Unit 9: Statistics and Probability

Content Area: **Mathematics**
Course(s): **Algebra 2H**
Time Period: **May**
Length: **5 weeks**
Status: **Published**

Enduring Understandings

- Mathematical models, created using techniques of line/curve of best fit, can be useful for making predictions about the future.
- Random phenomena are unpredictable in the short term, but show long-run regularity
- Sophisticated tools for data analysis cannot compensate for poorly collected data.
- Statistical analysis and data displays often reveal patterns that may not be obvious.
- Statistical Inference is a tool for validating a claim about a population parameter.
- The probability of an event is the proportion of times the event will occur over many trials

Essential Questions

- How does the normal distribution apply to the real world?
- How is probability used to make informed decisions about uncertain events?
- To what extent does data collection methodology affect results?
- What does it mean to make an inference? How can statistics help?
- What real world scenario would benefit from using a line or curve of best fit?

Standards/Indicators

MA.S-ID	Interpreting Categorical and Quantitative Data
MA.S-ID.A	Summarize, represent, and interpret data on a single count or measurement variable
MA.S-ID.A.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).
MA.S-ID.A.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
MA.S-ID.A.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
MA.S-ID.A.4	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.
MA.S-ID.B	Summarize, represent, and interpret data on two categorical and quantitative variables
MA.S-ID.B.6c	Fit a linear function for a scatter plot that suggests a linear association.
MA.S-ID.C.9	Distinguish between correlation and causation.
MA.S-IC	Making Inferences and Justifying Conclusions

MA.S-IC.B	Make inferences and justify conclusions from sample surveys, experiments, and observational studies
MA.S-CP	Conditional Probability and the Rules of Probability
MA.S-CP.A	Understand independence and conditional probability and use them to interpret data
MA.S-CP.A.1	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).
MA.S-CP.A.2	Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.
MA.S-CP.A.3	Understand the conditional probability of A given B as $P(A\ and\ B)/P(B)$, and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.
MA.S-CP.A.4	Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.
MA.S-CP.A.5	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.
MA.S-MD	Using Probability to Make Decisions
MA.S-MD.B	Use probability to evaluate outcomes of decisions
MA.S-MD.B.6	Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).

Inter-Disciplinary Connections

LA.RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
LA.W.9-10.6	Use technology, including the Internet, to produce, share, and update individual or shared writing products, taking advantage of technology’s capacity to link to other information and to display information flexibly and dynamically.
9-12.HS-ETS1-4.5	Using Mathematics and Computational Thinking

Instructional Strategies, Learning Activities, and Levels of Blooms/DOK

- Assessment
- Intro 68-95-99 rule
- Intro. 5 number summary
- Intro. Combinations
- Intro. conditional probability
- Intro. dot plot
- Intro. histograms
- Intro. independent event

- Intro. line of best fit
- Intro. mutually exclusive
- Intro. normal distribution
- Intro. permuations
- Intro. probability
- Intro. sample space
- Intro. two-way tables
- Review Anticipatory Set
- Review Assessment
- Review game
- Review hw
- Review Quiz
- students will be working on a free-response problem, they will hand this in at the end of the class

Formative Assessment

- Anticipatory Set
- Closure
- Group Work
- Partner Discussion
- Pass out of class
- Quiz - Analyzing Statistical Data and the Normal Distribution
- Quiz on Combinations and Permutations
- Teacher Observation
- Warm Up

Summative Assessment

- Benchmark Assessment
- Marking Period Assessment
- Unit Test on Statistics and Probability

Resources & Materials

- Establish a set of general strategies for student independence and self-evaluation
- Smartboard lessons
- Algebra and Trigonometry Book 2
- Evoke student participation from their seats and at the board
- Independent/Cooperative learning explorations

- Mathispower4u math videos
- Powerpoint lessons
- Teacher Generated Worksheets
- Use youtube videos to introduce/demonstrate concepts in real-life situations.

Technology

- Chromebooks
- Desmos
- Equatio
- Graphing Calculator
- MathXLforschool.com

TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.E.CS3	Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.
TECH.8.1.12.E.CS4	Process data and report results.
TECH.8.2.12.A.CS3	The relationships among technologies and the connections between technology and other fields of study.