

Vertical Progression:

6th Grade	<p>ELG 6.9 Develop understanding of statistical variability.</p> <ul style="list-style-type: none"> ○ 6.SP.A.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. ○ 6.SP.A.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. ○ 6.SP.A.3 Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
7th Grade	<p>ELG 7.7 Use random sampling to draw inferences about a population.</p> <ul style="list-style-type: none"> ○ 7.SP.A.1 Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences. ○ 7.SP.A.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. <i>For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.</i>
8th Grade	<p>ELG 8.10 Investigate patterns of association in bivariate data.</p> <ul style="list-style-type: none"> ○ 8.SP.A.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. ○ 8.SP.A.4 Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables.

Students will demonstrate command of the ELG by:

- Understanding that statistics uses samples of a population to gain information about the entire population.
- Understanding that random sampling produces representative samples and supports valid inferences.
- Drawing inferences about a population from samples.
- Generating multiple samples to gauge variation in the estimates.

Vocabulary:

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|------------------|-------------------------|---------------|
| • generalization | • random sample | • statistics |
| • inference | • representative sample | • variability |
| • population | • sample | |
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Sample Instructional/Assessment Tasks:

1) Standard(s): 7.SP.A.1

Source: <https://www.illustrativemathematics.org/content-standards/7/SP/A/1/tasks/974>

Item Prompt:

In a poll of Mr. Briggs's math class, 67% of the students say that math is their favorite academic subject. The editor of the school paper is in the class, and he wants to write an article for the paper saying that math is the most popular subject at the school. Explain why this is not a valid conclusion and suggest a way to gather better data to determine what subject is most popular.

Solution

It is unlikely that Mr. Briggs's math class is a representative of all students at the school. For example, Mr. Briggs may be a particularly good (or entertaining) teacher, or he may pass out candy every day, or this class might be an advanced elective. Perhaps the students responded positively in hopes of pleasing their teacher. A better way to gather data would be to take a random sample of 25 students from all students at the school, so that it would be more representative of the population of interest. Among other options, this could be done by assigning a random number to every student from 1 to N , where N is the number of students at the school. Then a random digits table or a calculator could be used to select 25 random numbers between 1 to N for the sample.

2) Standard(s): 7.SP.A.2

Source: Engage NY <https://www.engageny.org/sites/default/files/resource/attachments/math-g7-m5-teacher-materials.pdf>

Item Prompt:

Identify each as true or false. Explain your reasoning in each case.

1. The values of a sample statistic for different random samples of the same size from the same population will be the same.
2. Random samples from the same population will vary from sample to sample.
3. If a random sample is chosen from a population that has a large cluster of points at the maximum, the sample is likely to have at least one element near the maximum.

Correct Answer:

Identify each as true or false. Explain your reasoning in each case.

1. The values of a sample statistics for different random samples of the same size from the same population will be the same.
False, because by chance the samples will have different elements, so the values of summary statistics may be different.
2. Random samples from the same population will vary from sample to sample.
True, because each element has the same chance of being selected, and you cannot tell which ones will be chosen; it could be any combination.
3. If a random sample is chosen from a population that has a large cluster of points at the maximum, the sample is likely to have at least one element near the maximum.
True, because if many of the elements are near the same value, it seems the chance of getting one of those elements in a random sample would be high.