Unit 5 Sampling and Data Analysis
Math 7 Reg

Last Update: August 1, 2025

Archdiocesan Curriculum > Grade > Math > Days 14 to 18

Stage 1: Desired Results

General Information

In this unit, students will learn to understand populations and how to select and use representative random samples to make inferences about a population. They will explore how data can vary when repeatedly sampling a population using random samples of the same size. Students will also analyze and compare the center and spread of data displayed in dot plots and box plots, using these visual representations to draw inferences about two populations. Throughout the unit, students will deepen their understanding of statistical variability and how to interpret and compare data to make informed conclusions.

Mathematical Practices:

- Make sense of problems and persevere in solving them
- Reason abstractly and quantitatively
- Construct viable arguments and critique the reasoning of others
- Model with mathematics
- Attend to precision

Essential Question(s)

- What makes a sample representative of a population, and why is this important when drawing conclusions?
- How can random sampling be used to make reliable inferences about an entire population?
- Why does data vary when repeatedly sampling from the same population, and what does this tell us about statistical conclusions?
- How do measures of center (mean, median) and spread (range, interquartile range) help us interpret and compare data sets?
- In what ways do dot plots and box plots help us visualize data, and how can these visuals be used to compare two populations?

Enduring Understanding/Knowledge

Students will:

- Understand populations, random samples, and how to select a representative sample.
- Use a random sample to make inferences about a population.
- Understand that repeatedly sampling a population with the same size random sample will cause the data to vary.

Review/Assess

- Compare the center and spread of data displayed in dot plots.
- Compare data displayed in box plots, and use these comparisons to draw inferences about two populations.
- Use means and MADs to compare two populations.

Review/Assess

Vocabulary

New	Review
• bias • population • random sample • representative sample • sample	• mean • median • range • interquartile range • lower quartile • upper quartile • mean absolute deviation

Connections to Catholic Identity / Other Subjects

Religion/Catholic Identity:

- The Importance of Every Person: Catholic teachings emphasize the inherent dignity of each individual. When collecting data from a sample, it's important to ensure that every member of the population has a fair chance to be included. This reflects the Catholic belief in justice and fairness.

Other Subject Here:

- **Science:** Data Collection and analysis of

Differentiation

Enrichment

- **Design and Conduct Surveys with Representative Samples**
  Challenge students to create a survey question and determine a sampling method that ensures the sample is representative of a larger population. Have them explain their sampling strategy and justify how it minimizes bias.
- **Simulate Repeated Sampling and Analyze**

experiment results ● **Social Studies:** Show examples from polling (e.g., presidential polls, surveys for consumer products) to demonstrate how random sampling works in the real world.	**Variability** Guide students through simulations of repeated random samples from the same population. Have them compare sample statistics, discuss variability, and draw conclusions about the reliability of their inferences. ● **Compare Populations Using Box Plots** Ask students to construct and interpret box plots for two different populations, then write a comparative analysis using measures of center and spread. Encourage use of precise vocabulary like interquartile range and outliers. ● **Explore Real-World Data Sets** Provide students with real-world data (e.g., environmental, sports, or economic data). Have them analyze the data using appropriate measures of center and spread, and present their findings with dot plots or box plots. ● **Develop Criteria for Choosing Statistical Measures** ● Engage students in evaluating when to use mean vs. median and range vs. interquartile range based on data characteristics (e.g., skewed data or presence of outliers). **Support** ● **Dot Plot and Box Plot Building with Templates** Provide guided templates or digital tools to help students construct dot plots and box plots step-by-step using sample data. ● **Sampling Sort – Random vs. Biased** Give students sample scenarios and have them sort or label them as random or biased samples. Discuss how sampling type affects data reliability. ● **Guided Practice with Measures of Center and Spread** Offer scaffolded practice in calculating mean, median, range, and interquartile range using structured tables and visual aids. ● **Interpretation Sentence Frame**s Use sentence starters to help students explain what statistical measures and plots tell us about a population (e.g., “The median shows that most values are around…”). ● **Hands-On Sampling Activities** Use physical objects (e.g., colored cubes, cards) for students to draw repeated random samples from a “population” and record variability in their sample statistics. ● **Data Comparison with Partner Discussions** Have students work in pairs to compare two data sets using dot plots or box plots. Provide question prompts to guide discussion about variability and central tendency.

Standards & Benchmarks

Proportional Reasoning with Samples:

7.SP.A.1

Explore how 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

Collect and 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.

Use Statistics and Graphs to Compare Data:

7.SP.B.3

Informally compare the measures of center (mean, median, mode) of two numerical data distributions with similar variabilities.

7.SP.B.4

Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.

7.SP.D.8a

Give quantitative measures of center (median and/or mean) and variability (range and/or interquartile range), as well as describe any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

7.SP.D.8b

Relate and understand the choice of measures of center (median and/or mean) and variability (range and/or interquartile range) to the shape of the data distribution and the context in which the data were gathered.

Teaching Ideas/Resources

Websites/Resources:

- **Free TPT 7.SP Lessons/Worksheets/Activities**
- **Illustrative Math 7.SP** -This website includes short challenging tasks to reinforce the skills and concepts being
- taught.
- **Data and Statistics** – From fishtank learning, this resource will have students understanding and identifying populations and sample populations for statistical questions.
- Mashup Math Students can use this to play games, solve puzzles, and review work
- Gimkit- some free games that really engage students and their learning