Marietta City Schools

2024–2025 District Unit Planner

Algebra: Concepts & Connections

Unit title	Unit 7: Investigating Data	**MYP year**	4	**Unit duration (hrs)**	*15 hours*

Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): *What will students learn?*

GA DoE Standards

Standards

6.NR.2*: Apply operations with whole numbers, fractions and decimals within relevant applications **(integrate with A.DSR.10.1)**

6.NR.2.2 Interpret numerical data to answer a statistical investigative question created. Describe the distribution of a quantitative

A.DSR.10: Collect, analyze, and interpret univariate quantitative data to answer statistical investigative questions that compare groups to solve real-life problems; Represent bivariate data on a scatter plot and fit a function to the data to answer statistical questions and solve real-life problems.

A.DSR.10.1 Use statistics appropriate to the shape of the data distribution to compare and represent center (median and mean) and variability (interquartile range, standard deviation) of two or more distributions by hand and using technology.

Terminology

- Measures of center include the median and mean.
- Measures of spread include the range, interquartile range and standard deviation.
- Univariate data involves describing a single variable, such as the age of a student or the height of a student.
- Bivariate data involves relationships between two variables, such as comparing the age of a student and their height.

Fundamentals

- Students should use the meaning of mean absolute deviation (MAD) learned in sixth grade to interpret the meaning of standard deviation.
- Students were first introduced to the concept of MAD as a tool for comparing variability of multiple data sets in sixth grade mathematics.
- Students should initially have opportunities to explore standard deviation, by hand, with small data sets, to gain conceptual understanding.
- Students should advance to using technology to determine standard deviation to solve problems and answers statistical investigative questions

A.DSR.10.2 Interpret differences in shape, center, and variability of the distributions based on the investigation, accounting for possible effects of extreme data points (outliers).

Strategies and Methods

- Use the 1.5 IQR rule to determine the outliers and analyze their effects on the data set

Example

- Using the 1.5 IQR rule on data set {5,7,8,10,11,12,30}, 30 is determined to be an outlier since it is greater than 19.5, which is the 1.5*IQR +12 (the Q3).

A.DSR.10.3 Represent data on twoF quantitative variables on a scatter plot and describe how the variables are related.

Fundamentals

- Students should be able to describe the direction, strength, and form (linear, non-linear) of the association between two quantitative variables.

A.DSR.10.4 Interpret the slope (predicted rate of change) and the intercept (constant term) of a linear model based on the investigation of the data.

Strategies and Methods

• Students should be given the opportunity to utilize interactive graphing technologies to model linear data and make sense of the slope (predicted rate of change) visually.

A.DSR.10.5 Calculate the line of best fit and interpret the correlation coefficient, r, of a linear fit using technology. Use r to describe the strength of the goodness of fit of the regression. Use the linear function to make predictions and assess how reasonable the prediction is in context.

Strategies and Methods

• Students should be given the opportunity to utilize interactive graphing technologies to interpret the correlation coefficient, r

Fundamentals

• Students should be able to use the line of best fit and the correlation coefficient, r, to make predictions and describe the reasonableness of the prediction in the investigation of a practical, real-life situation.

A.DSR.10.6 Decide which type of function is most appropriate by observing graphed data.

Fundamentals

• Students should be able to emphasize linear, quadratic, and exponential models.

A.DSR.10.7 Distinguish between correlation and causation.

Application and Relevance

• It is important for students to discover and understand that strong association does not indicate causation

A.MM.1: Apply mathematics to real-life situations; model real-life phenomena using mathematics

A.MM.1.1 Explain applicable, mathematical problems using a mathematical model.

Fundamentals

• Students should be provided with opportunities to learn mathematics in the framework of real-life problems.

• Mathematically applicable problems are those presented in which the given framework makes sense, realistically and mathematically, and allows for students to make decisions about how to solve the problem (model with mathematics).

A.MM.1.2 Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities domains.

Fundamentals

• Students should be able to use the content learned in this course to create a mathematical model to explain real-life phenomena.

