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2020
Teacher Resource
Guide for
Alternate Math
Elements III and
Alternate Algebra
Elements

Effective Date: 2020-2021 School Year



2020

Teacher Resource Guide for
MS AAAS for
Alternate Math Elements III and
Alternate Algebra Elements

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The Standards

The *2020 Mississippi Alternate Academic Achievement Standards for Alternate Math Elements III and Alternate Algebra Elements* are comprised of six conceptual categories: Number and Quantity, Algebra, Functions, Modeling, Geometry, and Statistics and Probability. The different categories combine to provide a broad scope of the study of mathematics.

Remaining Material in the Teacher Resource Guide

The remaining materials in the teacher resource guide (performance objectives, real-world connections, vocabulary, and resources) were developed through a collaboration of Mississippi teachers, administrators, the Mississippi Department of Education (MDE) Office of Special Education staff, and the Mississippi State University Research and Curriculum Unit staff.

Introduction

The MDE is dedicated to student success, improving student achievement in mathematics and establishing communication skills within a technological environment. The Mississippi Alternate Academic Achievement Standards provide a consistent, clear understanding of what students are expected to know and be able to do by the end of each grade level or course. The purpose of the Alternate Standards is to build a bridge from the content in the general education mathematics framework to academic expectations for students with the most significant cognitive disabilities. The standards are designed to be rigorous and relevant to the real-world, reflecting the knowledge and skills that students need for success in postsecondary settings.

Purpose

In an effort to closely align instruction for students with significant cognitive disabilities who are progressing toward postsecondary settings, the *MS AAAS for Math Elements III and Alternate Algebra Elements* include course-specific standards for mathematics. This document is designed to provide a resource for ninth through 12th grade special education teachers with a basis for curriculum development and instructional delivery.

The *Teacher Resource Guide for Alternate Math Elements III and Alternate Algebra Elements* contains prioritized content, which is presented as a matrix to show the continuum of the concept across complexity levels. The matrix shows varying access points to the prioritized content. A student's progression through content contained in the matrix is intended to be fluid. It is not the intent, nor should it be practice, for a student to be exposed to content in a straight vertical line through one of the columns. Every student, regardless of disability, comes to the learning environment with a different set of prior knowledge and experience. For this reason, a student may be able to access some content from the middle complexity level and access other concepts at the more complex level. Teachers should evaluate a student's ability in relation to the content and select the entry point based on that evaluation. Students should not be locked into receiving exposure to all content at the same entry point.

Support Documents and Resources

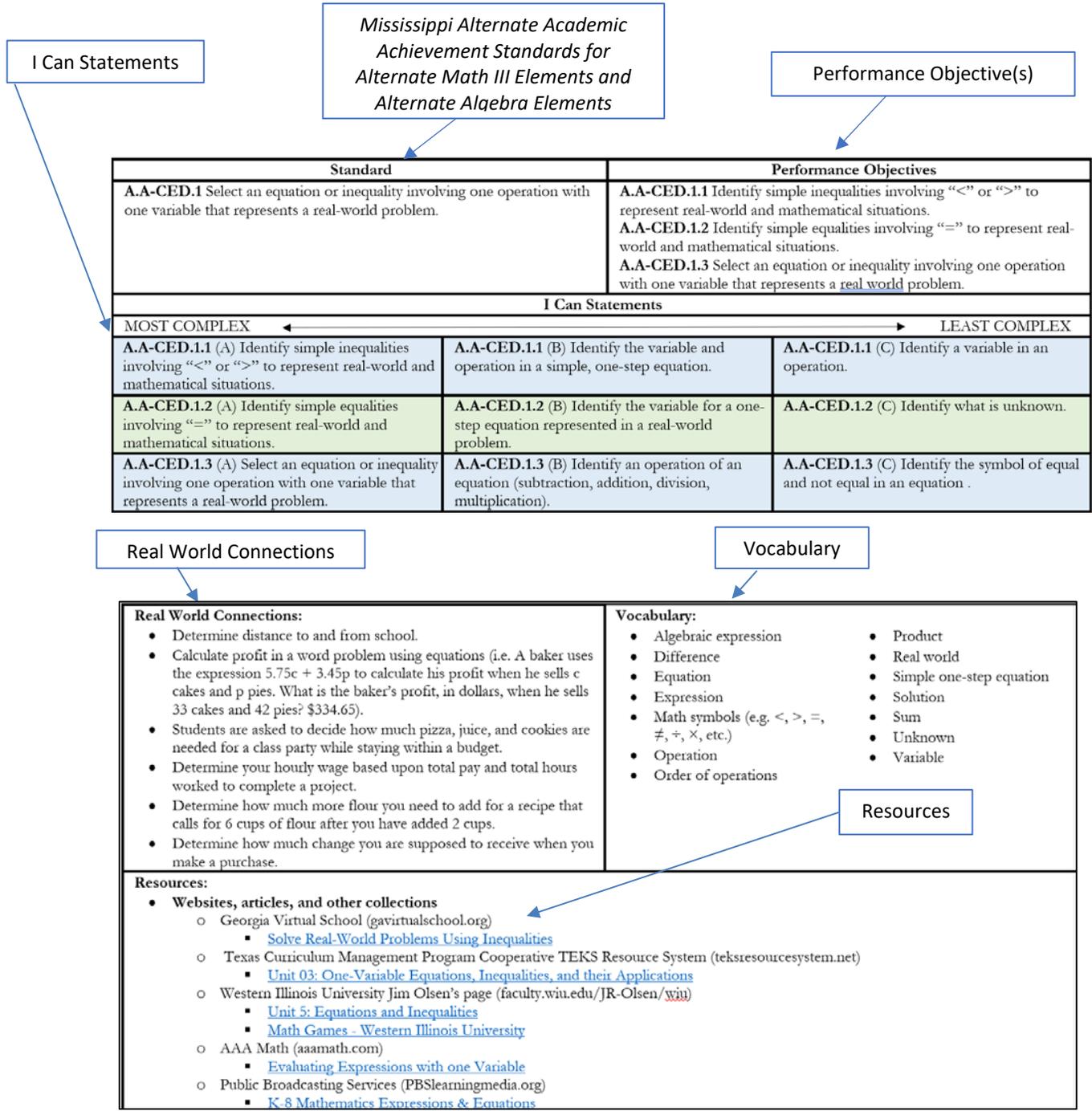
The MDE Office of Special Education aims to provide local districts, schools, and teachers supporting documents to construct standards-based instruction and lessons, allowing them to customize content and delivery methods to fit each student's needs. The teacher resource guide includes suggested resources, instructional strategies, sample lessons, and activities. Additional sample activities and resources for selected standards may be added; this shall be a living document with ongoing updates based on educator feedback. The intent of these resources is to assist teachers in linking their instruction to the prioritized content. The teacher resource guide includes activity adaptations for students with a varying range of abilities within the classroom. The activities and adaptations provided are intended to serve as a model of how students participating in the Mississippi Academic Assessment Program-Alternate (MAAP-A) may receive academic instruction in mathematics. There are many ways in which skills and concepts can be incorporated based on students individual learning styles and needs. Professional development efforts are aligned to the *MS AAAS for Math Elements III and Alternate Algebra Elements* and delivered in accord with teacher resources to help expand expertise in delivering student-centered lessons.

Structure of the *Teacher Resource Guide MS AAAS for Alternate Math Elements III and Alternate Algebra Elements*

MS AAAS for Math Elements III and Alternate Algebra Elements: A general statement of what students with significant cognitive disabilities should know and be able to do because of instruction. This guide includes statements that describe in precise, measurable terms what learners will be able to do at the end of an instructional sequence; ways educators can link theory to real world activities; focused vocabulary banks; and additional teaching resources.

- **I Can Statement(s)**: These statements include the Performance Objective(s) as the *Most Complex* and scaffolds the performance objectives two additional levels (B) and (C) to *Least Complex*. This matrix demonstrates the continuum of the concept across complexity levels. The purpose is to assist teachers in modifying to meet the unique diverse needs of learners with significant cognitive disabilities.
- **Real World Connections**: These items help facilitate learning that is meaningful to students and prepares them for their professional lives outside of school. When teachers move beyond textbook or curricular examples and connect content learned in the classroom to real people, places, and events, students can see a greater relevance to their learning. Real-world connections are used to help students see that learning is not confined to the school, allow them to apply knowledge and skills in real world situations, and personalize learning to increase and sustain student engagement.
- **Vocabulary**: These lists include difficult or unfamiliar words students need to know and understand.
- **Resources**: These resources include instructional strategies, lessons, and activities. Additional sample activities and resources for selected standards may be added; this shall be a living document with ongoing updates based on educator feedback. The intent of these activities is to assist teachers in linking their instruction to the prioritized content.

*Teacher Resource Guide for Alternate Math Elements III and Alternate Algebra Elements
(Graphic)*



Levels of Support (LOS)

Students with significant cognitive disabilities require varying LOS to engage in academic content. The goal is to move the student along the continuum of assistance toward independence by decreasing the LOS provided and increasing student accuracy within the context of content to demonstrate progress.

The following chart describes the continuum of LOS. Appropriate LOS are important to increase student engagement and student independence and to track student achievement and progress.

Level of Assistance	Definition	Example	Non-Example
Non-Engagement (N)	The student requires assistance from the teacher to initiate, engage, or perform; however, the student actively refuses or is unable to accept teacher assistance.	The student resists the teacher's physical assistance toward the correct answer.	The student does not look at the activity.
Physical Assistance (P)	The student requires physical contact from the teacher to initiate, engage, or perform.	The teacher physically moves the student's hand to the correct answer.	The teacher taps the correct answer and expects the student to touch where he/she tapped.
Gestural Assistance (G)	The student requires the teacher to point to the specific answer.	When presenting a choice of three pictures and asking the student which picture is a triangle, the teacher will point to or tap on the correct picture to prompt the student to indicate that picture.	The teacher moves the student's hand to gesture toward the right answer.
Verbal Assistance (V)	The student requires the teacher to verbally provide the correct answer to a specific item.	The teacher says, "Remember, the main character was George. Point to the picture of the main character."	The teacher says, "Who is the main character?" without providing the information verbally.
Model Assistance (M)	The student requires the teacher to model a similar problem/opportunity and answer prior to performance.	The teacher models one-to-one correspondence using manipulatives and then asks the student to perform a similar item.	The teacher completes the exact same activity as the student is expected to perform.
Independent (I)	The student requires no assistance to initiate, engage, or perform. The student may still require other supports and accommodations to meaningfully engage in the content but does not require assistance to participate and respond.	The teacher asks the student, "Who is the main character of the book?" and the student meaningfully responds without any prompting or assistance.	The teacher asks the student, "Who is the main character?" and points to the picture of the main character.

