Module 1 Topic 3

Content Area: **Math**
Course(s):
Time Period: **Full Year**
Length: **10 Sessions**
Status: **Published**

Linear Regressions

Standards

MATH.9-12.S.ID.B.6	Represent data on two quantitative variables on a scatter plot and describe how the variables are related.
MATH.9-12.S.ID.B.6.a	Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear and exponential models.
MATH.9-12.S.ID.B.6.b	Informally assess the fit of a function by plotting and analyzing residuals, including with the use of technology.
MATH.9-12.N.Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
MATH.9-12.S.ID.B.6.c	Fit a linear function for a scatter plot that suggests a linear association.
MATH.9-12.S.ID.C.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
MATH.9-12.S.ID.C.8	Compute (using technology) and interpret the correlation coefficient of a linear fit.
MATH.9-12.S.ID.C.9	Distinguish between correlation and causation.

Learning Objectives

- Lesson 1: Students create a scatter plot and, determine a line of best fit graphically., They then use technology to determine, the regression equation and analyze, a diagram to make sense of the Least, Squares Method. They interpret the, contextual and mathematical, meanings of the equation's, components and address the, reasonableness of predictions from, interpolation and extrapolation.

- Lesson 2: Students learn the meaning of a, correlation coefficient, r, and, coefficient of determination, r^2., They create scatter plots and use, technology to determine a linear, regression equation, and r^2. Students, interpret the results to determine, whether a line is an appropriate, model for a data set. They learn that, a correlation is a necessary, but not, sufficient, condition for causation.

- Lesson 3: Students construct scatter plots and, determine lines of best fit and, correlation coefficients. They learn, the meaning of a residual and, examine examples of residual plots, indicating linear and nonlinear, relationships. Students then, construct residual plots to, determine whether a linear model, is appropriate. They describe the, difference between the line of best, fit and the most appropriate model.

- Lesson 4: Students consider a linear model, with a correlation coefficient that, identifies a good fit but a residual, plot that does not. They graph a given, nonlinear equation on the scatter, plot and realize its better fit also gives, better interpolation results. Students, explain why they need to consider, the scatter plot's shape, correlation, coefficient, and residual plot to, determine a linear model's fit.

Essential Skills

- Lesson 1: A least squares regression line is the line of best fit that minimizes the squares of the, distances of the points from the line., • Interpolation is the process of using a regression equation to make predictions within, the data set., • Extrapolation is the process of using a regression equation to make predictions beyond, the data set.
- Lesson 2: A correlation is a measure of how well a regression model fits a data set., • The correlation coefficient is a numeric summary of bivariate data that measures the, strength of the relationship between two variables., • The r-value value falls between -1 and 0 when the data show a negative association or, between 0 and 1 when the data show a positive association., • The closer the correlation coefficient is to 1 or -1, the stronger the relationship is, between the two variables., • Causation is when one event causes a second event. A correlation is a necessary, but, not sufficient, condition for causation., • When some other reason may cause the same result or when there are other unknown, or unobserved variables correlation is often mistaken for causation.
- Lesson 3: A residual is the distance between an observed data value and its predicted value, using the regression equation., • Analyzing residuals is a method to determine whether a linear model is appropriate, for a data set., • A residual plot is a scatter plot of the independent variable on the x-axis and the, residuals on the y-axis., • The shape of a residual plot is useful to determine whether there may be a more, appropriate model than a line of best fit for a data set.
- Lesson 4: You can use scatter plots, regression functions, correlation noefficients, residuals, and, residual plots to determine the appropriate model of best fit., • It is essential to use several measures to determine the appropriate model of best fit.

Instructional Tasks/Activities

- Arts inspired projects
- Exit Ticket
- Formative Assessments
- Graphic Organizers
- Ladder Activity
- Mathia
- Pie Activity
- Quizizz
- Review, makeup assignments, complete missing assignments, absent work
- Stations or rotational activities
- Workbook Pages
- Worksheets

Assessment Procedure

- Exit Ticket/Entrance Ticket/Do Now
- Kahoot
- Problem Correction
- Project

- Quiz
- Review
- Rubric
- Teacher Collected Data
- Test
- Worksheet

Recommended Technology Activities

- Appropriate Content Specific Online Resource
- Chromebook
- Diffit
- Gimkit
- GoGuardian
- Google Classroom
- Google Docs
- Google Forms
- Google Slides
- Kahoot
- MagicSchool AI
- MATHia
- Online assessments
- Power Point
- Quizizz
- Screencastify

Accommodations & Modifications & Differentiation

Accommodations and Modifications should be used to meet individual needs. Their IEP and 504 plans should be used in addition to the following suggestions.

Gifted and Talented

- Compare & Contrast
- Conferencing
- Debates
- Jigsaw
- Peer Partner Learning

- Problem Solving
- Structured Controversy
- Think, Pair, Share
- Tutorial Groups

Instruction/Materials

- alter format of materials (type/highlight, etc.)
- color code materials
- eliminate answers
- extended time
- large print
- modified quiz as needed
- modified test as needed
- Modify Assignments as Needed
- Modify/Repeat/Model directions
- necessary assignments only
- Other (specify in plans)
- other- named in lesson
- provide assistance and cues for transitions
- provide daily assignment list
- read class materials orally
- reduce work load
- shorten assignments
- study guide/outline
- utilize multi-sensory modes to reinforce instruction

Environment

- alter physical room environment
- assign peer tutors/work buddies/note takers
- assign preferential seating
- individualized instruction/small group
- modify student schedule (Describe)
- other- please specify in plans
- provide desktop list/formula

Resources

- Carnegie Learning MATHbook
- Diffit
- www.KhanAcademy.com

State Mandated Topics in this Unit

State Mandated Topics Addressed in this Unit	
N/A	N/A