A.MM.1.3 Use units of measure (linear, area, capacity, rates, and time) as a way to make sense of conceptual problems; identify, use, and record appropriate units of measure within the given framework, within data displays, and on graphs; convert units and rates using proportional reasoning given a conversion factor; use units within multi-step problems and formulas; interpret units of input and resulting units of output.

Strategies and Methods

• Dimensional analysis may be used when converting units and rates.

Examples

• Units of measure may include linear, area, capacity, rates, and time.

A.MM.1.4 Use various mathematical representations and structures with this information to represent and solve real-life problems.

Strategies and Methods

• Students should be able to fluently navigate between mathematical representations that are presented numerically, algebraically, and graphically.

• For graphical representations, students should be given opportunities to analyze graphs using interactive graphing technologies.

A.MM.1.5 Define appropriate quantities for the purpose of descriptive modeling.

Fundamentals

• Given a situation, framework, or problem, students should be able to determine, identify, and use appropriate quantities for representing the situation.

Concepts/Skills to support mastery of standards

● Know how to compute the mean, median, interquartile range, mean absolute deviation, and standard deviation by hand in simple cases and using technology with larger data sets. ● Find the lower extreme (minimum), upper extreme (maximum), and quartiles. ● Create a graphical representation of a data set. ● Plot data on a coordinate grid and graph linear functions. ● Recognize characteristics of linear and exponential functions. ● Write an equation of a line given two points. ● Graph data in a scatter plot and determine a trend. ● Determine the slope of a line from any representation. ● Identify the y-intercept from any representation. ● Be able to use graphing technology. ● Understand the meaning of correlation.

Vocabulary

Association	Bivariate Data	Box Plot	Categorical Values	Causation	Center
Conditional Frequencies	Constant	Correlation	Correlation Coefficient	Data Distribution	Deviation
Direction of Skew	Dot Plot	First Quartile (Q_1)	Five Number Summary	Frequency Table (two-way table)	Histogram
Intercept	Interquartile Range	Joint Frequencies	Line of Best Fit	Linear Model	Linear Fit
Marginal Frequencies	Mean Absolute Deviation (MAD)	Number of Peaks	Prediction	Outlier	Quantitative Data
Quantitative Variables	Range	Rate of Change	Regression	Scatter Plot	Second Quartile (Q_2)
Shape of a Distribution	Slope	Standard Deviation	Symmetry	Third Quartile (Q_3)	Trend
Uniformity	Univariate Data	Variability			

Notation

$\bar{x}$ - mean, σ - standard deviationMId

Key concept	Related concept(s)	Global context
Relationships Identify and understand connections and associations between properties, objects, people, and ideas - including the human community's connections with the world in which we live.	Quantity, Representation, Validity	Identities & Relationships Competition and Cooperation; teams, affiliation & leadership

Statement of inquiry

Representing relationships in different quantities, data builds identities in sports.

Inquiry questions
Factual— How is data measured? How can we represent information? ● What is a dot plot? ● What is a histogram? ● What is a box plot? ● How do I graph a line of best fit? **Conceptual—** What makes a good survey question? How do we interpret/analyze results? ● How does the correlation coefficient affect a graph? ● What classifies a strong/weak correlation coefficient? **Debatable-** Who makes decisions? How do we ensure our decisions are based in logic? ● What graph is easiest to read: a histogram, dot plot or a box plot?