Teacher Resource Guide for MS AAAS for Alternate Math Elements III and Alternate Algebra Elements

COURSE: Alternate Math Elements III and Algebra Elements
 DOMAIN: Number and Quantity- The Real Number System (N-RN)
 CLUSTER: Extend the properties of exponents to rational exponents

Standard		Performance Objectives	
A.N-RN.1 Determine the value of a quantity that is squared or cubed.		A.N-RN.1.1 Solve repeated addition problems. A.N-RN.1.2 Solve multiplication problems. A.N-RN.1.3 Identify and explain exponents. A.N-RN.1.4 Determine the value of a quantity that is squared or cubed.	
I Can Statements			
MOST COMPLEX ←		→ LEAST COMPLEX	
A.N-RN.1.1 (A) Solve repeated addition problems.	A.N-RN.1.1 (B) Represent repeated addition.	A.N-RN.1.1 (C) Create sets with manipulatives.	
A.N-RN.1.2 (A) Solve multiplication problems.	A.N-RN.1.2 (B) Explain multiplication in steps using three terms (product, multiply, by, times).	A.N-RN.1.2 (C) Create sets demonstrating multiplication with manipulatives.	
A.N-RN.1.3 (A) Identify and explain exponents.	A.N-RN.1.3 (B) Identify and explain whole numbers.	A.N-RN.1.3 (C) Demonstrate the concept of addition using models.	
A.N-RN.1.4 (A) Determine the value of a quantity that is squared or cubed.	A.N-RN.1.4 (B) Evaluate expression with whole-number exponents.	A.N-RN.1.4 (C) Solve addition problem.	
Real World Connections: <ul style="list-style-type: none"> • Measure and construct items. • Use models to represent quantities as parts of a whole. • Put furniture in spaces by looking at shapes and measurement. • Put items in a bag to determine how many will fit in the bag. • Measure the height of students, chairs, and tables in the classroom and classify them into sets. 		Vocabulary <ul style="list-style-type: none"> • Add • Addition • Area • Base • Cubed • Exponent • Multiply • Product • Repeated • Sets • Squared • Value • Volume 	
Resources: <ul style="list-style-type: none"> • Websites, articles, and other collections <ul style="list-style-type: none"> ○ The World of Math Online (math.com) <ul style="list-style-type: none"> ▪ The World of Math Online: Square roots ○ SparkNotes by Barnes & Noble (sparknotes.com) <ul style="list-style-type: none"> ▪ Squares, Cubes, and Higher Order Exponents ○ Math Worksheets Land - Complete guided lessons and worksheets (mathworksheetsland.com). <ul style="list-style-type: none"> ▪ Grade 6 Expressions and Equations ○ Worksheet Fun Free Printable Worksheets (worksheetfun.com) 			

- [Multiplication-Repeated Addition Worksheets](#)
- Great Schools nonprofit (greatschools.org)
 - [Multiplication as repeated addition worksheets](#)
- Math Worksheets 4 Kids (mathworksheets4kids.com)
 - [Squaring Numbers Worksheets](#)
- EdPlace Limited (edplace.com)
 - [What is a cubed number? \(examples and worksheets\)](#)
- Teachers Pay Teachers (teacherspayteachers.com)
 - [Repeated addition activities](#)
- **Activities**
 - Find perfect squares and perfect cubes using manipulatives.
 - Count the number of sides on a perfect square/on a perfect cube.
 - You have 6 lollipops. Give the student two pieces. Write the expression that shows the number of lollipops you have left.
 - Have students cut out or draw pictures of different animals with four legs, such as dogs, cats, and rabbits. Then have pairs present each other with their pictures. How many legs are there in all? Guide students to write a multiplication sentence and a repeated addition sentence to help them solve. Partners can check each other's work. Then repeat the activity using pictures of animals with two legs.
 - Have each student hold up two counters. How many counters does the whole class have together? Go around the room and have students skip-count by twos in succession to find the answer. Then write the repeated addition sentence on the board. Repeat the activity again with 5 and 10 counters. Why is it easier to multiply than to add? Discuss with the whole class.
 - Use gummy bears for this activity. Give your student instructions, such as "Make 4 groups, with 2 gummy bears in each group. How many gummy bears do you have in all?" Have your child model the story problem and write number sentences to find the answer. Repeat the activity with other numbers. Then switch roles. Be sure to "make a mistake" in your calculations and have your students correct your work.
 - Go to the grocery store with your student. Have him or her take a hundred chart, a notepad, and pencil. Then count different items on the shelves together. For example, you might see juice boxes that come in packs of 6. Have your child figure out how many juice boxes are on the shelf or on a section of the shelf. He or she can write a multiplication sentence and a repeated addition sentence, and then use a hundred chart to solve. Repeat the activity with different items in the store.
 - Use a multiplication table to locate numbers multiplied by themselves and connect to squaring and square roots.
 - Play square root/cubed bingo
- **Videos**
 - YouTube by Smith Math Academy
 - [Perfect Squares](#)
 - YouTube by FuseSchool – Global Education
 - [What Are Square Numbers | Number | Maths | FuseSchool](#)
 - YouTube by Joanne Hiller
 - [Evaluating numerical expressions that contain exponents](#)

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Number and Quantity- The Real Number System (N-RN)

CLUSTER: Extend the properties of exponents to rational exponents

- YouTube by Kids Academy
 - [Repeated Addition using Arrays | 2nd Grade Math](#)
- Khan Academy (khanacademy.org)
 - [Square roots introduction](#)
- ALEX Alabama Learning Exchange (alex.state.al.us)
 - [Square and Cube Root Salad](#)

COURSE: Alternate Math Elements III and Algebra Elements
 DOMAIN: Number and Quantity - Quantities (N-Q)
 CLUSTER: Reason quantitatively and use units to solve problems

Standard		Performance Objectives	
A.N-Q.1-3 Using vocalization, sign language, augmentative communication, or assistive technology, express quantities to the appropriate precision of measurement.		A.N-Q.1-3.1 Identify measurement tools. Identify the attribute to be measured (e.g., weight, length, and temperature). A.N-Q.1-3.2 Select the appropriate type of unit of measurement (e.g., inches, yard, minutes, ounces, etc.). A.N-Q.1-3.3 Express quantities to the appropriate precision of measurement.	
I Can Statements			
MOST COMPLEX ←		→ LEAST COMPLEX	
A.N-Q.1-3.1 (A) Identify measurement tools. Identify the attribute to be measured (e.g., weight, length, and temperature).	A.N-Q.1-3.1 (B) Match measurement tools.	A.N-Q.1-3.1 (C) Classify objects according to attributes (e.g., big/small, heavy/light, etc.).	
A.N-Q.1-3.2 (A) Select the appropriate type of unit of measurement (e.g., inches, yard, minutes, ounces, etc.).	A.N-Q.1-3.2 (B) Match three physical or visual representations of measurement tools and units (e.g., time – clock, liquid – teaspoons, cups, or gallons, length – ruler or yardstick, etc.).	A.N-Q.1-3.2 (C) Match one physical or visual representation of measurement tools and units (e.g., time – clock, liquid – teaspoons, cups or gallons, length – ruler or yardstick, etc.).	
A.N-Q.1-3.3 (A) Express quantities to the appropriate precision of measurement.	A.N-Q.1-3.3 (B) Express solutions to problems using appropriate precision measurements (e.g., elapsed time, fitting an item into space, arriving home on time, etc.).	A.N-Q.1-3.3 (C) Use one measurement tool and determine the measurement.	
Real World Connections: <ul style="list-style-type: none"> • Measure items in the various settings using measurement tools. • Create a real-world math wall. • Interview cafeteria workers, custodians, and maintenance workers to determine how measurement is used in their jobs. • Select appropriate measurement tools for various projects. • Measure the length of an object to the nearest half and quarter of an inch. • Measure time in hours (e.g., determine elapsed time when watching a TV show that starts at 8:00 p.m. and ends at 9:00 p.m.). • Measure ingredients for a recipe accurately. 		Vocabulary <ul style="list-style-type: none"> • Approximate • Area • Attribute • Estimate • Height • Length • Measurement words (e.g. inches, feet, ounces, quart, pounds, etc.) • Perimeter • Place value • Rational number • Round • Measurement tools (e.g., ruler, yardstick, measuring tape, cubes, etc.) • Scale • Tally • Width 	

Resources:

• **Websites, articles, and other collections**

- TCH Teaching Channel (teachingchannel.com)
 - [Measuring With Non-standard Units](#)
 - [How Many Peas Fill the Classroom](#)
- Teachers Pay Teachers (teacherspayteachers.com)
 - [What measurement tool to use](#)
 - [Measurement! nearest inch, half inch, quarter inch and eighth inch!](#)
 - [Identifying Measurement Tools and Their Uses](#)
 - [Measurement for Kindergarten](#)
- Education.com, Inc. (education.com)
 - [Measurement Activities for Kids](#)
- Brain Pop Jr. (jr.brainpop.com)
 - [Measurement](#)
- Public Broadcasting Service (PBSkids.org)
 - [Measurement Games](#)
- JumpStart owned subsidiary of NetDragon (jumpstart.com)
 - [Measurement Activities for Kids](#)
- Florida Department of Education BEES Portal Professional Development Alternatives (fl-pda.org)
 - [Identifying and Selecting Appropriate Tools and Units of Measurement for Various Science Tasks](#)
- MTI Instruments a subsidiary of Mechanical Technology Incorporated (www.mtiinstruments.com)
 - [15 Measurement Activities for Students](#)
- SplashLearn a registered trademark of Study Pad, Inc. (splashlearn.com)
 - [Measurement Games](#)

• **Activities**

- Set up a measurement exploration center. Begin by gathering as many measurement tools as you can that may be lying around your home or classroom. Add crayons and sticky notes so that students can write down their findings. Have your students measure items.
- Set up a Lego measurement center. You'll need Lego blocks, markers, paper and items to measure. Create three columns labeled item, prediction, and result. Write down the item name in the column. Go through each item and ask for a prediction before performing the measurement. Stack the Lego blocks until you reach the height of the object. Write the result.
- Measure with non-standard units. Take anything but a ruler and make a "hand" measurement device. Give the student a clipboard to record their measurements.
- Measure small items in the room using inches and centimeters.
- Measure length of hall and height of doors and lockers using feet.
- Put thermometer on outside of building, read temp each day.

