Standard #: MAFS.912.F-LE.2.5

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Interpret the parameters in a linear or exponential function in terms of a context. ★

Subject Area: Mathematics

Grade: 912

Domain-Subdomain: Functions: Linear, Quadratic, & Exponential Models

Cluster: Level 2: Basic Application of Skills & Concepts

Cluster: Interpret expressions for functions in terms of the situation they model. (Algebra 1 - Supporting Cluster) (Algebra 2 - Additional 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

Item Type(s): This benchmark may be assessed using: GRID item(s)

Assessed with:

MAFS.912.F-LE.1.1

SAMPLE TEST ITEMS (1)

Test Item #: Sample Item 1
Question:
The graph shows T, the temperature of water, in degrees Celsius, in a test tube after m minutes of an experiment.

Drag a label to each box to correctly identify the type of rate of change between temperature and time on each part of the graph.

Difficulty: N/A
Type: GRID: Graphic Response Item Display

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))
1200330:	Algebra 2 (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
1200340:	Algebra 2 Honors (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
1200370:	Algebra 1-A (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
1200400:	Intensive Mathematics (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
1207310:	Liberal Arts Mathematics (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
7912080:	Access Algebra 1A (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))
1200335:	Algebra 2 for Credit Recovery (Specifically in versions: 2014 - 2015, 2015 - 2019 (course terminated))
1200375:	Algebra 1-A for Credit Recovery (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
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.F-LE.2.AP.5a:	Describe the meaning of the factors and intercepts on linear and exponential functions.

Related Resources

Problem-Solving Task

Name	Description
A Saturating Exponential:	This task provides an interesting context to ask students to estimate values in an exponential function using a graph.
Carbon 14 Dating in Practice I:	In the task "Carbon 14 Dating" the amount of Carbon 14 in a preserved plant is studied as time passes after the plant has died. In practice, however, scientists wish to determine when the plant died, and as this task shows, that is not possible with a simple measurement of the amount of Carbon 14 remaining in the preserved plant.
Illegal Fish:	This problem-solving task asks students to describe exponential growth through a real-world problem involving the illegal introduction of fish into a lake.
Newton's Law of Cooling:	The coffee cooling experiment is a popular example of an exponential model with immediate appeal. The model is realistic and provides a good context for students to practice work with exponential equations.
Taxi!:	This simple conceptual problem does not require algebraic manipulation, but requires students to articulate the reasoning behind each statement.
US Population 1982-1988:	This problem solving task asks students to predict and model US population based on a chart of US population data from 1982 to 1988.

Formative Assessment

Name	Description
Computer Repair:	Students are given a linear function in context and asked to interpret its parameters in the context of a problem.
Interpreting Exponential Functions:	Students are asked to interpret parameters of an exponential function in context.
Lunch Account:	Students are given a linear function in context and asked to interpret its parameters in the context of a problem.

Unit/Lesson Sequence

Name	Description
Direct and Inverse Variation:	"Lesson 1 of two lessons teaches students about direct variation by allowing them to explore a simulated oil spill using toilet paper tissues (to represent land) and drops of vegetable oil (to simulate a volume of oil). Lesson 2 teaches students about inverse variation by exploring the relationship between the heights of a fixed amount of water poured into cylindrical containers of different sizes as compared to the area of the containers' bases." from Insights into Algebra 1 - Annenberg Foundation.
Sample Algebra 1 Curriculum Plan Using CMAP:	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: 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

Virtual Manipulative

Name	Description
Function Flyer:	In this online tool, students input a function to create a graph where the constants, coefficients, and exponents can be adjusted by slider bars. This tool allows students to explore graphs of functions and how adjusting the numbers in the function affect the graph. Using tabs at the top of the page you can also access supplemental materials, including background information about the topics covered, a description of how to use the application, and exploration questions for use with the java applet.

Lesson Plan

Name	Description
Functions and Everyday Situations:	This lesson unit is intended to help you assess how well students are able to articulate verbally the relationships between variables arising in everyday contexts, translate between everyday situations and sketch graphs of relationships between variables, interpret algebraic functions in terms of the contexts in which they arise and reflect on the domains of everyday functions and in particular whether they should be discrete or continuous.
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.
Modeling: Having Kittens:	This lesson unit is intended to help you assess how well students are able to interpret a situation and represent the constraints and variables mathematically, select appropriate mathematical methods to use, make sensible estimates and assumptions, investigate an exponentially increasing sequence and communicate their reasoning clearly.
The Power of Exponentials, Big and Small - MIT Blossoms:	Exponential growth is keenly applicable to a variety of different fields ranging from cell growth in biology, nuclear chain reactions in physics to computational complexity in computer science. In this *video-based lesson*, through various examples and activities, we have tried to compare exponential growth to polynomial growth and to develop an insight about how quickly the number can grow or decay in exponentials. A basic knowledge of scientific notation, plotting graphs and finding intersection of two functions is assumed. It would be better if the students have done pre-calculus, though this is not a requirement. The lesson is about 20 minutes, interspersed with simple activities that can require up to half an hour. The webpage for this video also includes tabs where additional resources and information can be found. These include a Teacher's Guide, a Powers of 2 table, links to other helpful lessons and resources, a transcript of the video, and even an option to download the video.
You're Pulling My Leg – or Candy!:	Students will watch a Perspectives Video to see how exponential growth is modeled in the real world. Students then explore how exponential growth and decay can model other real world problems. Students will also discover how manipulating the variables in an exponential equation changes the graph.

Perspectives Video: Professional/Enthusiast

Name	Description
Making Candy: Illuminating Exponential Growth:	No need to sugar coat it: making candy involves math and muscles. Learn how light refraction and exponential growth help make candy colors just right!

Professional Development

Name	Description
Mathematical Modeling: Insights into Algebra, Teaching for Learning:	This professional development resource provides a rich collection of information to help teachers engage students more effectively in mathematical modeling. It features videos of two complete lessons with commentary, background information on effective teaching, modeling, and lesson study, full lesson plans to teach both example lessons, examples of student work from the lessons, tips for effective teaching strategies, and list of helpful resources. • In Lesson 1 students use mathematical models (tables and equations) to represent the relationship between the number of revolutions made by a "driver" and a "follower" (two connected gears in a system), and they will explain the significance of the radii of the gears in regard to this relationship. • In Lesson 2 students mathematically model the growth of populations and use exponential functions to represent that growth.

Video/Audio/Animation

Name	Description
MIT BLOSSOMS - Flu Math Games:	This video lesson shows students that math can play a role in understanding how an infectious disease spreads and how it can be controlled. During this lesson, students will see and use both deterministic and probabilistic models and will learn by doing through role-playing exercises. There are no formal prerequisites, as students in any high school or even middle school math class could enjoy this learning video. But more advanced classes can go into the optional applied probability modeling that accompanies the module in a downloadable pdf file. The primary exercises between video segments of this lesson are class-intensive simulation games in which members of the class 'infect' each other under alternative math modeling assumptions about disease progression. Also there is an occasional class discussion and local discussion with nearby classmates.

Text Resource

Name	Description
	This informational text resource is intended to support reading in the content area. The text sets out to provide the

Robots Will Steal Your Job: Exponential Growth:	reader with a clear understanding of the concept of exponential growth. Stories and examples tied to the stories are used to clarify the concept of exponential growth. Readers are offered various scenarios where exponential growth applies to everyday life, and opportunities are given to practice their grasp of the concepts.

Assessment

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

Student Resources

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Parent Resources

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