LESSON MAKER PRO

Sample Spread

Use repeated samples to judge how much estimates vary.

HIGH SCHOOL · MA.912.DP.5.4

MA.912.DP.5.4 "Generate multiple samples or simulated samples of the same size to measure the variation in estimates or predictions."

NAME _____ DATE _____

COMPARE SAMPLE ESTIMATES

Generate same-size random samples; calculate each estimate, their mean, and their range (largest minus smallest). In Apply 3, actually generate and record three samples.

WORKED EXAMPLE

Four simulated samples of 12 voters contain 5, 7, 6, and 6 voters who favor Plan A. Find the mean estimate and the range.

1. Estimates: 5/12, 7/12, 6/12, 6/12.
2. Mean count = (5 + 7 + 6 + 6)/4 = 6; mean estimate = 6/12 = 1/2.
3. Range = 7/12 - 5/12 = 2/12 = 1/6.

Answer: Mean: 1/2; range: 1/6.

PRACTICE 5 problems

1 Three samples of 10 students have 3, 4, and 3 students who bike to school. List the estimates and find the range.

ANSWER _____

2 Four samples of 25 customers have 8, 9, 10, and 8 customers choosing a new product. Find the mean estimate.

ANSWER _____

3 Equal-size samples give estimates of 45%, 55%, and 50%. Find the range.

ANSWER _____

4 Five samples give estimates of 30%, 35%, 25%, 40%, and 30%. Find the mean estimate and the range.

ANSWER _____

5 Set A has estimates of 48%, 52%, and 50%. Set B has estimates of 42%, 58%, and 50%. Which set varies less?

ANSWER _____

APPLY IT Show your work

1 A music app runs six simulated random samples of 20 students. The numbers who save a song are 11, 9, 12, 10, 8, and 10. Predict how many of 200 students would save the song. Also find the variation in the sample estimates.

WORK SPACE

ANSWER _____

2 A gaming club simulates four random samples of 15 students to estimate who would join a tournament. The numbers interested are 6, 9, 8, and 7. Predict how many of 120 students would join. Also find the variation in the sample estimates.

WORK SPACE

ANSWER _____

3 Actually generate three samples. Use a teacher-provided coin or a teacher-operated fair coin simulator. Model a yes/no population with equally likely outcomes: heads means yes. Flip 10 times for Sample 1, reset your tally, then flip 10 new times each for Samples 2 and 3. Record all three head counts and estimates (count/10), then calculate the mean estimate and range in percentage points. Explain the observed variation; do not invent or replace your results.

YOUR GENERATED SAMPLES

Sample	Number of flips	Heads observed	Estimate
1	10	Record: ____	____/10
2	10	Record: ____	____/10
3	10	Record: ____	____/10

ANSWER _____

CHALLENGE One step up

Two survey methods each use five simulated samples of 40 students. Method A gives estimates of 45%, 50%, 55%, 50%, and 45%. Method B gives 40%, 60%, 50%, 55%, and 45%. Find each method's mean estimate and range. Which method gives the more consistent prediction?

WORK SPACE AND ANSWER

ANSWER KEY

Sample Spread

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Three samples of 10 students have 3, 4, and 3 students who bike to school. List the estimates and find the range.	**30%, 40%, 30%; range 10 percentage points.**
2	Four samples of 25 customers have 8, 9, 10, and 8 customers choosing a new product. Find the mean estimate.	**35%.**
3	Equal-size samples give estimates of 45%, 55%, and 50%. Find the range.	**10 percentage points.**
4	Five samples give estimates of 30%, 35%, 25%, 40%, and 30%. Find the mean estimate and the range.	**Mean estimate: 32%. Range: 15 percentage points.**
5	Set A has estimates of 48%, 52%, and 50%. Set B has estimates of 42%, 58%, and 50%. Which set varies less?	**Set A. Its range is 4 percentage points, while Set B's range is 16 percentage points.**

PART 2 · APPLY IT

1. **100 students. Variation: 20 percentage points, from 40% to 60%.** The mean count is 10 out of 20, or 50%, so 50% of 200 is 100. The estimates range from 8/20 to 12/20, a spread of 20 percentage points.
2. **60 students. Variation: 20 percentage points, from 40% to 60%.** The mean is 7.5 out of 15, or 50%, so the prediction is 60 of 120. The estimates range from 6/15 to 9/15, a spread of 20 percentage points.
3. **Results vary. Example only: 4, 6, 5 heads gives estimates 40%, 60%, 50%; mean 50%, range 20 percentage points.** Observe three actual sets of 10 flips and verify each estimate against its recorded count. Accept the correctly calculated mean and range for the learner's real results, including zero variation. The fair coin is a defined simulation model, not a claim about an actual survey population.

CHALLENGE

Method A: mean 49%, range 10 percentage points. Method B: mean 50%, range 20 percentage points. Method A is more consistent because its estimates have the smaller range.

Accept equivalent fraction, decimal, or percent forms when they represent the same estimate. For variation, accept a correct range stated in percentage points or as the difference between the largest and smallest proportions. For Apply 3, the teacher supplies or operates the coin/simulator, checks three actual samples of exactly 10 outcomes, and assesses calculations from the recorded results rather than requiring the example values.