Unit 6: Statistics and Probability

Content Area: **Mathematics**
Course(s): **Math 3, Math 4, Math 5, Math 6**
Time Period: **May**
Length: **4 weeks**
Status: **Published**

Unit Summary

The goal for this unit is to develop students' understanding of basic statistical concepts such as central tendency, variability, and distribution. Students will also use their prior knowledge to strengthen their statistical inferencing skills to connect the randomness of data. In addition, students will have the opportunity to build their foundation skills relating to probability.

Standards

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.6.RP.A	Understand ratio concepts and use ratio reasoning to solve problems.
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.C.5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
MA.7.SP.C.7a	Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.
MA.6.SP	Statistics and Probability
MA.7.SP.C.7b	Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.
MA.6.SP.A	Develop understanding of statistical variability.
MA.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.
MA.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.
MA.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.
MA.6.SP.B.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
MA.6.SP.B.5	Summarize numerical data sets in relation to their context, such as by:

MA.6.SP.B.5a	Reporting the number of observations.
MA.6.SP.B.5b	Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
MA.6.SP.B.5c	Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
MA.6.SP.B.5d	Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.
MA.6.4.5.6 F	Technology
MA.6.4.5.6 F.1	Use technology to gather, analyze, and communicate mathematical information.
MA.6.4.5.6 F.4	Use calculators as problem-solving tools (e.g., to explore patterns, to validate solutions).
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	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.8.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
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.C	Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
TECH.8.1.8.C.CS4	Contribute to project teams to produce original works or solve problems.
TECH.8.1.8.D	Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
TECH.8.1.8.D.1	Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media.
TECH.8.1.8.D.CS1	Advocate and practice safe, legal, and responsible use of information and technology.
TECH.8.1.8.D.CS2	Demonstrate personal responsibility for lifelong learning.
TECH.8.1.8.D.CS3	Exhibit leadership for digital citizenship.
TECH.8.1.8.E	Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.
TECH.8.1.8.E.1	Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.
TECH.8.1.8.F	Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
TECH.8.1.8.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.2.8.D.CS2	Use and maintain technological products and systems.

Student Learning Objectives

- Students will learn to display data in a variety of ways.

- Students will learn to interpret data from a number line, dot plots, box-whisker plot, and histogram.
- Students will learn to determine the measures of central tendency and use these determine the best representation of the data set.
- Students will learn to summarize numerical data sets by center, spread, and overall shape.
- Students will learn to look at the patterns of quantitative measures of center and variability to understand the manner in which the data was collected.
- Students will learn to determine the probability of event occurring by plotting it on a probability line (impossible, unlikely, even, likely, certain).
- Students will learn to determine the probability of an independent event (simple probability).

Essential Questions

- How can the collection, organization, display, and interpretation of data be used to answer real world questions?

Enduring Understandings

- The students will understand that statistical questions are questions that anticipate variability in the resulting data and accounts for it in the answers.
- The students will understand that measures of central tendency are used to understand data and to make decisions based on the data.
- The students will understand that distribution of data and its patterns can provide information.
- The students will understand that probability is a measure of the likelihood that an event will happen.
- The students will understand that probability is the ratio of the number of ways an event can occur to the number of possible outcomes.

Application

- Students will be able to independently use their learning to write a statistical question that anticipates variability.
- Students will be able to independently use their learning to interpret and summarize data sets from various data displays collected to answer a statistical question.
- Students will be able to independently use their learning to determine the best measure of central tendency to describe a data set.
- Students will be able to independently use their learning to recognize that probability is the measure of the likelihood that an event will occur and probability is quantified as a number between 0 and 1.

Skills

Students will be skilled at:

- Determining measures of central tendency.
- Writing statistical questions.
- Displaying, describing and interpreting the answers of statistical questions.
- Solving simple probability problems.