



Standard #: MAFS.912.A-CED.1.1

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Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational, absolute, and exponential functions. ★

Subject Area: Mathematics	Grade: 912
Domain-Subdomain: Algebra: Creating Equations	Cluster: Level 2: Basic Application of Skills & Concepts
Cluster: Create equations that describe numbers or relationships. (Algebra 1 - Major Cluster) (Algebra 2 - Supporting 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)

Also assesses:

MAFS.912.A-REI.2.3

MAFS.912.A-CED.1.4

Assessment Limits :

In items that require the student to write an equation, equations are limited to exponential functions with one translation, linear functions, or quadratic functions.

Items may include equations or inequalities that contain variables on both sides.

Items may include compound inequalities.

In items that require the student to write an exponential function given ordered pairs, at least one pair of consecutive values must be given.

In items that require the student to write or solve an inequality, variables are restricted to an exponent of one.

Items that involve formulas should not include overused contexts such as Fahrenheit/Celsius or three-dimensional geometry formulas.

In items that require the student to solve literal equations and formulas, a linear term should be the term of interest.

Items should not require more than four procedural steps to isolate the variable of interest.

Items may require the student to recognize equivalent expressions but may not require a student to perform an algebraic operation outside the context of Algebra 1.

Calculator :

Neutral

Clarification :

Students will write an equation in one variable that represents a real world context.

Students will write an inequality in one variable that represents a real-world context.

Students will solve a linear equation.

Students will solve a linear inequality.

Students will solve multi-variable formulas or literal equations for a specific variable.

Students will solve formulas and equations with coefficients represented by letters.

Stimulus Attributes :

Items assessing A-CED.1.1 and A-CED.1.4 must be placed in real-world context.

Items assessing REI.2.3 do not have to be in a real-world context.

Response Attributes :

Items assessing REI.2.3 should not require the student to write the equation.

Items may require the student to choose an appropriate level of accuracy.

Items may require the student to choose and interpret units.

For A-CED.1.1 and A-CED.1.4, items may require the student to apply the basic modeling cycle.

SAMPLE TEST ITEMS (1)

Test Item #: [Sample Item 1](#)

Question:

The table shows a company's income and expenses over the last 7 days.

Day of Week	Income	Expenses
Sun.	\$ 169.56	\$ 256.25
Mon.	\$ 217.61	\$ 195.79
Tues.	\$ 150.89	\$1208.55
Wed.	\$ 409.73	\$ 709.11
Thurs.	\$ 687.45	\$ 190.98
Fri.	\$1563.09	\$ 325.78
Sat.	\$1267.92	\$ 315.64

The company found that its weekly income and expenses were approximately the same from week to week.

A. Select the correct definition of the variable x .

B. Drag terms to the boxes and symbols to the circles to create an equation that can be solved to approximate the number of weeks it will take for the company's income to be \$10,000 more than its expenses.

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))
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))
1206330:	Analytic Geometry (Specifically in versions: 2014 - 2015 (course terminated))
1200500:	Advanced Algebra with Financial Applications (Specifically in versions: 2014 - 2015 (course terminated))
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))
7912060:	Access Informal Geometry (Specifically in versions: 2014 - 2015 (course terminated))
7912070:	Access Liberal Arts Mathematics (Specifically in versions: 2014 - 2015, 2015 - 2018, 2018 - 2019, 2019 and beyond (current))
7912080:	Access Algebra 1A (Specifically in versions: 2014 - 2015, 2015 - 2018, 2018 - 2019, 2019 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))
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))
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))
1207300:	Liberal Arts Mathematics 1 (Specifically in versions: 2014 - 2015, 2015 and beyond (current))
7912065:	Access Geometry (Specifically in versions: 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.A-CED.1.AP.1a:	Create linear, quadratic, rational, and exponential equations and inequalities in one variable and use them in a contextual situation to solve problems.