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Number and Quantity - Quantities (N-Q)

CLUSTER: Reason quantitatively and use units to solve problems

- Read food labels to determine how many ounces are in each container.
- Measure cup task boxes.
- Measure ingredients when cooking.
- Frog jump: Point the student to a starting point from which to jump. When the student jumps, mark off where they land, and measure their distance using yard stick or measuring tape.
- **Videos**
 - YouTube by Kids Edu-Kids Educational Games
 - [Math for Kids: Measurement, "How Do You Measure Up" - Fun & Learning Game for Children](#)
 - YouTube by Teaching Without Frills
 - [Introduction to Standard Measurement for Kids: Measuring Length in Inches with a Ruler](#)
 - YouTube by The Jim Henson Company
 - [Nonstandard Measurement - Sid The Science Kid](#)
 - YouTube by Periwinkle
 - [Measure Length for Kids | Grade 1 Maths For Kids](#)
 - YouTube by Boddle Learning
 - [Comparing and Measuring Lengths](#)
 - Turtle Diary (tTurtlediary.com)
 - [Length Measurement](#)

Standard		Performance Objectives	
<p>A.A-SSE.1 Identify an algebraic expression involving addition or subtraction to represent a real-world problem.</p>		<p>A.A-SSE.1.1 Identify numbers, operations, and variables in an algebraic expression.</p> <p>A.A-SSE.1.2 Identify the operation used for the word expressions as indicated by an illustration.</p> <p>A.A-SSE.1.3 Identify an algebraic expression involving one operation to represent a real-world problem.</p>	
I Can Statements			
MOST COMPLEX ←		→ LEAST COMPLEX	
<p>A.A-SSE.1.1 (A) Identify four numbers, operations, and variables in an algebraic expression.</p>	<p>A.A-SSE.1.1 (B) Identify two numbers, operations, and variables in an algebraic expression.</p>	<p>A.A-SSE.1.1 (C) Select a number, an operation and a variable in an algebraic expression.</p>	
<p>A.A-SSE.1.2 (A) Identify the operation used for the word expressions as indicated by an illustration.</p>	<p>A.A-SSE.1.2 (B) Match an algebraic expression involving one operation to represent a given word expression with an illustration.</p>	<p>A.A-SSE.1.2 (C) Identify the equal sign ($=$), the plus sign ($+$), and the minus sign ($-$) when given an algebraic expression.</p>	
<p>A.A-SSE.1.3 (A) Identify an algebraic expression involving one operation to represent a real-world problem.</p>	<p>A.A-SSE.1.3 (B) Represent the unknown in an equation and expressions with variables.</p>	<p>A.A-SSE.1.3 (C) Demonstrate the concept of addition and subtraction using manipulatives.</p>	
<p>Real-World Connections:</p> <ul style="list-style-type: none"> Count items. Order items. Shop for items. Determine weight gain or loss. Nancy has 10 balloons. She gives three away to her friend. What operation (addition or subtraction) do you use to find how many are left, as indicated by an illustration or manipulatives ($10-3=x$). Dave has 10 cookies. His friend gives him two more cookies. What operation (addition or subtraction) should Dave use to determine how many cookies he has in all, as indicated by an illustration or manipulatives? José has three more baseball cards than his brother. What operation (addition or subtraction) do you use to find how many more baseball cards José has, as indicated by manipulatives? 		<p>Vocabulary</p> <ul style="list-style-type: none"> Addition Algebra Algebraic Equal Equation Expression Illustration Manipulative Math signs ($+$, $-$, $=$) Number Operation Real-world problem Subtraction Variable 	

Resources:

• **Websites, articles, and other collections**

- Big Ideas Math (Bigideasmath.com)
 - [Evaluating Algebraic Expressions](#)
- Khan Academy (khanacademy.org)
 - [Identify equations from visual models \(tape diagrams\)](#)
 - [Grade 6: Expressions and Equations](#)
- IXL Learning (IXL.com)
 - [Simplifying Variable Expressions](#)
- Math Aids (math-aids.com)
 - [Algebra 1 - Word Problems Worksheets](#)
- NZmaths owned by New Zealand Ministry of Education (nzmaths.co.nz)
 - [Unknowns and variables: Solving one-step equations](#)
- Math Planet (mathplanet.com)
 - [Expressions and variables](#)
- Math Worksheets Land (mathworksheetsland.com)
 - [Using Variables to Represent Numbers](#)
- Tuscaloosa County School System (www.tcass.net/cms/lib)
 - [Algebraic Expressions](#)
- I Know It (iknowit.com)
 - [Word Problems: Choose the Operation \(Addition & Subtraction\)](#)
- Steilacoom Historical School District (www.steilacoom.k12.wa.us)
 - [Writing and Evaluating Expressions Worksheet](#)
- Florida State University CPALMS (cpalms.org)
 - [Dissecting an Expression](#)

• **Activities**

- Match signs ($-$, $+$, $=$) to correct terms
- Create word problems using items in the room. Write the equation then solve using items in the word problem.

• **Videos**

- Study.com (www.study.com)
 - [How to Write Equations & Formulas](#)
 - [Equation Lesson for Kids: Definition & Examples](#)
- YouTube by Icon Math
 - [Identify Parts of Expressions](#)

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Algebra - Seeing Structure in Expressions (A-SSE)

CLUSTER: Interpret the structure of expressions

- YouTube by Anywhere Math
 - [Algebraic Expressions \(Basics\)](#)
- Math Playground (mathplayground.com), subscription required
 - [Algebra Equations](#)

Standard		Performance Objectives	
A.A-SSE.3 Solve simple algebraic equations with one variable using multiplication and division.		A.A-SSE.3.1 Identify numbers, multiplication, division, and variables in an algebraic equation. A.A-SSE.3.2 Identify the operation needed to solve an algebraic equation involving multiplication or division. A.A-SSE.3.3 Solve simple algebraic equations with one variable using multiplication and division.	
I Can Statements			
MOST COMPLEX ←		→ LEAST COMPLEX	
A.A-SSE.3.1 (A) Identify numbers, multiplication, division, and variables in an algebraic equation.	A.A-SSE.3.1 (B) Write expressions that record operations with numbers and with letters standing for numbers (e.g., express the calculation “subtract y from 5” as “ $5 - y$ ”).	A.A-SSE.3.1 (C) Identify multiplication and division signs.	
A.A-SSE.3.2 (A) Identify the operation needed to solve an algebraic equation involving multiplication or division.	A.A-SSE.3.2 (B) Identify parts of an expression using one or more mathematical terms (e.g., sum, term, product, factor, quotient, coefficient, etc.).	A.A-SSE.3.2 (C) Identify quantity and match the number.	
A.A-SSE.3.3 (A) Solve simple algebraic equations with one variable using multiplication and division.	A.A-SSE.3.3 (B) Write expressions in which letters stand for numbers.	A.A-SSE.3.3 (C) Relate a letter (variable) to a number (e.g., $x=3$, $y=5$, etc.).	
Real-World Connections: <ul style="list-style-type: none"> Determine how many candy bars you can buy with your allowance. Double a recipe to make more cookies. Figure out the cost of items you are selling to make sure you cover your expenses. Determine how long to cook a turkey based upon its weight. Dave has 10 cookies. He has 5 friends he wants to give them to. What operation (multiplication or division) should Dave use to determine how many cookies he and his friends will get? Division (i.e., $10/5=x$). 		Vocabulary: <ul style="list-style-type: none"> Algebraic Coefficient Constant Divide Equal Equation Expression Factor Multiply Operation Product Quantity Quotient Sum Symbol Terms Variable 	
Resources: <ul style="list-style-type: none"> Websites, articles, and other collections <ul style="list-style-type: none"> Big Ideas Math Larson Texts, Inc. authors Ron Larson and Laurie Boswell (Bigideasmath.com) 			

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Algebra - Seeing Structure in Expressions (A-SSE)

CLUSTER: Write expressions in equivalent forms to solve problems

- [Evaluating Algebraic Expressions](#)
- Quizlet.com
 - [Simple algebraic equations](#)
- Maths Tips (mathstips.com)
 - [Simple Equations in One Variable](#)
- IXL Learning (IXL.com)
 - [P-12 Math Lessons](#)
 - [Simplify variable expressions involving like terms and the distributive property](#)
- Ducksters Education Site (ducksters.com)
 - [Kids Math Solving Algebra Equations with Addition and Subtraction](#)
- Khan Academy (khanacademy.org)
 - [Grade 6: Expressions and Equations](#)
- Loudoun County Public Schools, Ashburn, Virginia (lcps.org)
 - [Solving One-Step Equations – Multiplication & Division - worksheet](#)
- CK-12 | Neeru Khosla, Executive Director & Co-Founder (ck12.org)
 - [Single Variable Equations with Multiplication and Division](#)
- Purplemath by Elizabeth Stapel (purplemath.com)
 - [Solving One-Step Linear Equations: Multiplying & Dividing](#)
- Soft Schools free math worksheets (SoftSchools.com)
 - [Solving Equations with Multiplication/Division](#)
- Dearborn Public Schools iBlog Teacher Websites (https://iblog.dearbornschools.org)
 - [Solving One-Step Equations – Multiplication & Division](#)
- Math Worksheets Land - Complete guided lessons and worksheets (mathworksheetsland.com).
 - [One-Step Equation: Multiplication and Division Worksheets](#)
- Florida State University CPALMS (cpalms.org)
 - [Dissecting an Expression](#)
- Teachers Pay Teachers (teacherspayteachers.com)
 - [Worksheet: Identifying and Evaluating Algebraic Expression in a Coffee House](#)
 - [Algebraic Expressions Vocabulary Foldable](#)
- **Activities**
 - Identify division and multiplication signs and match to correct terms
- **Videos**
 - YouTube by Tarcia Hubert
 - [Basic algebra - solving linear equations in one variable](#)
 - YouTube by Math Antics

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Algebra - Seeing Structure in Expressions (A-SSE)

CLUSTER: Write expressions in equivalent forms to solve problems

- [Algebra Basics: Solving Basic Equations Part 1](#)
- Khan Academy (khanacademy.org)
 - [Inequalities Word Problems](#)
- YouTube by Anywhere Math
 - [Solving Equations Using Multiplication or Division](#)
 - [Algebraic Expressions \(Basics\)](#)
- YouTube by mathantics
 - [Algebra Basics: Solving Basic Equations Part 2 - Math Antics](#)
- YouTube by HCCMathHelp
 - [Solving Equations by Using Multiplication or Division 1-5](#)
- YouTube by Teachings in Education
 - [Identifying Parts of an Expression: Algebra Animations](#)
- YouTube by CK-12 Foundation
 - [Solving Equations with Multiplication and Division: An Application \(Algebra I\)](#)
- YouTube by Icon Math
 - [Identify Parts of Expressions](#)

Standard		Performance Objectives	
A.A-SSE.4 Determine the successive term in a geometric sequence given the common ratio.		A.A-SSE.4.1 Do skip counting. (e.g., 2's, 5's, 10's, odds, evens, etc.). A.A-SSE.4.2 Recognize a geometric sequence applying the recursive rule (e.g., 2, 4, 6, x, 10 rule=+2). A.A-SSE.4.3 Determine the successive term in a geometric sequence given the common ratio.	
I Can Statements			
MOST COMPLEX ←		→ LEAST COMPLEX	
A.A-SSE.4.1 (A) Do skip counting (e.g., 2's, 5's, 10's, odds, evens, etc.).	A.A-SSE.4.1 (B) Identify different ways to count (i.e., patterns) using single digits and multiple digits (e.g., odds, evens, 2's, 5's, 10's, etc.).	A.A-SSE.4.1 (C) Count to a number using single numbers to student's limit (e.g., 10, 20, 25, 50, 75, 100, etc.).	
A.A-SSE.4.2 (A) Recognize a geometric sequence applying the recursive rule (e.g., 2, 4, 6, x, 10 rule=+2).	A.A-SSE.4.2 (B) Recognize a pattern, repeating pattern, and changing pattern.	A.A-SSE.4.2 (C) When presented in various forms such as numbers and/or letters, identify the pattern.	
A.A-SSE.4.3 (A) Determine the successive term in a geometric sequence given the common ratio.	A.A-SSE.4.3 (B) Complete a geometric sequence using a calculator or manipulatives.	A.A-SSE.4.3 (C) Select a sequence using manipulatives, a calculator, picture cards, or samples.	
Real-World Connections: <ul style="list-style-type: none"> • Create a pattern using various items such as a job might require (e.g., fabric, bricks, numbers, etc.). • Count money in skip counting method. • Investigate how skip counting is used in sports scoring. • Determine the amount of interest you can earn on your savings over a period of time due to interest rate (i.e., interest rate at 2% annually for 10 years). 		Vocabulary: <ul style="list-style-type: none"> • Arithmetic sequence • Calculator • Digits • Doubling • Even • Geometric • Multiples • Odd • Pattern • Ratio • Recursive rule • Repeating • Representation • Sequence • Single • Skip counting • Successive 	
Resources: <ul style="list-style-type: none"> • Websites, articles, and other collections <ul style="list-style-type: none"> ○ Apples and Bananas Education (applesandbananaseducation.com) <ul style="list-style-type: none"> ▪ Geometric Sequences in the Real-world ○ Math Portal Math calculators, lessons and formulas (mathportal.org) <ul style="list-style-type: none"> ▪ Geometric Sequence Calculator 			

