Standard #: MAFS.912.S-ID.3.7

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Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. ★

Grade: 912

Cluster: Interpret linear models. (Algebra 1 - Major Cluster) -
Clusters should not be sorted from Major to Supporting and then taught in that order. To do so would strip the coherence of the mathematical ideas and miss the opportunity to enhance the major work of the grade with the supporting clusters.

Date Adopted or Revised: 02/14

Content Complexity Rating: Level 2: Basic Application of Skills & Concepts - More Information

Date of Last Rating: 02/14

Status: State Board Approved

Assessed: Yes

TEST ITEM SPECIFICATIONS

Assessed with:

MAFS.912.F-IF.2.6

Related Courses

Course Number	Course Title
1200310:	Algebra 1 (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
1200320:	Algebra 1 Honors (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
1200380:	Algebra 1-B (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
1200400:	Intensive Mathematics (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
1210300:	Probability & Statistics with Applications Honors (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
1200410:	Mathematics for College Success (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
1200700:	Mathematics for College Readiness (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
2107310:	Psychology 2 (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
7912090:	Access Algebra 1B (Specifically in versions: 2014 - 2015, 2015 - 2018, 2018 - 2019, 2019 and beyond (current))
1200315:	Algebra 1 for Credit Recovery (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
1200385:	Algebra 1-B for Credit Recovery (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
7912100:	Fundamental Algebraic Skills (Specifically in versions: 2013 - 2015, 2015 - 2017 (course terminated))
7912075:	Access Algebra 1 (Specifically in versions: 2014 - 2015, 2015 - 2018, 2018 - 2019, 2019 and beyond (current))

Related Access Points

Access Point

Access Points Number	Access Points Title
MAFS.912.S-ID.3.AP.7a:	Interpret the meaning of the slope and y-intercept in context.

Related Resources

Perspectives Video: Expert

Name	Description
Analyzing Antarctic Ice Sheet Movement to Understand Sea Level Changes:	In this video, Eugene Domack explains how past Antarctic ice sheet movement rates allow us to understand sea level changes. Video funded by NSF grant #: OCE-1502753.

Assessment of Past and Present Rates of Sea Level Change:	In this video, Brad Rosenheim describes how Louisiana sediment cores are used to estimate sea level changes over the last 10,000 years. Video funded by NSF grant #: OCE-1502753.
Oceanography & Math:	A discussion describing ocean currents studied by a physical oceanographer does and how math is involved.

Formative Assessment

Name	Description
Bungee Cord Model:	Students are asked to interpret the meaning of the constant term in a linear model.
Intercept for Life Expectancy:	Students are asked to interpret the intercept of a linear model of life expectancy data.
Slope for Foot Length Model:	Students are asked to interpret the meaning of the slope of the graph of a linear model.
Slope for Life Expectancy:	Students are asked to interpret the meaning of the slope of the graph of a linear model.