Related Resources

Lesson Plan

Name	Description
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"When will we ever meet?":	Students will be guided through the investigation of $y = mx + b$. Through this lesson, students will be able to determine whether lines are parallel, perpendicular, or neither by looking at the graph and the equation.
CollegeReview.com:	This is a model-eliciting activity where students have been asked by a new website, CollegeReview.com, to come up with a system to rank various colleges based on five categories; tuition cost, social life, athletics, education, city population and starting salary upon graduation.
Looking for the best Employment Option:	Students will reaffirm their knowledge about linear equations. Will be able to apply the concept to real life situations.
My Candles are MELTING!:	In this lesson, students will display data in a variety of ways. They will analyze a situation in which 2 candles burn at different rates. They will determine a linear equation for each and determine when/and if the candles will ever be the same height. They will also determine the domain and range of their functions and determine whether there are constraints on their functions.
Piles of Paper:	Piles of Paper is a student activity that demonstrates linear and exponential growth using heights of flat and folded paper. Data tables are created and then algebraic models are developed. Real world types of linear and exponential growth are also introduced.
The Yo-Yo Problem: Solving Linear Equations:	In this lesson, students explore linear patterns, write a pattern in symbolic form, and solve linear equations using algebra tiles, symbolic manipulation, and the graphing calculator. The lesson starts with the presentation of the yo-yo purchase problem. Students then complete a hands-on activity involving a design created with pennies that allows them to explore a linear pattern and express that pattern in symbolic form. Algebra tiles are introduced as the students practice solving linear equations. Working from the concrete to the abstract is especially important for students who have difficulty with mathematics, and algebra tiles help students make this transition. In addition to using algebra tiles, students also use symbolic manipulation and the graphing calculator. Finally, the students return to solve the yo-yo problem. A feature of this lesson is the effective use of peer tutors in this inclusion classroom. Student worksheets are included to print.

Video/Audio/Animation

Name	Description
Averages:	This Khan Academy video tutorial introduces averages and algebra problems involving averages.
Solving Mixture Problems with Linear Equations:	Mixture problems can involve mixtures of things other than liquids. This video shows how Algebra can be used to solve problems involving mixtures of different types of items.
Using Systems of Equations Versus One Equation:	When should a system of equations with multiple variables be used to solve an Algebra problem, instead of using a single equation with a single variable?

Problem-Solving Task

Name	Description
Basketball:	This task provides a simple but interesting and realistic context in which students are led to set up a rational equation (and a rational inequality) in one variable, and then solve that equation/inequality for an unknown variable. It seems likely to be direct and relevant enough to be used for assessment purposes, either in part or in whole. Alternatively, this task could be used as a motivation for studying equations of this form in general, as while students might be able to solve the first part by trial and error, this becomes rather tedious for the later parts. Teachers might also find this task could be used to illustrate standard A-REI.A.1 if some more emphasis were placed on the reasoning behind the algebraic manipulations provided in the solutions.
Buying a Car:	Students extrapolate the list price of a car given a total amount paid in states with different tax rates. The emphasis in this task is not on complex solution procedures. Rather, the progression of equations, from two that involve different values of the sales tax, to one that involves the sales tax as a parameter, is designed to foster the habit of looking for regularity in solution procedures, so that students don't approach every equation as a new problem but learn to notice familiar types.
Cash Box:	The given solutions for this task involve the creation and solving of a system of two equations and two unknowns, with the caveat that the context of the problem implies that we are interested only in non-negative integer solutions. Indeed, in the first solution, we must also restrict our attention to the case that one of the variables is further even. This aspect of the task is illustrative of mathematical practice standard MP4 (Model with mathematics), and crucial as the system has an integer solution for both situations, that is, whether or not we include the dollar on the floor in the cash box or not.
Harvesting the Fields:	This is a challenging task, suitable for extended work, and reaching into a deep understanding of units. Students are given a scenario and asked to determine the number of people required to complete the amount of work in the time described. The task requires students to exhibit MAFS.K12.MP.1.1 , Make sense of problems and persevere in solving them. An algebraic solution is possible but complicated; a numerical solution is both simpler and more sophisticated, requiring skilled use of units and quantitative reasoning. Thus the task aligns with either MAFS.912.A-CED.1.1 or MAFS.912.N-Q.1.1 , depending on the approach.
Paying the Rent:	Students solve problems tracking the balance of a checking account used only to pay rent. This simple conceptual task focuses on what it means for a number to be a solution to an equation, rather than on the process of solving equations.
Planes and Wheat:	In this resource, students refer to given information which defines 5 variables in the context of real world government expenses. They are then asked to write equations based upon specific known values for some of the variables. The emphasis is on setting up, rather than solving, the equations.
	This problem provides students with an opportunity to discover algebraic structure in a geometric context. More

