

# \*Unit 6: Association in Data

Content Area: **Mathematics**  
Course(s): **Math - Grade 8**  
Time Period: **4th Marking Period**  
Length: **5 weeks**  
Status: **Published**

## Unit Overview

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Construct and interpret scatter plots for bivariate measurement data.

Draw lines of best fit to model data that suggest a linear association.

*By the end of the year, administer the Link IT! G8 NJSLS math online Form C.*

## Transfer

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*Students will be able to independently use their learning to ...*

Students will understand that functions describe relationships and will be able to compare and construct a function. The equation  $y=mx+b$  will be interpreted as a straight line, where  $m$  and  $b$  are constants. Students learn to recognize linearity in a table when constant differences between input values produce constant differences between output values, and they can use the constant rate of change and initial value appropriately in a verbal description of a context. Students will establish a routine of exploring functional relationships algebraically, graphically, and numerically in tables and verbal descriptions. When using functions to model a linear relationship between quantities, students learn to determine the rate of change of the function which is the slope of a graph.

Students will apply experience with coordinate planes and linear functions in the study of association between two variables related to a question of interest. Describe patterns such as clustering, outliers, positive or negative association, linear and non-linear association. The shape is a description of the cloud of points on a plane, the center is the line of best fit, and the spread is how far data points are from the line.

## Meaning

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## Understandings

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Students will understand that

- A function is a specific topic of relationship in which each input has a unique output which can be represented in a table.
- A function can be represented graphically using ordered pairs that consist of the input and the output of the function in the form (input, output).
- A function can be represented with an algebraic rule.
- The equation is a straight line and that slope and y-intercept are critical to solving real problems involving linear relationships.
- Changes in varying quantities are often related by patterns which can be used to predict outcomes and solve problems.
- Linear functions may be used to represent and generalize real situations.
- For scatter plots that suggest a linear association, informally fit a straight line
- Written descriptions, tables, graphs, and equations are useful in representing and investigating relationships between varying quantities.
- Different representations (written descriptions, tables, graphs, and equations) of the relationships between varying quantities may have different strengths and weaknesses.
- Linear functions may be used to represent and generalize real situations.
- Slope and -intercept are keys to solving real problems involving linear relationship models of data.
- Some data may be misleading based on representation.

## **Essential Questions**

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Students will keep considering...

- How can you find and use patterns to model real-world situations?
- How can we model relationships between quantities?
- Why is learning mathematics important?
- How are patterns used when comparing two quantities?

## **Application of Knowledge and Skill**

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### **Students will know...**

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Students will know...

The characteristics of a linear function in an equation, table, and a graph.

How the changes in a variable affect the function on an equation, table and a graph.

How to experiment and collect data to create a scatter plot.

To analyze and use a scatter plot.

## Students will be skilled at...

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Students will be skilled at...

- Verify that a relationship is a function or not. (8.F.1)
- Reason from a context, graph, or table after knowing which quantity is the input and which is the output. (8.F.1)
- Represent and compare functions numerically, graphically, verbally and algebraically. (8.F.2)
- Interpret equations in form as a linear function. (8.F.3)
- Determine whether a function is linear or non-linear. (8.F.3)
- Identify and contextualize the rate of change and the initial value from tables, graphs, equations, or verbal descriptions. (8.F.4)
- Construct a model for a linear function. (8.F.4)
- Describe the qualities of a function using a graph (e.g., where the function is increasing or decreasing). (8.F.5)
- Sketch a graph when given a verbal description of a situation. (8.F.5)
- Use similar triangles to explain why the slope is the same between any two distinct points on a non-vertical line in the coordinate plane. (8.EE.6)
- Derive the equation for a line through the origin. (8.EE.6)
  
- Construct and interpret scatter plots and two-way tables for patterns such as positive or negative association, linearity or curvature, and outliers. (8.SP.1)
- Generate an approximate line of best fit. (8.SP.2)
- Use the equation of a linear model to solve problems in the context of bivariate measurement data. (8.SP.3)
- Interpret the slope and  $y$ -intercept of the line of best fit in context. (8.SP.3)
- Show that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. (8.SP.4)
- Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. (8.SP.4)

Use relative frequencies calculated for rows or columns to describe possible association between the two variables. (8.SP.4)

## Academic Vocabulary

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Bivariate data, distribution, five-number summary, line of best fit, mean absolute deviation, qualitative data, quantitative data, relative frequency, scatter plot, standard deviation, symmetric, two-way table, univariate data, receptive, data display, attribute, numerical data, categorical data, predict, overpredict, underpredict, linear model negative association, positive association, linear association, nonlinear association, no

association, fitted line, outlier, cluster, independent variable, dependent variable, segmented bar graph

## **Learning Goal 1**

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Construct and interpret scatter plots.

Draw lines of best fit to model data that suggest a linear association.

MA.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.
MA.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.
MA.K-12.1	Make sense of problems and persevere in solving them.
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.