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Algebra - Seeing Structure in Expressions (A-SSE)

CLUSTER: Write expressions in equivalent forms to solve problems

- EDF2304 Early Numeracy by Amy Degenhardt, Chloe Russell, and Olivia Remy (<https://edf2304-earlynumeracy-assignment2.weebly.com>)
 - [Using Skip Counting in Everyday Life](#)
- Math Portal by mathematician Miloš Petrović. (mathportal.org)
 - [Geometric sequences calculator](#)
- Purple Math (purplemath.com)
 - [Arithmetic & Geometric Sequences](#)
- Quizlet.com
 - [Arithmetic and Geometric Sequences Vocabulary](#)
- Math Is Fun by Rod Pierce (mathisfun.com)
 - [Geometric Sequences and Sums](#)
- Math Worksheets Land - Complete guided lessons and worksheets (mathworksheetsland.com).
 - [Patterns & Sequence Worksheets](#)
- Math-Aids Worksheets (<https://www.math-aids.com>)
 - [Skip Counting Worksheets](#)
- Super Teacher Worksheets Subscription Required (superteacherworksheets.com)
 - [Skip Counting Worksheets](#)
- Worksheet Fun free printable worksheets (www.worksheetfun.com)
 - [Skip Counting Worksheets](#)
- Math Worksheets 4 Kids (mathworksheets4kids.com)
 - [Skip Counting Worksheets](#)
- The Classroom Key (theclassroomkey.com)
 - [The Big List of Skip Counting Activities](#)
- Math Geek mama (mathgookmama.com)
 - [20+ Unique Skip Counting Activities Kids Will Adore](#)
- **Activities**
 - Make a hand painting handprint chart using a student's hand, making sure all 5 fingers show on each print. Then practice skip counting by 5s.
 - Students type " $2+2=$ " into their calculator and record the result. Then they continue to type " $+2=$ " and record the sequence generated into a chart. Practice skip counting with the chart.
 - Paint hopscotch on the sidewalk using colored chart to portray skip counting by 2's.
 - Using pebbles and sidewalk chalk, draw a bullseye with 5 rings. Number each ring to depict skip counting by 5's with the center ring being a 25. Allow the student to throw a pebble into the rings to try and hit the bullseye and ask them to skip count to the ring where their pebble lands.
 - Color skip counting patterns on a 100s chart.
 - Skip count puzzles.

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Algebra - Seeing Structure in Expressions (A-SSE)

CLUSTER: Write expressions in equivalent forms to solve problems

- Skip count using a number line.

Videos

- YouTube by ProfRobBob
 - [Intro to Geometric Sequences](#)
- YouTube by Mario's Math Tutoring
 - [Geometric Sequence Formula](#)
- YouTube by Khan Academy
 - [Introduction to geometric sequences | Sequences, series and induction | Precalculus](#)
- YouTube by Jack Hartmann Kids Music Channel
 - [Workout & Count | Skip Count by 2's, 5's and 10's | Count Backwards](#)
- YouTube by Mathematics is Fun
 - [Skip Counting](#)

COURSE: Alternate Math Elements III and Algebra Elements
 DOMAIN: Algebra – Creating Equations (A-CED)
 CLUSTER: Create equations that describe numbers or relationships

Standard	Performance Objectives	
A.A-CED.1 Select an equation or inequality involving one operation with one variable that represents a real-world problem.	A.A-CED.1.1 Identify simple inequalities involving “<” or “>” to represent real-world and mathematical situations. A.A-CED.1.2 Identify simple equalities involving “=” to represent real-world and mathematical situations. A.A-CED.1.3 Select an equation or inequality involving one operation with one variable that represents a real world problem.	
I Can Statements		
MOST COMPLEX ←—————→ LEAST COMPLEX		
A.A-CED.1.1 (A) Identify simple inequalities involving “<” or “>” to represent real-world and mathematical situations.	A.A-CED.1.1 (B) Identify the variable and operation in a simple, one-step equation.	A.A-CED.1.1 (C) Identify a variable in an operation.
A.A-CED.1.2 (A) Identify simple equalities involving “=” to represent real-world and mathematical situations.	A.A-CED.1.2 (B) Identify the variable for a one-step equation represented in a real-world problem.	A.A-CED.1.2 (C) Identify what is unknown.
A.A-CED.1.3 (A) Select an equation or inequality involving one operation with one variable that represents a real-world problem.	A.A-CED.1.3 (B) Identify an operation of an equation (subtraction, addition, division, multiplication).	A.A-CED.1.3 (C) Identify the symbol of equal and not equal in an equation .

COURSE: Alternate Math Elements III and Algebra Elements
DOMAIN: Algebra – Creating Equations (A-CED)
CLUSTER: Create equations that describe numbers or relationships

Real World Connections:

- Determine distance to and from school.
- Calculate profit in a word problem using equations (i.e. A baker uses the expression $5.75c + 3.45p$ to calculate his profit when he sells c cakes and p pies. What is the baker's profit, in dollars, when he sells 33 cakes and 42 pies? \$334.65).
- Students are asked to decide how much pizza, juice, and cookies are needed for a class party while staying within a budget.
- Determine your hourly wage based upon total pay and total hours worked to complete a project.
- Determine how much more flour you need to add for a recipe that calls for 6 cups of flour after you have added 2 cups.
- Determine how much change you are supposed to receive when you make a purchase.

Vocabulary:

- Algebraic expression
- Difference
- Equation
- Expression
- Math symbols (e.g. $<$, $>$, $=$, \neq , \div , \times , etc.)
- Operation
- Order of operations
- Product
- Real world
- Simple one-step equation
- Solution
- Sum
- Unknown
- Variable

Resources:

- **Websites, articles, and other collections**
 - Georgia Virtual School (gavirtualschool.org)
 - [Solve Real-World Problems Using Inequalities](#)
 - Texas Curriculum Management Program Cooperative TEKS Resource System (teksresourcesystem.net)
 - [Unit 03: One-Variable Equations, Inequalities, and their Applications](#)
 - Western Illinois University Jim Olsen's page (faculty.wiu.edu/JR-Olsen/wiu)
 - [Unit 5: Equations and Inequalities](#)
 - [Math Games - Western Illinois University](#)
 - AAA Math (aaamath.com)
 - [Evaluating Expressions with one Variable](#)
 - Public Broadcasting Services (PBSlearningmedia.org)
 - [K-8 Mathematics Expressions & Equations](#)
 - Illustrative mathematics (tasks.illustrativemathematics.org)
 - [Task Distance to School](#)
 - Georgia Standards of Excellence Curriculum Frameworks (georgiastandards.org)
 - [Mathematics GSE Grade 6 Unit 4: One Step Equations and Inequalities](#)
 - Khan Academy (khanacademy.org)
 - [One-step equations revise](#)
 - Math Worksheets 4 Kids (mathworksheets4kids.com)

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Algebra – Creating Equations (A-CED)

CLUSTER: Create equations that describe numbers or relationships

- [Solving One-Step Equation Worksheets](#)
- BL Better Lesson Professional Learning, Reimagined (betterlesson.com)
 - [Writing Algebraic Equations to Represent Real-World Scenarios \(One-Step\)](#)
- Idea Galaxy Teacher Subscription Required (ideagalaxyteacher.com)
 - [12 One Step Equations Activities](#)
- IXL Learning (IXL.com)
 - [Solve one-step inequalities](#)
- Math is Fun maintained by Rod Pierce (mathisfun.com)
 - [Solving Inequalities](#)
- Georgia Virtual School (students.ga.desire2learn.com)
 - [Solve Real-World Problems Using Inequalities](#)
- ACT Inc. ACT Academy (actacademy.act.org)
 - [One Step Equations Real-World](#)
- Kate's Math Lessons (KatesMathLessons.com)
 - [Solving One-Step Equations](#)
- **Activities**
 - Find out how many items you need at a party (cookies, toys, etc.)
- **Videos**
 - YouTube by Infinite Math
 - [One Variable Inequalities in Real Life Situations | Infinite-Math.com](#)
 - YouTube by Khan Academy
 - [How to describe real-world situations with inequalities | 6th grade](#)
 - Public Broadcasting Service (pbslearningmedia.org)
 - [Writing Algebraic Equations](#)

COURSE: Alternate Math Elements III and Algebra Elements
 DOMAIN: Algebra – Creating Equations (A-CED)
 CLUSTER: Create equations that describe numbers or relationships

Standard		Performance Objectives	
A.A-CED.2-4 Solve one-step equations or inequalities.		A.A-CED.2-4.1 Create two sets that are equal and two sets that are not equal (representing addition, subtraction, multiplication, and/or division). A.A-CED.2-4.2 Determine whether the one-step problem is equal or an inequality. A.A-CED.2-4.3 Solve one-step equations or inequalities.	
I Can Statements			
MOST COMPLEX ←		→ LEAST COMPLEX	
A.A-CED.2-4.1 (A) Create two sets that are equal and two sets that are not equal (representing addition, subtraction, multiplication, and/or division).	A.A-CED.2-4.1 (B) Create a set that is equal and a set that is not equal (representing addition, subtraction, multiplication, and/or division).	A.A-CED.2-4.1 (C) Identify one set that is equal and one set that is not equal using manipulatives (representing addition, subtraction, multiplication, and/or division).	
A.A-CED.2-4.2 (A) Determine whether the one-step problem is equal or an inequality.	A.A-CED.2-4.2 (B) Given a one-step equation identify the variables and expression.	A.A-CED.2-4.2 (C) Recognize the unknown in an equation.	
A.A-CED.2-4.3 (A) Solve one-step equations or inequalities.	A.A-CED.2-4.3 (B) Determine the unknown in the equation.	A.A-CED.2-4.3 (C) Recognize the equal sign's meaning in an equation.	
Real World Connections: <ul style="list-style-type: none"> Determine how many girls are in the class. Determine how many boys are in the class. What is the total number in the class? Determine how many boxes of Girl Scout Cookies you must sell to reach your goal. Determine how much profit you can make by selling a certain number of items that you bought on sale when the price you charge is more than what you paid for them. Determine how many laps you must walk to raise \$30 for the school's walk-a-thon. Write an algebraic equation to represent the problem "How many chocolate bars can you buy with \$20, when they cost \$1.25 each?" 		Vocabulary: <ul style="list-style-type: none"> Addition/subtraction/multiplication/division/properties of equality Braces Brackets Equal Equal sign Equality Equation Evaluate Expressions Identify Inequality Manipulative Parentheses Recognize Solve Symbols Term Unknown Value Variable 	
Resources: <ul style="list-style-type: none"> Websites, articles, and other collections <ul style="list-style-type: none"> Georgia Virtual School. (gavirtuallschool.org) <ul style="list-style-type: none"> Solve Real-World Problems Using Inequalities 			