[Sum of Angles in a Polygon:](#) specifically, the student will need to divide up the given polygons into triangles and then use the fact that the sum of the angles in each triangle is 180° .

[Throwing a Ball:](#) Students manipulate a given equation to find specified information.

Tutorial

Name	Description
Evaluating an algebraic expression in a word problem:	In this example of evaluating expressions, we're dusting off some geometry. On top of that, it's a word problem. We're seeing how different concepts in math are layered on top of each other to create more interesting and complex problems to solve.
How to evaluate an expression using substitution:	In this example we have a formula for converting Celsius temperature to Fahrenheit. Let's substitute the variable with a value (Celsius temp) to get the degrees in Fahrenheit. Great problem to practice with us!
How to evaluate an expression with variables:	Learn how to evaluate an expression with variables using a technique called substitution (or "plugging in").
What is a variable?:	Our focus here is understanding that a variable is just a letter or symbol (usually a lower case letter) that can represent different values in an expression. We got this. Just watch.
Why aren't we using the multiplication sign?:	Great question. In algebra, we do indeed avoid using the multiplication sign. We'll explain it for you here.

Formative Assessment

Name	Description
Follow Me:	Students are asked to write and solve an equation that models an exponential relationship between two variables.
Music Club:	Students are given a real world context and asked to model the situation by writing and then solving a multistep inequality.
Quilts:	Students are asked to write and solve an equation that models a given problem.
State Fair:	Students are asked to write and solve an equation that models a given problem.
Writing Absolute Value Equations:	Students are asked to solve a set of absolute value equations.
Writing Absolute Value Inequalities:	Students are asked to write absolute value inequalities to represent the relationship among values described in word problems.

Perspectives Video: Professional/Enthusiast

Name	Description
Gear Heads and Gear Ratios:	Have a need for speed? Get out your spreadsheet! Race car drivers use algebraic formulas and spreadsheets to optimize car performance.

Assessment

Name	Description
Sample 2 - High School Algebra 1 State Interim Assessment:	This is a State Interim Assessment for 9th-12th grades.
Sample 3 - High School Algebra 1 State Interim Assessment:	This is a State Interim Assessment for 9th-12th grades.

Unit/Lesson Sequence

Name	Description
	<p>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.</p> <p>Learn more about the sample Algebra 1 CMAP, its features and customizability by watching the following video:</p>
Sample Algebra 1 Curriculum Plan Using CMAP:	

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

Teaching Idea

Name	Description
Translating Word Problems into Equations:	This site shows students how to translate word problems into equations. It gives seven steps, from reading the problem carefully to checking the solution, to creating equations. The lesson moves on to a few simple exercises in which a natural language sentence is translated to an algebraic equation. It then moves on to more elaborate word problems which require students to identify the important data and follows the given seven steps to create and solve the equation. The more complex questions draw on student understanding of geometric formulae. There are six questions at the end for students to test their new knowledge of how to create and solve equations.

Original Student Tutorial

Name	Description
Writing Inequalities with Money, Money, Money:	Write linear inequalities for different money situations in this interactive tutorial.

Student Resources

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Parent Resources

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