## **Target 1.1--(Level of Difficulty: Retrieval, DOK: 1- Recall)**

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SWBAT:

Use a scatter plot to investigate the relationship between two sets of data. **(Chapter 6, Lesson 1)**

Construct and make conjectures about scatter plots. **(Chapter 6, Lesson 1)**

MA.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.
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-12.7	Look for and make use of structure.

## **Target 1.2--(Level of Difficulty: Comprehension, DOK: 2- Skill/Concept)**

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SWBAT:

Draw lines of best fit and use them to make predictions about data. **(Chapter 6, Lesson 2)**

Use data models to make predictions. **(Chapter 6, Lesson 3-4)**

MA.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.
MA.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.
MA.K-12.1	Make sense of problems and persevere in solving them.
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.

**Target 1.3--(Level of Difficulty: Comprehension (symbolizing), DOK: 2- Skill/Concept)**

SWBAT: Construct and interpret two -way tables. **(Chapter 6, Lesson 1-4) \*Construct found in lesson 1 & Interpret found in lesson 2-4**

MA.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.
MA.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.
MA.K-12.1	Make sense of problems and persevere in solving them.
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.

**Target 1.4---(Level of Difficulty: Comprehension, DOK: 2- Skill/Concept)**

SWBAT:

Solve problems by using a graph. Find the measures of center and variation. **(Chapter 6, Lesson 5)**

MA.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.
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-12.7	Look for and make use of structure.

### **Target 1.5--(Level of Difficulty: Comprehension, DOK: 2- Skill/Concept)**

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SWBAT:

Find and interpret the mean absolute deviation for a set of data (**Chapter 6, Lesson 6-7**)

MA.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.
MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.7	Look for and make use of structure.

### **Target 1.6 -- (Level of Difficulty: Knowledge Utilization, DOK: 4- Extended Thinking)**

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Analyze data distributions. (**Chapter 6, Lesson 6-7**)

MA.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.
MA.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.
MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.

### **21st Century Life and Careers**

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CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.

CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.
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.

## **Formative Assessment and Performance Opportunities**

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Am I Ready Assessments  
 Mid chapter checkups  
 Tests  
 Quizzes  
 Informal Assessments  
 Graded Classwork  
 Surveys  
 WhiteBoard Activities  
 Exit tickets  
 Group activities  
 Projects  
 Teacher Observations  
 Student Interviews  
 Aleks Assessments

## **Summative Assessment**

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Unit Test-Found on linkit  
 Aleks-Based off percentage  
 Unit Project  
 Performance based assessment

## **Accommodations & Modifications**

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See Unit Resources below for specific targeted resources

- Additional plotting practice
- Calculators
- Centers
- Document Camera- to support visual demonstration
- Extra time

- Graphing Calculator to help graph as well as determine line of best fit accurately
- Interactive Notebook-Marked and labeled examples to determine and identify vocabulary
- Large Graph paper to help plot data points
- Modifications as per IEP/504
- Quizlet-Flashcard review and interactive practice/test prep
- Review and Practice
- Rulers (Clear to see data points)
- Small Group Instruction
- Translate the text
- Use of visual such as Desmos
- www.quizlet.com

## Unit Resources

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### Additional resources found in unit folder

- <http://schools.nyc.gov/Academics/CommonCoreLibrary/TasksUnitsStudentWork/default.htm>
- Aleks online supplement
- <http://blog.mrmeyer.com/?p=213>
- <http://illuminations.nctm.org/LessonDetail.aspx?id=L298>
- <http://illuminations.nctm.org/LessonDetail.aspx?id=L646>
- <http://illuminations.nctm.org/LessonDetail.aspx?ID=L673>
- <http://illuminations.nctm.org/LessonsList.aspx?grade=3&standard=all>
- <http://illuminations.nctm.org/LessonsList.aspx?grade=3&standard=all>
- <http://insidemathematics.org/index.php/8th-grade>
- <http://learnzillion.com/>
- [http://www.education.ucsb.edu/ucsbpt3/afield/teacher\\_projects/jimsfinal/Jimstudent.htm](http://www.education.ucsb.edu/ucsbpt3/afield/teacher_projects/jimsfinal/Jimstudent.htm)
- [http://www.education.ucsb.edu/ucsbpt3/afield/teacher\\_projects/jimsfinal/Jimstudent.htm](http://www.education.ucsb.edu/ucsbpt3/afield/teacher_projects/jimsfinal/Jimstudent.htm)
- <http://www.illustrativemathematics.org/>
- <http://www.pbs.org/teachers/connect/resources/4384/preview/>
- <https://www.khanacademy.org/>
- Unit projects

## Interdisciplinary Connections

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Shaq Shoe Size- Students create a scatter plot of the relationship of your handspan and foot length. Gathering data will allow the students to make a prediction of Shaq's potential shoe size given his hand span. (8.SP.A.1)

9-12.HS-LS3-1.1.1

Ask questions that arise from examining models or a theory to clarify relationships.

9-12.HS-LS3-3.3.1

Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth).