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Algebra – Creating Equations (A-CED)

CLUSTER: Create equations that describe numbers or relationships

- Better Lesson (betterlesson.com)
 - [So Many Options: Solving One-Step Inequalities](#)
- Math Papa by Robert Ikeda and Priscilla Pham (mathpapa.com)
 - [Solving One-Step Equations](#)
- Kate's Math Lessons (katesmathlessons.com)
 - [Solving One-Step Equations](#)
- Teachers Pay Teachers (teacherspayteachers.com)
 - [One to One Correspondence \(Cardinality\) Math Counting Centers](#)
 - [One to One Correspondence! Counting with Math Manipulative](#)
 - [One Step Equations Connect 4 Game](#)
 - [One-Step Equations Picture Puzzle](#)
- The Measured Mom: Tools for Teaching (themeasuredmom.com)
 - [One-to-one Correspondence](#)
- Karen McNabbs Free math Worksheets (karen.mcnabbs.org/worksheets)
 - [Solving One-Step Equations worksheet](#)
- Khan Academy (khanacademy.org)
 - [Construct & solve one-step inequality](#)
 - [Inequalities word problems](#)
- I Heart Education by Meagan Kelly (i-heart-edu.com)
 - [Solving Inequalities Scavenger Hunt: A Low-Tech Activity](#)
- **Videos**
 - YouTube by Stasia Pagliuca
 - [Solve One-Step Inequalities](#)
 - YouTube by patrickJMT
 - [Solving Word Problems Involving Inequalities – Example 1](#)
 - YouTube by Katie Belongia
 - [Writing and Solving One Step Inequalities](#)
 - YouTube by MathMotor
 - [How to Solve One-Step Equations: The Easy Way](#)

COURSE: Alternate Math Elements III and Algebra Elements
 DOMAIN: Algebra – Reasoning with Equations and Inequalities (A-REI)
 CLUSTER: Represent and solve equations and inequalities graphically

Standard		Performance Objectives	
A.A-REI.10-12 Interpret the meaning of a point on the graph of a line. For example, on a graph of pizza purchases, trace the graph to a point and tell the number of pizzas purchased and the total cost.		A.A-REI.10-12.1 Recognize the coordinate pairs. A.A-REI.10-12.2 Describe the rate of change in the graph (i.e., whether it is increasing or decreasing and by how much?). A.A-REI.10-12.3 Interpret the meaning of a point on the graph of a line. For example, on a graph of pizza purchases, trace the graph to a point and tell the number of pizzas purchased and the total cost).	
I Can Statements			
MOST COMPLEX ←		→ LEAST COMPLEX	
A.A-REI.10-12.1 (A) Recognize the coordinate pairs.	A.A-REI.10-12.1 (B) Recognize covariation, as in: (x, y) as it relates to ordered pairs in a graph.	A.A-REI.10-12.1 (C) Locate the origin of the graph.	
A.A-REI.10-12.2 (A) Describe the rate of change in a graph (i.e., whether it is increasing or decreasing and by how much?).	A.A-REI.10-12.2 (B) Recognize the direction of the covariation (i.e., increasing or decreasing).	A.A-REI.10-12.2 (C) Locate the x and y coordinate.	
A.A-REI.10-12.3 (A) Interpret the meaning of a point on the graph of a line. For example, on a graph of pizza purchases, trace the graph to a point and tell the number of pizzas purchased and the total cost).	A.A-REI.10-12.3 (B) Interpret a point on the graph of a linear function (i.e., describe what it represents).	A.A-REI.10-12.3 (C) Locate a point on the graph.	
Real World Connections: <ul style="list-style-type: none"> Identify the cost of cell phone bill over a period of time using a graph. Create a line graph to identify number of answers and days of an assignment. Plot a graph to determine gains in height or weight. Use a graph to show change in something over time. Find the relationship between two data sets with one data set always being dependent on the other set. 		Vocabulary: <ul style="list-style-type: none"> Axis Coordinate Covariation Data Function Graph Horizontal Interpret Labels Line graph Linear function Lines Ordered pair Origin Points Predictions Representation Title Value Variable Vertical Vertical axis 	
Resources: <ul style="list-style-type: none"> Websites, articles, and other collections 			

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Algebra – Reasoning with Equations and Inequalities (A-REI)

CLUSTER: Represent and solve equations and inequalities graphically

- Tutorials Point (tutorialspoint.com)
 - [Interpreting a Line Graph](#)
- Study.com
 - [Quiz & Worksheet - Reading and Interpreting Line Graphs](#)
- Teachnology - The Art and Science of Teaching with Technology (teach-nology.com)
 - [Teacher Guide to Graphing Resources](#)
- Math Worksheets 4 Kids (mathworksheets4kids.com)
 - [Math Worksheets 4 Kids | Line Graph Worksheets](#)
- Rapid Tables Online Calculators & Tools (rapidtables.com)
 - [Line Graph Maker](#)
- Math Planet (mathplanet.com)
 - [Coordinate system and ordered pairs](#)
- Math Worksheets 4 Kids (mathworksheets4kids.com)
 - [Ordered Pairs and Coordinate Plane Worksheets](#)
 - [Line Graph Worksheets](#)
- Super Teacher Worksheets, subscription required (superteacherworksheets.com)
 - [Ordered Pairs and Coordinate Plane Worksheets](#)
- Teachers Pay Teachers (teacherspayteachers.com)
 - [Rate of Change of Graphs \(Google Form & Interactive Video Lesson!\)](#)
 - [Slope and Rate of Change: He Said, She Said](#)
 - [Coordinate Plane Mystery Pictures](#)
- Math Worksheets (imathworksheets.com)
 - [Interpreting Points on a Graph](#)
- Math Worksheets Land - Complete guided lessons and worksheets (mathworksheetsland.com).
 - [Coordinate Graphing and Position](#)
- *Treasure Hunters Quadrant I Graphing Edition* by Clark Creative Education
- **Activities**
 - Record the daily temperature for the city over days. Plot a graph showing the temperatures. Make a prediction about day seven by looking at the graph.
- **Videos**
 - Study.com
 - [Reading and Interpreting Line Graphs](#)
 - Khan Academy (khanacademy.org)
 - [Interpreting a graph exercise](#)
 - [Interpreting points in context of graphs of systems](#)

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Algebra – Reasoning with Equations and Inequalities (A-REI)

CLUSTER: Represent and solve equations and inequalities graphically

- [Introduction to the coordinate plane](#)
- YouTube Math Songs by Numberock
 - [Coordinate Plane and Ordered Pairs Song | 1st Quadrant](#)

Standard		Performance Objectives	
A.F-IF.1 Given a table or graph, identify the domain and range values using positive numbers 1-20.		A.F-IF.1.1 Identify a given relation as a function using the vertical line test (i.e., If you can draw a vertical line anywhere through the graph, and it intersects only one point on the graph, then it is a function.). A.F-IF.1.2 Given a table or graph using positive numbers 1-20, identify the function (i.e., finding the rule) as the set of possible output values, which are shown on the Y-axis. A.F-IF.1.3 Given a table or graph using positive numbers 1-20, identify the domain as all the input values shown on the X-axis. A.F-IF.1.4 Given a table or graph, identify the domain and range values using positive numbers 1-20.	
I Can Statements			
MOST COMPLEX ←		→ LEAST COMPLEX	
A.F-IF.1.1 (A) Identify a given relation as a function using the vertical line test (i.e., If you can draw a vertical line anywhere through the graph, and it intersects only one point on the graph then it is a function.).	A.F-IF.1.1 (B) Select the X- and the Y-axis on a table or graph.	A.F-IF.1.1 (C) Identify that a table or graph has two axes, the X-axis and the Y-axis.	
A.F-IF.1.2 (A) Given a table or graph using positive numbers 1-20, identify the function (i.e., finding the rule) as the set of possible output values, which are shown on the Y-axis.	A.F-IF.1.2 (B) Given the rule, define the output values on a table or graph.	A.F-IF.1.2 (C) Select X (input) and select Y (output) in a table or graph.	
A.F-IF.1.3 (A) Given a table or graph using positive numbers 1-20, identify the domain as all the input values shown on the X-axis.	A.F-IF.1.3 (B) List three or more values of X (domain).	A.F-IF.1.3 (C) List one value of X (domain).	
A.F-IF.1.4 (A) Given a table or graph, identify the domain and range values using positive numbers 1-20.	A.F-IF.1.4 (B) List three or more values of X (domain) and three or more values of Y (range).	A.F-IF.1.4 (C) List one value of X (domain) and one value of Y (range).	
Real World Connections: <ul style="list-style-type: none"> Given a graph showing the growth of a plant over a period of one month, identify that, as the number of days increase, plant height increases. Given a graph that shows the amount of paint in a can and the area painted, identify that, as the area painted increases, the amount of paint in the can decreases. 		Vocabulary: <ul style="list-style-type: none"> Axis Coordinate grid system Coordinates Domain Function Number line Output Positive numbers Range Table 	

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Functions – Interpreting Functions (F-IF)

CLUSTER: Understand the concept of a function and use function notation

- Tell the cost of movie tickets for five people if movies tickets are \$3 per ticket.
- If you know how much gas will cost for one gallon, you can calculate how many gallons you will be able to purchase with the money you have.
- Create a problem using exercise (Each week, Tim wants to increase the number of sit-ups he does daily by two sit-ups. The first week, he does 15 sit-ups each day.)