Lesson Plan

Name	Description
Cat Got Your Tongue?:	This lesson will be using real world examples to help explain the meaning of slope and y-intercept of a linear model in the context of data. Literacy will also be infused during the independent practice portion of the lesson. A PowerPoint is included for guidance throughout the whole lesson and to provide visual representation for students. There are guided notes available as well to provide assistance in note-taking for students.
Compacting Cardboard:	Students with investigate the amount of space that could be saved by flattening cardboard boxes. The analysis includes linear graphs and regression analysis along with discussions of slope and a direct variation phenomenon.
Doggie Data: It's a Dog's Life:	This lesson allows students to use real-world data to construct and interpret scatter plots using technology. Students will create a scatter plot with a line of best fit and a function. They describe the relationship of bi-variate data. They recognize and interpret the slope and y-intercept of the line of best fit within the context of the data.
Don't Mope Over Slope:	This is an introductory lesson designed to help students have a better understanding of the interpretation of the slope (rate of change) of a graph.
Graphing Equations on the Cartesian Plane: Slope:	The lesson teaches students about an important characteristic of lines: their slope. Slope can be determined either in graphical or algebraic form. Slope can also be described as positive, negative, zero, or undefined. Students get an explanation of when and how these different types of slope occur. Finally, students learn how slope relates to parallel and perpendicular lines. When two lines are parallel, they have the same slope and when they are perpendicular their slopes are negative reciprocals of one another. Prerequisite knowledge: Students must know how to graph points on the Cartesian plane. They must be familiar with the x- and y- axes on the plane in both the positive and negative directions.
How Hot Is It?:	This lesson allows the students to connect the science of cricket chirps to mathematics. In this lesson, students will collect real data using the CD "Myths and Science of Cricket Chirps" (or use supplied data), display the data in a graph, and then find and use the mathematical model that fits their data.
Hybrid-Electric Vehicles vs. Gasoline-Powered Vehicles:	Students will be comparing hybrid-electric vehicles (HEV) versus gasoline-powered vehicles. They will research the benefits of owning a HEV while also analyzing the cost effectiveness.
Is My Model Working?:	Students will enjoy this project lesson that allows them to choose and collect their own data. They will create a scatter plot and find their line of best fit. Next they write interpretations of their slope and *y*-intercept. Their final challenge is to calculate residuals and conclude whether or not their data is consistent with their linear model.
Line of Best Fit:	This lesson provides students with opportunities to examine the slope and y-intercept of a line of best fit using scatterplots. Students will gain a deeper conceptual understanding of slope and y-intercept based on real world data. Students will graph scatterplots and draw a line of best fit. Then, students will use the line to interpret the slope and y-intercept with regard to the data. Students will also make predictions using the graph and the equation of the data.
Picture This!:	This is a short unit plan that covers position/time and velocity/time graphs. Students are provided with new material on both topics, will have practice worksheets, and group activities to develop an understanding of motion graphs.
Scatter Plots and Correlations:	In this lesson, students will interpret and analyze data to create a scatter plot and line of best fit. Students will make predictions for the number of views of a video for any given number of weeks on the charts. The lesson provides suggestions for finding the line of best fit using different technologies to graph, GeoGebra free online software, Excel spreadsheets, and graphing calculators. Teachers can determine which technology will best suit their class or incorporate all three as part of the lesson.
Scatter plots, spaghetti, and predicting the future:	Students will construct a scatter plot from given data. They will identify the correlation, sketch an approximate trend line, and find the equation of the trend line. They will explain the meaning of the slope and y-intercept in the context of the data and use the trend line to extrapolate values beyond the data set.
Slippery Slopes:	This lesson will not only reinforce students understanding of slope and y-intercept, but will also ensure the students understand how it can be modeled in a real world situation. The focus of this lesson is to show student's understanding of slope being a rate of change and the y-intercept the value of y when x is zero. They will be able to read a problem and create a linear equation based upon what they read. They will then make predictions based upon this information.
Slope and y-Intercept of a Statistical Model:	After activating prior knowledge and presentation of new skills, students will be collecting and evaluating data to interpret the line of best fit and y-intercept in order to develop an equation in point-slope form to represent the data.
Spaghetti Bridges:	Students use data collection from their spaghetti bridge activity to write linear equations, graph the data, and interpret the data.

Spaghetti Trend:	This lesson consists of using data to make scatter plots, interpret slope and the y-intercept and to make predictions about the line of best fit using the slope intercept form.
Springing into Hooke's Law:	This lab exploration provides students with an opportunity to examine the relationship between the amount a linear spring is stretched and the restoring force that acts to return the spring to its rest length. This concept is central to an understanding of elastic potential energy in mechanical systems and has implications in the study of a large array of mechanical and electromagnetic simple harmonic oscillators.
The Gumball Roll Lab:	This lesson is on motion of objects. Students will learn what factors affect the speed of an object through experimentation with gumballs rolling down an incline. The students will collect data through experimenting, create graphs from the data, interpret the slope of the graphs and create equations of lines from data points and the graph. They will understand the relationship of speed and velocity and be able to relate the velocity formula to the slope intercept form of the equation of a line.
Using Acid/Base Neutralization to Study Endothermic vs Exothermic Reactions and Stoichiometry:	In this lesson, students will experimentally determine whether an acid/base neutralization reaction is endothermic or exothermic. They will also use their results to identify the limiting reactant at various times in the process and calculate the concentration of one of the reactants.
What does it mean?:	This lesson provides the students with scatter plots, lines of best fit and the linear equations to practice interpreting the slope and y-intercept in the context of the problem.
What Will I Pay?:	*Who doesn't want to save money?* In this lesson, students will learn how a better credit score will save them money. They will use a scatter plot to see the relationship between credit scores and car loan interest rates. They will determine a line of best fit equation and interpret slope and y-intercept to make conclusions about interest and credit scores.
What's Slope got to do with it?:	In this lesson students will interpret the meaning of slope and y-intercept in a wide variety of examples of "real world" situations that are modeled by linear functions.
You Can Plot it! Bivariate Data:	This review lesson relates graphical and algebraic representations of bivariate data by giving students opportunities to create scatter plots, calculate a regression equation using technology, and interpret the slope and *y*-intercept of the equation in the context of the data.

