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

Run or imagine several random samples of the same size. Find an estimate from each sample, then compare the range, largest estimate minus smallest estimate, and the mean estimate.

## 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. The sample estimates are 5/12, 7/12, 6/12, and 6/12.
2. Mean count = (5 + 7 + 6 + 6) / 4 = 6, so the mean estimate is 6/12 = 1/2.
3. Range = 7/12 - 5/12 = 2/12 = 1/6.

**Answer: Mean estimate: 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** _____

## CHALLENGE One step up

**CHALLENGE**

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?

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_____

# 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. **Prediction: 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. **Prediction: 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.

## 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.