size 3. Set Y contains sample means 34, 35, 36, and 35 from samples of size 9. In one or two sentences, explain which set shows less variation from the population mean. Use the range and the greatest difference in your explanation.

WORK SPACE AND ANSWER

ANSWER KEY # Sample Mean Check

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A population has mean 24. Four random samples of size 5 have means 23, 25, 24, and 26. What is the greatest difference between a sample mean and the population mean?	**2**
2	A population has mean 18. Four random samples of size 3 have means 17, 18, 19, and 18. List the differences from 18. Then state the greatest difference.	**1, 0, 1, 0; greatest difference: 1**
3	A population has mean 16. Three random samples of size 2 are {8, 24}, {12, 16}, and {16, 20}. Find the three sample means. What is the greatest difference from 16?	**16, 14, 18; greatest difference: 2**
4	A population has mean 40. Sample Set A, with samples of size 2, has means 38, 42, 40, and 38. Sample Set B, with samples of size 8, has means 39, 40, 41, and 40. Which set shows less variation? Give the range of each set.	**Set B; Set A range: 4, Set B range: 2**

PART 2 · APPLY IT

1. **1 minute; the sample means in these trials stay within 1 minute of the population mean.** Compare each table value with 16. The largest difference is 1, so these sample means stay close to 16.
2. **11, 12, 13; greatest difference: 1 point** Add the scores in each sample and divide by 3. Compare each sample mean with 12.
3. **Results vary. Require five recorded size-3 samples, correct means and absolute distances from population mean 16, and correct range/greatest-distance calculations with an observed-variation explanation.** Supply identical cards and an opaque container; support drawing/recording. Check actual results, not copied examples. Five trials do not guarantee a population-wide bound.

CHALLENGE

Set Y shows less variation. Its range is 2 and its greatest difference from 35 is 1, while Set X has range 6 and a greatest difference of 3.

Accept equivalent wording for intervals, ranges, and differences. For written responses, accept any explanation that correctly compares the ranges or greatest distances from the population mean. Apply It 3 requires actual random draws, recorded values, calculations, and an observed-variation explanation, not a future simulation plan.