Problem-Solving Task

Name	Description
Coffee and Crime:	This problem solving task asks students to examine the relationship between shops and crimes by using a correlation coefficient.
Downhill:	This task would be especially well-suited for instructional purposes. Students will benefit from a class discussion about the slope, y-intercept, x-intercept, and implications of the restricted domain for interpreting more precisely what the equation is modeling.
Texting and Grades II:	The purpose of this task is to assess ability to interpret the slope and intercept of the least squares regression line in context.

Original Student Tutorial

Name	Description
It's a Slippery Slope!:	Learn what slope is in mathematics and how to calculate it on a graph and with the slope formula in this interactive tutorial.

Video/Audio/Animation

Name	Description
Linear Equations in the Real World:	Linear equations can be used to solve many types of real-word problems. In this episode, the water depth of a pool is shown to be a linear function of time and an equation is developed to model its behavior. Unfortunately, ace Algebra student A. V. Geekman ends up in hot water anyway.

Unit/Lesson Sequence

Name	Description
Linear Functions and Slope:	This session on linear function and slope contains five parts, multiple problems and videos, and interactive activities geared to help students recognize and understand linear relationships, explore slope and dependent and independent variables in graphs of linear relationships, and develop an understanding of rates and how they are related to slopes and equations. Throughout the session, students use spreadsheets to complete the work, and are encouraged to think about the ways technology can aid in teaching and understanding. The solutions for all problems are given, and many allow students to have a hint or tip as they solve. There is even a homework assignment with four problems for students after they have finished all five parts of the session.
	This sample Algebra 1 CMAP is a fully customizable resource and curriculum-planning tool that provides a framework for the Algebra 1 Course. The units and standards are customizable and the CMAP allows instructors to add lessons, worksheets, and other resources as needed. This CMAP also includes rows that automatically filter and display Math Formative Assessments System tasks, E-Learning Original Student Tutorials and Perspectives Videos that are aligned to the standards, available on CPALMS. Learn more about the sample Algebra 1 CMAP, its features and customizability by watching the following video: 

Sample Algebra 1 Curriculum Plan Using CMAP:	Could not load plugins: File not found

Using this CMAP

To view an introduction on the CMAP tool, please click here.

To view the CMAP, click on the "Open Resource Page" button above; be sure you are logged in to your iCPALMS account.

To use this CMAP, click on the "Clone" button once the CMAP opens in the "Open Resource Page." Once the CMAP is cloned, you will be able to see it as a class inside your iCPALMS My Planner (CMAPs) app.

To access your My Planner App and the cloned CMAP, click on the iCPALMS tab in the top menu.

All CMAP tutorials can be found within the iCPALMS Planner App or at the following URL: http://www.cpalms.org/support/tutorials_and_informational_videos.aspx

Assessment

Name	Description
Sample 2 - High School Algebra 1 State Interim Assessment:	This is a State Interim Assessment for 9th-12th grades.
Sample 4 - High School Algebra 1 State Interim Assessment:	This is a State Interim Assessment for 9th-12th grades.

Perspectives Video: Professional/Enthusiast

Name	Description
Slope and Deep Sea Sharks:	Shark researcher, Chip Cotton, discusses the use of regression lines, slope, and determining the strength of the models he uses in his research.

Student Resources

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It's a Slippery Slope!:	Learn what slope is in mathematics and how to calculate it on a graph and with the slope formula in this interactive tutorial.
Linear Equations in the Real World:	Linear equations can be used to solve many types of real-word problems. In this episode, the water depth of a pool is shown to be a linear function of time and an equation is developed to model its behavior. Unfortunately, ace Algebra student A. V. Geekman ends up in hot water anyway.
Texting and Grades II:	The purpose of this task is to assess ability to interpret the slope and intercept of the least squares regression line in context.

Parent Resources

Name	Description
Coffee and Crime:	This problem solving task asks students to examine the relationship between shops and crimes by using a correlation coefficient.
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Texting and Grades II:	The purpose of this task is to assess ability to interpret the slope and intercept of the least squares regression line in context.