MYP Objectives	**Assessment Tasks**	
*What specific MYP **objectives** will be addressed during this unit?*	***Relationship** between summative assessment task(s) and statement of inquiry:*	*List of common formative and summative assessments.*
MYP B - Patterns in the Data	Summative assessment will include models and systems for students to interpret. Students will be asked to answer questions on models using logic decision making skills.	**Formative Assessment(s):** Mid Unit Check **Summative Assessment(s):** Cumulative Unit 7 Test

Approaches to learning (ATL)	
Category: Thinking Skills **Cluster:** Critical Thinking **Skill Indicator:** Identify trends and forecast possibilities **Learning Experience: The Basketball Star**	**Category:** Communication Skills **Cluster:** Communication **Skill Indicator:** Negotiate ideas and knowledge with peers and teachers **Learning Experience: Sports Analysis**

Learning Experiences Add additional rows below as needed.		
Objective or Content	**Learning Experiences**	**Personalized Learning and Differentiation**
A.DSR.10.1 Use statistics appropriate to the shape of the data distribution to compare center (median and mean) and variability (interquartile range, standard deviation) of two or more distributions by hand and using technology. A.DSR.10.2 Interpret differences in shape, center, and variability of the distributions in the framework, accounting for possible effects of extreme data points (outliers).	**The Basketball Star- Performance Task The Basketball Star** **Description:** In this learning plan, students will focus on comparing univariate data in different contexts. Students will analyze data that has already been collected and interpret the results. Once students understand different ways to compare data, they will seek to create their own statistical questions, collect their own data, and analyze and interpret the results. **Learning Goals:** ● I can compare univariate data sets by shape. ● I can compare center and variation of two or more different data sets.	Supporting the Learning: To assist students who are having difficulty, the teacher might consider having students work with smaller data sets to simplify calculations. Interpretation / comparison of statistics can still be the central purpose of this task. Language Supports: Provide a hard copy of the 2 graphic organizers: Representing Data Graphically and Measures of Center and Spread. Guide students through completing the organizers by projecting them on board and completing with the who group. Extending the Learning: Ask students to suppose Bob and Alan each had their best game ever, scoring 16 points in a game. How would this affect the statistics for each boy? Note what their work reveals about their current levels of understanding.
A.DSR.10: Collect, analyze, and interpret univariate quantitative data to answer statistical investigative questions that compare groups to solve real-life problems; Represent bivariate data on a scatter plot and fit a function to the data to answer statistical questions and solve real-life problems. o A.DSR.10.3: Represent data on two quantitative variables on a scatter plot and describe how the variables are related. o A.DSR.10.5: Calculate the line of best fit and interpret the correlation coefficient, r, of a linear fit using technology. Use r to describe the strength of the goodness of fit of the regression. Use the linear function to make predictions and assess how reasonable the prediction is in context.	**Sports Analysis- Explore and Engage** **Description:** In this learning plan, students will collect, analyze and interpret the strength of a correlation, describe how two variables are related, and fit a linear function for a scatter plot that suggests a linear association **Learning Goals:** ● I can fit a linear function for a scatter plot that suggests a linear association. ● I can describe how two variables are related. ● I can describe the strength of a correlation.	Language Supports: Provide a hard copy of a graphic organizer that illustrates several different models: positive/strong correlation, positive/weak correlation, negative strong correlation, negative weak correlation, no correlation, and perfect correlation. All students to work in small groups to complete the graphic organizer. Ask probing, scaffolding questions to support students as they work to complete the graphic organizer. Supporting the Learning: Guide students through the discovery process to recognize how the scatter box changes when the correlation coefficient is closer to 1, closer to 0, closer to -1? Extending the Learning: Name different pairs of variables that are likely to have a positive correlation, a negative correlation, a perfect correlation, and no correlation.

Content Resources
Textbook Correlation: enVision A|G|A - Algebra 1 **A.DSR.10.1** - Lesson 11-2, 11-3, 11-4, Topic 11 - Mathematical Modeling in 3 Acts **A.DSR.10.2** - Lessons 11-2, 11-3, Topic 11 - Mathematical Modeling in 3 Acts **A.DSR.10.3** - Lesson 3-5, 3-6, Topic 3 - Mathematical Modeling in 3 Acts **A.DSR.10.4** - Lessons 3-5, Topic 3 - Mathematical Modeling in 3 Acts **A.DSR.10.5** - Lessons 3-6 **A.DSR.10.6** - Lesson 8-5 **A.DSR.10.7** - Lesson 3-6