- Graph
- Input value
- Line
- Negative numbers

- Values
- X-axis
- Y-axis

Resources:

- **Websites, articles, and other collections**

- Standards Aligned System Pennsylvania Department of Education (pdesas.org)
 - [Slope and y-Intercept in the Real-world](#)
- Mr. Bailey's Class (esbailey.cuipblogs.net)
 - [Examples of Domains and Ranges from Graphs](#)
- Teachers Pay Teachers (teacherspayteachers.com)
 - [Functions or Not, Domain and Range Activity Cards](#)
 - [Domain and Range Scavenger Hunt](#)
- Scaffolded Math and Science
 - [Domain and Range Intervention](#)
- Math is Fun, maintained by Rod Pierce (mathisfun.com)
 - [What is a function?](#)
 - [Domain, Range and Codomain](#)
- Math Planet (mathplanet.com)
 - [Representing functions as rules and graphs](#)
- Coolmath.com (coolmath.com)
 - [What's a Function \(Intro to Domain and Range\)](#)
- Sciencing (sciencing.com)
 - [How to Explain Input & Output Tables in Algebra](#)

- **Videos**

- Study.com
 - [Using Tables and Graphs in the Real-world](#)
- YouTube by Brian McLogan
 - [Learn how to determine the domain and range from a table and from a graph](#)
- YouTube by Shmoop
 - [Domain and Range by Shmoop](#)

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Functions – Interpreting Functions (F-IF)

CLUSTER: Understand the concept of a function and use function notation

- YouTube by Numberbender
 - [Algebra: Describing the Domain and Range](#)
- Khan Academy (khanacademy.org)
 - [What is the range of a function?](#)
 - [Finding the domain and the range of a function that is given graphically | Created by Sal Khan](#)

Standard		Performance Objectives	
A.F-IF.2 Use the vertical line test to determine if a given relation is a function.		A.F-IF.2.1 Draw a function (i.e., when you draw a vertical line anywhere, it will only intersect one point on the graph). A.F-IF.2.2 Use the vertical line test to determine if a given relation is a function.	
I Can Statements			
MOST COMPLEX ←		→ LEAST COMPLEX	
A.F-IF.2.1 (A) Draw a function (i.e., when you draw a vertical line anywhere, it will only intersect one point on the graph).	A.F-IF.2.1 (B) Identify whether two lines intersect.	A.F-IF.2.1 (C) Identify a shaded region in a picture or an object.	
A.F-IF.2.2 (A) Use the vertical line test to determine if a given relation is a function.	A.F-IF.2.2 (B) Locate the coordinate point on the graph at which two lines intersect.	A.F-IF.2.2 (C) Select a line that intersects with another line.	
Real World Connections: <ul style="list-style-type: none"> • Draw a graph with two points. • Hook up your computer peripherals, TV, DVD, and make sure the cords do not overlap. • Use a graph with shaded area to recognize data used in the classroom (number of pencils and number of students); determine the answer. 		Vocabulary: <ul style="list-style-type: none"> • Function • Graph • Horizontal line • Intersect • Line • Point • Vertical line • Vertical line test 	
Resources: <ul style="list-style-type: none"> • Websites, articles, and other collections <ul style="list-style-type: none"> ○ Math Warehouse (mathwarehouse.com) <ul style="list-style-type: none"> ▪ Vertical Line Test ○ Karen Hutchinson (algebra-class.com) <ul style="list-style-type: none"> ▪ Is the Relation a Function? Using the Vertical Line Test ○ Chili Math by Mike Estela (chilimath.com) <ul style="list-style-type: none"> ▪ Vertical Line Test ○ Coolmath.com (coolmath.com) <ul style="list-style-type: none"> ▪ The Vertical Line Test ○ Mathematics Library (www.libretexts.org) <ul style="list-style-type: none"> ▪ Four ways to represent a function ○ Math Warehouse (mathwarehouse.com) 			

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Functions – Interpreting Functions (F-IF)

CLUSTER: Understand the concept of a function and use function notation

- [Worksheet on Math Functions, Relations, Domain & Range](#)
- HM Hanlon Math (www.hanlonmath.com)
 - [Vertical Line Test worksheet](#)
- Math Warehouse (mathwarehouse.com)
 - [Vertical Line Test](#)
- Education.com (education.com)
 - [Identify functions: vertical line test](#)
- Chili Math by Mike Estela (chilimath.com)
 - [Vertical Line Test](#)
- Teachers Pay Teachers (teacherspayteachers.com)
 - [Bundle Functions Relations Vertical Line Test Reteach Prep Review Notes](#)
- Math is Fun maintained by Rod Pierce (mathisfun.com)
 - [What is a function?](#)
 - [Domain, Range and Codomain](#)
- **Videos**
 - YouTube by mroldridge
 - [Vertical Line Test – Is something a function?](#)
 - YouTube by MathHelp.com
 - [Vertical Line Test|MathHelp.com](#)
 - YouTube by 1000+ Online Math Lessons
 - [Vertical Line Test](#)
 - YouTube by Nerdstudy
 - [What is a Function and Relation \(the Vertical Line test\)](#)

Standard		Performance Objectives	
<p>A.F-IF.3 Using vocalization, sign language, augmentative communication, or assistive technology, describe the rule in a simple sequence given the domain and range using positive numbers less than 20.</p>		<p>A.F-IF.3.1 Compare and describe two collections of numbers presented in the same visual/tactile organizers using terms such as more, less, or same.</p> <p>A.F-IF.3.2 Identify four simple sequences using numbers less than 20.</p> <p>A.F-IF.3.3 Describe the rule in a simple sequence given the domain and range using positive numbers less than 20.</p>	
I Can Statements			
MOST COMPLEX ←		→ LEAST COMPLEX	
<p>A.F-IF.3.1 (A) Compare and describe two collections of numbers presented in the same visual/tactile organizers using terms such as more, less, or same.</p>	<p>A.F-IF.3.1 (B) Demonstrate “more than” using objects and numbers in a sequence (e.g., show that 4 is more than 3, 8 is more than 7, etc.).</p>	<p>A.F-IF.3.1 (C) Identify numbers in a sequence (e.g., a sequence is a set of things [usually numbers] that are in order).</p>	
<p>A.F-IF.3.2 (A) Identify four simple sequences using numbers less than 20.</p>	<p>A.F-IF.3.2 (B) Select two simple sequences from a display using numbers less than 10.</p>	<p>A.F-IF.3.2 (C) Select a simple sequence from a display using numbers less than 10.</p>	
<p>A.F-IF.3.3 (A) Describe the rule in a simple sequence given the domain and range using positive numbers less than 20.</p>	<p>A.F-IF.3.3 (B) Recognize and match a rule that applies to simple sequencing when given the domain and range using positive numbers less than 20.</p>	<p>A.F-IF.3.3 (C) Select a rule given a simple sequence using a positive number less than 20.</p>	
<p>Real World Connections:</p> <ul style="list-style-type: none"> • Create a sequence of items used in a job; use simple sequence to determine which items are used more, less or same. • Use online or paper bank statements to determine sequence of spending or deductions. • Create a time sequence chart for classroom activities. 		<p>Vocabulary:</p> <ul style="list-style-type: none"> • Domain • Equal to • Greater than • Less than • More than • Positive numbers • Range • Sequence • Series • Set • Simple sequence 	
<p>Resources:</p> <ul style="list-style-type: none"> • Websites, articles, and other collections <ul style="list-style-type: none"> ○ Maths Is Fun maintained by Rod Pierce (https://www.mathsisfun.com) <ul style="list-style-type: none"> ▪ Sequences – Finding a Rule ▪ Domain, Range and Codomain ○ Free Math Help (freemathhelp.com) 			

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Functions – Interpreting Functions (F-IF)

CLUSTER: Understand the concept of a function and use function notation

- [Domain and Range](#)
- Centre for Innovation in Mathematics Teaching | University of Plymouth (cimt.org.uk)
 - [Number Patterns](#)
- Math Planet (mathplanet.com)
 - [Representing functions as rules and graphs](#)
- Teachers Pay Teachers (teacherspayteachers.com)
 - [Functions or Not, Domain and Range Activity Cards](#)
 - [Domain and Range of Functions Worksheet](#)
- Mr. Bailey's Class (esbailey.cuipblogs.net)
 - [Examples of domains and ranges from graphs](#)
- Math Bits by Frederick and Donna Roberts (mathbitsnotebook.com)
 - [Sequences - Basic Information](#)
- Monterey Institute for Technology and Education (montereyinstitute.org)
 - [Domain and Range](#)
- Math Worksheets 4 Kids (mathworksheets4kids.com)
 - [Pattern Worksheets: Pictures and Numbers](#)
- **Videos**
 - Khan Academy (khanacademy.org)
 - [What is the range of a function?](#)

Standard		Performance Objectives	
<p>A.F-IF.4-6 Given graphs that represent linear functions, interpret different rates of change (e.g., Which is faster or slower?).</p>		<p>A.F-IF.4-6.1 Recognize the direction of the covariation (e.g., is it going up or down?).</p> <p>A.F-IF.4-6.2 Compare two functions with different rates of change ($y=2x$ and $y=4x$, which is faster? $4x$).</p> <p>A.F-IF.4-6.3 Given graphs that represent linear functions, interpret different rates of change (e.g., Which is faster or slower?).</p>	
I Can Statements			
MOST COMPLEX ←		→ LEAST COMPLEX	
<p>A.F-IF.4-6.1 (A) Recognize the direction of the covariation (e.g., is it going up or down).</p>	<p>A.F-IF.4-6.1 (B) Locate two or more coordinate pairs (ordered pairs).</p>	<p>A.F-IF.4-6.1 (C) Locate one coordinate pair (ordered pair).</p>	
<p>A.F-IF.4-6.2 (A) Compare two functions with different rates of change ($y=2x$ and $y=4x$, which is faster? $4x$).</p>	<p>A.F-IF.4-6.2 (B) Describe the rate of change in graph. (e.g., Tell how many it moves up or down divided by how many it moves left or right. This equals the rate of change. Example in a graph with up 2 and over 1, the rate of change is $2/1$).</p>	<p>A.F-IF.4-6.2 (C) Point to three dots in a graph to show the direction of the rate of change.</p>	
<p>A.F-IF.4-6.3 (A) Given graphs that represent linear functions, interpret different rates of change (e.g., Which is faster or slower?).</p>	<p>A.F-IF.4-6.3 (B) Select two or more linear function graphs.</p>	<p>A.F-IF.4-6.3 (C) Select a linear function graph.</p>	
<p>Real World Connections:</p> <ul style="list-style-type: none"> • Discuss different rates of speed on roads and the rules on the driving test. • Use plans for building projects. • Describe the rate of change in your pace when you run a long distance verses a short distance. 		<p>Vocabulary:</p> <ul style="list-style-type: none"> • Compare • Contrast • Corresponding • Covariation • Function rule • Linear function • Output • Range • Rate of change • Relation • Set • Value • x–intercept • x-value • y-intercept • y-value 	
<p>Resources:</p> <ul style="list-style-type: none"> • Websites, articles, and other collections <ul style="list-style-type: none"> ○ Virtual Nerd (virtualnerd.com) <ul style="list-style-type: none"> ▪ What is rate of change? 			

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Functions – Interpreting Functions (F-IF)

CLUSTER: Interpret functions that arise in applications in terms of the context

- Teachers Pay Teachers (teacherspayteachers.com)
 - [Functions: Comparing Rates of Change Worksheet](#)
- Common Core Sheets (commoncoresheets.com)
 - [Comparing Rate of Change Worksheet](#)
- Math Bits by Frederick and Donna Roberts (mathbitsnotebook.com)
 - [Comparing Functions Practice](#)
- Math Worksheets 4 Kids (mathworksheets4kids.com)
 - [Linear Functions Worksheets](#)
- IXL Learning (IXL.com)
 - [Compare linear functions: tables, graphs, and equations](#)
- Math Aids (math-aids.com)
 - [Find the Slope of Each Line](#)
- Better Lesson (betterlesson.com)
 - [Rates of Change](#)
- Pleasantville Middle School, Pleasantville, NY (ms.pleasantvilleschools.com)
 - [Comparing Linear Functions](#)
- Varsity Tutors LLC. (varsitytutors.com)
 - [Rate of Change](#)
- Monterey Institute for Technology and Education | The NROC Math Project (montereyinstitute.org)
 - [Rate of Change and Slope](#)
- Virtual Nerd (Virtualnerd.com)
 - [What is rate of change?](#)
- Lumen Learning powered by Pressbooks (courses.lumenlearning.com)
 - [Graph linear functions](#)
- Columbia University in the City of New York (columbia.edu)
 - [Linear Functions](#)
- Math Idea Galaxy (ideagalaxyteacher.com)
 - [10 Activities to Practice Linear Functions Like a Boss](#)
 - [11 Activities to Make Comparing Functions Engaging](#)
- California State University Long Beach (http://web.csulb.edu)
 - [Who Shares My Function?](#)
- **Activities**
 - You and your friend are starting a pet-sitting company, taking care of cats and dogs. The first week, you will care for 1 dog and 2 cats. You plan to charge \$8 per day for boarding each cat and \$20 per day for each dog. Based on your plan, how much money

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Functions – Interpreting Functions (F-IF)

CLUSTER: Interpret functions that arise in applications in terms of the context

would you make in a week? How much will you earn in 2 weeks? Have the student expand on the activity by graphing both weeks of their earnings. Discuss the rate of change.

