Unit 4 - Statistics and Probability: Scatter Plots and Association

Content Area: **Mathematics**
Course(s):
Time Period: **Marking Period 4**
Length: **9-10 weeks**
Status: **Published**

Brief Summary of Unit

The Data Analysis, Statistics and Probability unit equips students with essential skills in interpreting and analyzing data through various visual representations. Students learn to interpret scatter plots to identify relationships and trends between variables, determine lines of fit to model data trends accurately, organize categorical data using two-way tables, select appropriate data displays such as histograms and box plots, and apply data analysis techniques to solve real-world problems. Through this unit, students develop critical thinking, problem-solving, and communication skills necessary for making informed decisions based on data analysis.

Revision Date: 5/30/24

Standards

ELA.L.VI.8.4.B	Use the relationship between particular words to better understand each of the words.
MATH.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.
MATH.8.SP.A.2	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit (e.g., line of best fit) by judging the closeness of the data points to the line.
MATH.8.SP.A.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.
MATH.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.
SCI.MS.ETS1.C	Optimizing the Design Solution
WORK.K-12.9.1	All students will develop career awareness and planning, employability skills and foundational knowledge necessary for success in the workplace.

Essential Questions

- How are two-way tables used to organize categorical data?
- How can scatter plots help us visualize relationships between two sets of data?
- How can we use scatter plots to make predictions and draw conclusions about data?
- How do we determine the best-fit line for a given set of data points?
- What factors should we consider when choosing a data display for a given data set?
- What types of analyses can we perform using data presented in two-way tables?
- Why is it important to select an appropriate data display to effectively communicate information?

Enduring Understandings

- Formulas can give us accurate or estimated results for real world situations.
- Lines of fit in scatter plots help model data trends and allow for predictions and estimations based on the data.
- Real-life data patterns are not always well behaved but can be modeled using equations, tables, and graphs.
- Scatter plots provide a visual representation of relationships between two sets of data points, aiding in the identification of trends and patterns.
- The way in which data is displayed affects how we perceive it.
- Two-way tables organize categorical data into a structured format, making it easier to analyze frequencies, percentages, and conditional probabilities.
- We can organize data in many ways when analyzing various statistical sets.
- We can use patterns of association to make predictions about a population.

Students Will Know

- How to create and analyze two-way tables.
- How to draw a line of best fit.
- How to find and interpret a solution to a system.
- How to interpret scatter plots: They will understand how to analyze scatter plots to identify trends, patterns, and relationships between two variables.
- Patterns of association can be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table.
- Straight lines are widely used to model relationships between two quantitative variables.

Students Will Be Skilled At

- Constructing and interpreting a two-way table summarizing data on two categorical variables collected from the same subjects.
- Constructing and interpreting scatter plots.
- Describing patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
- Fitting a line of best fit and assessing the model by judging the closeness of the data points to the line.

- Using relative frequencies calculated for rows or columns to describe possible association between the two variables.

Evidence/Performance Tasks

Assessments

- Formative: Daily assessments using examples from class notes, iReady MyPath, Big Ideas Math online platform problems, and NJSLA test bank problems
- Summative: Teacher-created assessments, NJSLA test bank problems, Big Ideas Math online platform problems, Big Ideas Math unit assessments
- Benchmark: iReady diagnostic assessments and district placement assessments in addition to unit assessments from Big Ideas Math
- Alternative Assessments: Student-centered activities such as scavenger hunts, various projects involving real world applications, and adaptive learning tasks in iReady, Khan Academy, and Big Ideas Math

- Answer essential questions
- Class discussion of daily topic
- Classwork and homework that assess the essential questions
- Entrance/exit slips
- Provide alternative means of assessments for certain students
- Teacher Observation
- Tests and quizzes that assess the essential questions
- Written assignments that assess the essential questions that involves providing explanations

Learning Plan

8th Grade Math Curriculum Learning Plan: Data Analysis and Displays

Scatter Plots

Objective: Create and interpret scatter plots to represent data relationships.

- Day 1:
    - Activity: Introduce scatter plots and their components.
    - Practice: Create scatter plots from given data sets.

- Day 2:
    - Activity: Analyze and interpret scatter plots to identify trends and patterns.
    - Practice: Draw conclusions and make predictions based on scatter plot data.

Lines of Fit

Objective: Use lines of fit to model and analyze data relationships.

- Day 3:
    - Activity: Introduce lines of fit and their significance in scatter plots.
    - Practice: Determine and draw lines of fit for scatter plots.
- Day 4:
    - Activity: Analyze the accuracy of lines of fit in representing data trends.
    - Practice: Use lines of fit to make predictions and extrapolate data.
- Day 5:
    - Activity: Explore the concept of correlation coefficients in relation to lines of fit.
    - Practice: Calculate and interpret correlation coefficients for scatter plots.

Two-Way Tables

Objective: Organize and analyze categorical data using two-way tables.

- Day 6:
    - Activity: Introduce two-way tables and their structure.
    - Practice: Create and fill in two-way tables with given data.
- Day 7:
    - Activity: Analyze and interpret data presented in two-way tables.
    - Practice: Use two-way tables to calculate frequencies, percentages, and conditional probabilities.

Choosing a Data Display

Objective: Select appropriate data displays based on data type and purpose.

- Day 8:
    - Activity: Explore different data displays such as histograms, box plots, and bar graphs.
    - Practice: Match data sets with the most suitable data display.

- Day 9:
    - Activity: Discuss the advantages and limitations of various data displays.
    - Practice: Choose and justify the use of a specific data display for given scenarios.

Materials

Core instructional materials: Core Book List including Big Ideas Math textbook and online platform for all levels of grade 6, 7, 8, and Algebra 1

Supplemental materials: Khan Academy, Edia, and DeltaMath

- Calculators/Math Tools
- District approved textbook
- Manipulatives
- Teacher created activiites
- Teacher created notes
- Websites, such as Khan Academy

Suggested Strategies for Modifications

Possible accommodations/modification for Grade 8