Unit 5 - Statistics and Data Analysis

Content Area: **Mathematics**
Course(s): **Math 7**
Time Period: **March**
Length: **6 weeks**
Status: **Published**

Unit Summary

In this unit, students will review and extend their understanding of data representations through a variety of graphs. Students will compare, make observations, and draw inferences about samples and populations using measures of central tendency (mean, median, mode) and range. Students will use their prior knowledge of proportions and ratios and apply it to data analysis. Students will make inferences about larger populations. Students will use past experience with constant of proportionality to understand correlation lines included on graphs. Students also calculate measures of central tendency and variability of samples, most notably, the mean and the mean absolute deviation, or MAD, and use these measures to compare across different populations. Students also review previous skills, particularly their work with ratios and proportions, when they use proportional reasoning to estimate population characteristics based on sample statistics. Students will also study climate change through the use of global temperature data.

Standards

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.7.SP.A	Use random sampling to draw inferences about a population.
MA.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.
MA.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.
MA.7.SP.B	Draw informal comparative inferences about two populations.
MA.7.SP.B.3	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.
MA.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.
CAEP.9.2.8.B.3	Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.
TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
TECH.8.1.8.A.CS1	Understand and use technology systems.

TECH.8.1.8.A.CS2	Select and use applications effectively and productively.
TECH.8.1.8.D.CS3	Exhibit leadership for digital citizenship.

Student Learning Objectives

- Students will learn the process of finding mean, median, mode and range of a set of data.
- Students will learn to analyze different graphs such as a line graph, line plot, pictograph, histograms, scattergram, and circle graphs.
- Students will learn to use graphs to determine measures of central tendency.
- Students will learn to make inferences about population based on a sample.
- Students will learn to find the constant of proportionality based on a graph.
- Students will there are five statistics given on a box and whisker plot (lower extreme, lower quartile, median, upper quartile, upper extreme).
- Students will use global temperature data to create models and compare short-term trends to long-term trends. They will then determine whether global temperature is rising based on the data.

Essential Questions

- How can data be used to influence the decisions we make in our every day lives?
- How can predictions be made based on data?

Enduring Understandings

- Students will understand that when you present data, the type of data, and your purpose influence the type of graph chosen (i.e box and whisker for distribution).
- Students will understand that a representative sample can be used to gain information about a larger population.

Application

- Students will be able to independently use their learning to select a random sample to accurately represent the entire population.
- Students will be able to independently use their learning to analyze frequency tables to determine how often data values occur.
- Students will be able to independently use their learning to determine the shape of set of data using frequency tables and line plots.
- Students will be able to independently use their learning to compare lengths of four quartiles using a box and whiskers plot.
- Students will be able to independently use their learning to determine if one setof data relates to another using a scatter plot.
- Students will be able to independently use their learning to make predications about data values that don't appear using a trend lines.
- Students will be able to independently use their learning to appropriately use mathematical vocabulary such as constant of proportionality, correlation, statistics, population, sample, representative sample, biased sample, variability, range, variance, mean deviation, random sampling, bivariate data, cluster, outliers, positive or negative correlation (not relationship), linear association, nonlinear association.

Skills

Students will be skilled at:

- Calculating measures of central tendency including mean, median, mode and range through different types of graphs and data.
- Utilizing measures of central tendency to compare data in real life situations.
- Creating and assessing the degree of visual overlap for frequency tables, histograms, line plots, line graphs, pictographs, box and whisker plots, scatter plots (identify which graph best displays the given data).
- Collecting data and comparing information from different samples (random, representative, biased).
- Drawing inferences and conclusions about a population based on the data displayed from random sample.
- Solving word problems and real life problems based on mean.
- Determining the mean deviation for data.
- Identifying a best fit line to show relationships between two quantities.
- Determining the constant of proportionality.
- Analyzing different graphs (line graph, histogram, line plot).
- Identifying correlation, trend, and line of best fit on a scattergram.
- Determining the five statistics given on a box and whisker plot (lower extreme, lower quartile, median, upper quartile, upper extreme).
- Utilizing the box and whisker plot to determine percent of data that meets criteria.
- Utilizing knowledge of mean to determine missing data from set.
- Plot data points to compare short-term trends to long-term trends. Determine whether global temperature is rising based on the data.