- **Videos**

- Khan Academy (khanacademy.org)
 - [Comparing linear functions: table vs. graph](#)
 - [Worked example: average rate of change from table](#)
- YouTube by David Tate
 - [Comparing functions rate of change](#)

Standard		Performance Objectives	
A.F-BF.1 Select the appropriate graphical representation (e.g., first quadrant) given a situation involving a constant rate of change (e.g., slope).		A.F-BF.1.1 Select the intercept on a graph involving constant rate of change. A.F-BF.1.2 Select the slope on a graph involving constant rate of change. A.F-BF.1.3 Select the appropriate graphical representation (i.e., first quadrant meaning positive X, positive Y) given a situation involving a constant rate of change (i.e., slope).	
I Can Statements			
MOST COMPLEX ←		→ LEAST COMPLEX	
A.F-BF.1.1 (A) Select the intercept on a graph involving constant rate of change.	A.F-BF.1.1 (B) Select X on a graph involving constant rate of change.	A.F-BF.1.1 (C) Point to show the direction that a graph portraying constant rate of change is moving.	
A.F-BF.1.2 (A) Select the slope on a graph involving constant rate of change.	A.F-BF.1.2 (B) Select Y on a graph involving constant rate of change.	A.F-BF.1.2 (C) Select two points on a graph portraying constant rate of change to show the direction of the change.	
A.F-BF.1.3 (A) Select the appropriate graphical representation (i.e., first quadrant meaning positive X, positive Y) given a situation involving a constant rate of change (i.e., slope).	A.F-BF.1.3 (B) Compare two graphs with different slopes to determine faster/slower/constant rate.	A.F-BF.1.3 (C) Indicate the direction of a linear function (e.g., increasing, decreasing, constant).	
Real World Connections: <ul style="list-style-type: none"> Compare the temperature in two cities over a week. Which city had the greatest change in temperature? Look at a graph to identify relationships between two variables (distance - time, cost - product, etc.) If every item cost \$1 at a store, how much would five items cost? If the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function. Have students bring pictures of themselves and their parents from home to use the patterns inherent in functions to quickly and accurately graph linear functions. This lesson deals with vertical shifts and the steepness of the line. Look at someone's savings account balance that has changed over 		Vocabulary: <ul style="list-style-type: none"> Constant Constant rate of change Coordinate pairs Covariation Increasing Intercept Linear function Origin Representation Slope X-coordinate Y-coordinate 	

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Functions – Building Functions (F-BF)

CLUSTER: Build a function that models a relationship between two quantities

the course of a year. You can see that how much was in it when opened and by the end of the first month. Then by the end of the 12-month time span, how much is in the savings account?

Resources:

• **Websites, articles, and other collections**

- Khan Academy (khanacademy.org)
 - [Graph from slope-intercept equation](#)
- Alex (Alabama Learning Exchange) Lesson Plan
 - [It's All in the family | Lesson plan to build new functions from existing functions](#)
- Open Middle (openmiddle.com)
 - [Slope](#)
- Math Aids (math-aids.com)
 - [Find the Slope of Each Line](#)
 - [Algebra 1 Linear Equations Worksheets | Finding Slope from Pair of Points Worksheets](#)
- Common Core Sheets (commoncoresheets.com)
 - [Comparing Rate of Change Worksheet](#)
- Math Bits by Frederick and Donna Roberts (mathbitsnotebook.com)
 - [Comparing Functions Practice](#)
- Math Worksheets 4 Kids (mathworksheets4kids.com)
 - [Linear Functions Worksheets](#)
 - [Slope](#)
- IXL Learning (IXL.com)
 - [Compare linear functions: tables, graphs, and equations](#)
- Math Worksheets (imathworksheets.com)
 - [Slope of a Line](#)
- Helping with Math (helpingwithmath.com)
 - [Calculating Slope](#)
- Algebra ...The Easy Way! (algebra-class.com)
 - [Rate of Change Connecting Slope to Real Life](#)
- Math Bits by Frederick and Donna Roberts (mathbitsnotebook.com)
 - [Slope and Rate of Change](#)
- Ponca City Public Schools (PCPS.us)
 - [Interpreting slope and y-intercept – Part 2](#)
- Math Worksheets 4 Kids (mathworksheets4kids.com)

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Functions – Building Functions (F-BF)

CLUSTER: Build a function that models a relationship between two quantities

- [Slope Worksheets](#)
- Math Idea Galaxy (ideagalaxyteacher.com)
 - [8 Activities to Make Graphing Lines Awesome](#)
- **Activities**
 - Toss objects of different weights and sizes (e.g., balled-up piece of paper, sheet of paper, feather etc.). Label and number the X and Y quadrants. On graph paper, record how far each object went. Record the different points. How does the graph change? Which item went farthest?
- **Videos**
 - YouTube by Brian McLogan
 - [How to determine the rate of change using a graph](#)
 - Khan Academy (khanacademy.org)
 - [Slope and rate of change](#)
 - Khan Academy (khanacademy.org)
 - [Intro to average rate of change](#)

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Functions – Building Functions (F-BF)

CLUSTER: Build a function that models a relationship between two quantities

Standard		Performance Objectives	
A.F-BF.2 Given arithmetic or geometric sequence, identify the graph that models the given rule.		A.F-BF.2.1 Identify and match an arithmetic sequence to the given rule. A.F-BF.2.2 Identify and match a geometric sequence to the given rule. A.F-BF.2.3 Given arithmetic or geometric sequence, identify the graph that models the given rule.	
I Can Statements			
MOST COMPLEX ←		→ LEAST COMPLEX	
A.F-BF.2.1 (A) Identify and match an arithmetic sequence to the given rule.	A.F-BF.2.1 (B) Recognize number patterns.	A.F-BF.2.1 (C) Sequence numbers.	
A.F-BF.2.2 (A) Identify and match a geometric sequence to the given rule.	A.F-BF.2.2 (B) Recognize geometric patterns (e.g., shrinking, symbolic, etc.).	A.F-BF.2.2 (C) Sequence geometric patterns by a given rule (e.g., largest to smallest).	
A.F-BF.2.3 (A) Given arithmetic or geometric sequence, identify the graph that models the given rule.	A.F-BF.2.3 (B) For the given pattern, select/arrange the next two patterns in the sequence.	A.F-BF.2.3 (C) For the given pattern, select the next pattern in the sequence.	
Real World Connections: <ul style="list-style-type: none"> Determine the number of people in a space for a party. Predict an event or reoccurring item. Calculate how quickly you will use up your pencil (decreases each time you sharpen it). Search for patterns throughout the classroom home and outdoors. (Floor tile, windows, desks, etc.) 		Vocabulary: <ul style="list-style-type: none"> Arithmetic Geometric Graph Pattern Rule Sequence Shrinking Symbolic 	
Resources: <ul style="list-style-type: none"> Websites, articles, and other collections <ul style="list-style-type: none"> BC Campus (https://opentextbc.ca) <ul style="list-style-type: none"> Arithmetic Sequences Better Lessons (betterlesson.com) <ul style="list-style-type: none"> Geometric and Arithmetic Sequences and Series Review Math Portal (mathportal.org) <ul style="list-style-type: none"> Arithmetic sequences calculator Math Worksheets 4 Kids (mathworksheets4kids.com) 			

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Functions – Building Functions (F-BF)

CLUSTER: Build a function that models a relationship between two quantities

- [Geometric Sequence Worksheets](#)
- [Pattern Worksheets: Pictures and Numbers](#)
- Online Math Learning (onlinemathlearning.com)
 - [Geometric Sequences](#)
- Math Guide owned and operated by Mark Karadimos (mathguide.com)
 - [Geometric Sequences and Series](#)
- Math Planet (mathplanet.com)
 - [Arithmetic sequences and series](#)
- Wikihow (wikihow.com)
 - [How to Find Any Term of an Arithmetic Sequence](#)
- CK-12 (ck12.org)
 - [Arithmetic Sequences](#)
- Big Ideas Learning (bigideasmath.com)
 - [Arithmetic Sequences](#)

• **Activities**

- Demonstrate an understanding of patterns by predicting “what comes next?” in a sequence of items of at least two objects.
- Represent a pattern using a table.

Candy Bar	Cost
1	\$2
2	\$4
3	\$6
x	?

• **Videos**

- The Mathematics Division Project (mathematicsvisionproject.org)
 - [Module 2 – Arithmetic and Geometric Sequences](#)
- YouTube by Paul Mcmorrow
 - [Graphing Arithmetic Sequences](#)
- YouTube by Mario’s Math Tutoring

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Functions – Building Functions (F-BF)

CLUSTER: Build a function that models a relationship between two quantities

- [Graph an Arithmetic Sequence and Geometric Sequence](#)
- Khan Academy (khanacademy.org)
 - [Intro to arithmetic sequences](#)
 - [Intro to geometric sequences](#)

Standard		Performance Objectives	
<p>A.F-LE.1-3 Model a simple linear function such as $y=mx$ to show that these functions increase by equal amounts over equal intervals. Given a simple linear function, select the model that represents an increase by equal amounts over equal intervals.</p>		<p>A.F-LE.1-3.1 Identify attributes of linear functions (i.e., m is the slope(y/x) how many up and how many over).</p> <p>A.F-LE.1-3.2 Model a simple linear function such as $y=mx$ to show that these functions increase by equal amounts over equal intervals (i.e., Given a simple linear function, select the model that represents an increase by equal amounts over equal intervals.)</p>	
I Can Statements			
MOST COMPLEX ←		→ LEAST COMPLEX	
<p>A.F-LE.1-3.1 (A) Identify attributes of linear functions (i.e., m is the slope(y/x) how many up and how many over).</p>	<p>A.F-LE.1-3.1 (B) Identify ordered pairs from the slope. The slope (m) = y/x. Ordered pairs would be (x, y).</p>	<p>A.F-LE.1-3.1 (C) Point to the x-axis and point to the y-axis.</p>	
<p>A.F-LE.1-3.2 (A) Model a simple linear function such as $y=mx$ to show that these functions increase by equal amounts over equal intervals (i.e., Given a simple linear function, select the model that represents an increase by equal amounts over equal intervals.)</p>	<p>A.F-LE.1-3.2 (B) Identify the slope (i.e., $m=y/x$).</p>	<p>A.F-LE.1-3.2 (C) Point to the values of the data points.</p>	
<p>Real World Connections:</p> <ul style="list-style-type: none"> • If a student makes two buttons per day, how many buttons would they make in three days? • If I drink $\frac{1}{2}$ cup of milk every 2 hours, how long would it take me to reach my required milk intake for the day? • Using the food labels on boxes of cereal or other food items, determine the number of calories in multiple servings of that item. How many calories in half a serving, $\frac{1}{4}$ of a serving, etc.? 		<p>Vocabulary:</p> <ul style="list-style-type: none"> • Attributes • Change • Data points • Equal intervals • Function • Linear • Rate • Slope • Values • X-axis • Y-intercept 	
<p>Resources:</p> <ul style="list-style-type: none"> • Websites, articles, and other collections <ul style="list-style-type: none"> ○ Maths is Fun (mathsisfun.com) <ul style="list-style-type: none"> ▪ Increasing and Decreasing Functions ○ Illustrative Mathematics (tasks.illustrativemathematics.org) <ul style="list-style-type: none"> ▪ Equal Differences over Equal Intervals 1 ○ Math Worksheets 4 Kids (mathworksheets4kids.com) <ul style="list-style-type: none"> ▪ Linear Functions Worksheets 			

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Functions – Linear, Quadratic, and Exponential Models (F-LE)

CLUSTER: Construct and compare linear, quadratic, and exponential models and solve problems

- [Slope Worksheets](#)
- IXL Learning (IXL.com)
 - [Compare linear functions: tables, graphs, and equations](#)
- Math Worksheets (imathworksheets.com)
 - [Slope of a Line](#)
- Helping with Math (helpingwithmath.com)
 - [Calculating Slope Using 2 Points](#)
- Math Aids (math-aids.com)
 - [Algebra 1 - Linear Equations Worksheets | Finding Slope from Pair of Points Worksheets](#)
- Big Ideas Learning (bigideasmath.com)
 - [Arithmetic Sequences](#)
- Texas Instruments (education.ti.com)
 - [Writing Linear Functions with Traffic Tickets](#)
- The Algebra Toolbox (lzlomek.wordpress.com)
 - [My Favorite Unit to Teach – Linear Functions](#)
- Teachers Pay Teachers (teacherspayteachers.com)
 - [Identifying Characteristics of Linear Equations Detective Activity](#)
- **Activities**
 - Measure precipitation and plant growth or soil erosion and volume of water. Collect pairs of data and instead of examining each variable separately (univariate data), find ways to describe bivariate data, in which two variables are measured on each subject in our sample. Begin by determining if there is a relationship between these two variables. As the values of one variable change, do we see corresponding changes in the other variable?
 - Learn to develop the equation of a line from its graph.
 - Learn to write the equation of a line from the slope and the y-intercept, a point and the slope, and two points.
 - Investigate slopes of lines that are parallel and perpendicular.
- **Videos**
 - YouTube by ecopoint
 - [Normal equations simple linear regression model](#)
 - YouTube by Joshua French
 - [Simple linear regression](#)
 - YouTube by mahalodotcom
 - [Linear Functions](#)
 - Khan Academy (khanacademy.org)
 - [Slope from two ordered pairs example 1](#)
 - [Recognize linear functions](#)

Standard		Performance Objectives	
A.S-ID.1-2 Given data, construct a simple graph (e.g., line, pie, bar, picture) or table and interpret the data.		A.S-ID.1-2.1 Recognize the structures of different simple graphs and tables (e.g., line, pie, bar, picture, etc.). A.S-ID.1-2.2 Given data, construct a simple graph (e.g., table, line, pie, bar, or picture) and interpret the data.	
I Can Statements			
MOST COMPLEX ←		→ LEAST COMPLEX	
A.S-ID.1-2.1 (A) Recognize the structures of different simple graphs and tables (e.g., line, pie, bar, picture, etc.).	A.S-ID.1-2.1 (B) Identify different types of simple graphs.	A.S-ID.1-2.1 (C) Identify one type of simple graph.	
A.S-ID.1-2.2 (A) Given data, construct a simple graph (e.g., table, line, pie, bar, or picture) and interpret the data.	A.S-ID.1-2.2 (B) Given data, construct a simple graph (e.g., pie, bar, or picture).	A.S-ID.1-2.2 (C) Place information on a partially constructed simple graph (e.g., pie, bar, or picture).	
Real World Connections: <ul style="list-style-type: none"> Review a household bill and create a graph. Create a simple graph using data from counting separate items or events, (e.g., number of people in different classrooms, different colors of M&Ms, etc.). Create a simple graph using measurements (e.g., birthdays, height, length, temperature, weight, taste testing graph, etc.). Graph the temperature every hour for multiple days. How does the temperature change over time? What do you notice? What do you wonder? 		Vocabulary: <ul style="list-style-type: none"> Bar graph Data Graph Information Line graph Locate Picture graph Pie graph Represent Simple graph Table 	
Resources: <ul style="list-style-type: none"> Websites, articles, and other collections <ul style="list-style-type: none"> The Mathematics Shed (mathematicsshed.com) <ul style="list-style-type: none"> How to teach data handling across the curriculum Math Goodies (mathgoodies.com) <ul style="list-style-type: none"> Bar Graphs Lesson Constructing Bar Graphs Lesson Math Aids (math-aids.com) <ul style="list-style-type: none"> Graph Worksheets Learning to Work with Charts and Graphs Super Teacher Worksheets (superteacherworksheets.com) 			

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Statistics & Probability – Interpreting Categorical and Quantitative Data (S-ID)

CLUSTER: Summarize, represent, and interpret data on a single count or measurement variable

- [Graphing Worksheets](#)
- Math Worksheets 4 Kids (mathworksheets4kids.com)
 - [Bar Graph Worksheets](#)
- Teachnology Inc. | The Art and Science of Teaching with Technology (teach-nology.com)
 - [Graphing Worksheets](#)
- Education.com, Inc. a division of IXL Learning (education.com)
 - [Graphing & Data Activities for Kids](#)
- **Activities**
 - Sort skittles, M&Ms or other candies by color and graph the number of colors.
 - Graph daily weather.
 - Give a handful of play money. Sort by coins and graph each coin.
 - Flip a coin and graph heads or tails after each flip.
 - Provide students with the previous months' slushie orders. Instruct them to chart the data by flavors to determine which flavors were more profitable and which flavors could be eliminated.
 - Provide students with the inventory for the mock grocery store. Have them chart for each item how much was purchased each week. This information is reflected on the inventory. Have them inform the teacher of which items were popular, which needed to be restocked, and which items could possibly be eliminated.
- **Videos**
 - Khan Academy (khanacademy.org)
 - [Read pie graphs \(circle graphs\)](#)
 - [Read bar graphs: dog bones](#)
 - YouTube by Math Mammoth
 - [Drawing a bar graph from the given data - 4th grade math](#)
 - YouTube by Icon Math
 - [Creating Bar Graphs](#)

Standard		Performance Objectives	
A.S-ID.3 Interpret general trends on a graph or chart.		A.S-ID.3.1 Select the appropriate graph to input given data (e.g., pictures on a picture graph, percentages on a pie chart, etc.). A.S-ID.3.2 Interpret information on a graph or chart (e.g., x is ?, y is ? What is the title?, etc.). A.S-ID.3.3 Interpret general trends on a graph or chart.	
I Can Statements			
MOST COMPLEX ←		→ LEAST COMPLEX	
A.S-ID.3.1 (A) Select the appropriate graph to input given data (e.g., pictures on a picture graph, percentages on a pie chart, etc.).	A.S-ID.3.1 (B) Recognize the type of data on a chart or graph (e.g., pictures, objects, numbers, etc.).	A.S-ID.3.1 (C) Point to a data point on a chart or graph.	
A.S-ID.3.2 (A) Interpret information on a graph or chart (e.g., X is ?, Y is ?, What is the title?, etc.).	A.S-ID.3.2 (B) Select data points on a graph or chart.	A.S-ID.3.2 (C) Choose a general trend on a graph or chart.	
A.S-ID.3.3 (A) Interpret general trends on a graph or chart.	A.S-ID.3.3 (B) List three general trends on a graph or chart (e.g., recognize upwards or downwards information, etc.).	A.S-ID.3.3 (C) List a general trend on a graph or chart (e.g., recognize upwards or downwards information, etc.).	
Real World Connections: <ul style="list-style-type: none"> Using a household bill, identify the trend of the usage. Keep a journal of number of loads of laundry washed each week or another activity for a data trend. Interview parent, guardian, teacher or other adults about trends and graph the information as a class (e.g., age one started dating, age of when you started walking, number of years married, etc.). Fling a small object (gummy bear, coin, etc.) and draw a picture representing its movement through the air. Add and label an x- and y-axis to your drawing. How can you make your object go higher/farther? How does the graph change? 		Vocabulary: <ul style="list-style-type: none"> Bar graph Chart Data points Downward Graph Line plot Line segment Percent Picture graph Pie chart Trend Upwards Variability 	
Resources: <ul style="list-style-type: none"> Websites, articles, and other collections <ul style="list-style-type: none"> ExpII (expII.com) <ul style="list-style-type: none"> Identify Trend Lines on Graphs Teachnology (teach-nology.com) <ul style="list-style-type: none"> Graphing Worksheets Math Goodies (mathgoodies.com) 			

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Statistics & Probability – Interpreting Categorical and Quantitative Data (S-ID)

CLUSTER: Summarize, represent, and interpret data on a single count or measurement variable

- [Constructing Bar Graphs Lesson](#)
- Math Aids (math-aids.com)
 - [Graph Worksheets | Learning to Work with Charts and Graphs](#)
- Super Teacher Worksheets (superteacherworksheets.com)
 - [Graphing Worksheets](#)
- Math Worksheets 4 Kids (mathworksheets4kids.com)
 - [Bar Graph Worksheets](#)
- Teachnology (teach-nology.com)
 - [Graphing Worksheets](#)
- Education.com (education.com)
 - [Graphing Worksheets and Printables](#)
- Common Core Sheets (commoncoresheets.com)
 - [Bar Graph Worksheets](#)
- Woodward English Vocabulary (vocabulary.cl/)
 - [Describing Trends in IELTS Writing Task 1](#)
- Easy Teaching (easyteaching.net)
 - [Data Worksheets](#)
- **Activities**
 - Provide students with the previous months' slushie orders. Instruct them to chart the data by flavors to determine which flavors were more profitable and which flavors could be eliminated.
 - Provide students with the inventory for the mock grocery store. Have them chart for each item how much was purchased each week. This information is reflected on the inventory. Have them inform the teacher of which items were popular, which needed to be restocked, and which items could possibly be eliminated.
- **Videos**
 - Khan Academy (khanacademy.org)
 - [Reading line graphs](#)
 - [Interpreting a trend line](#)
 - YouTube by Math Mammoth
 - [Drawing a bar graph from the given data - 4th grade math](#)
 - YouTube by Icon Math
 - [Creating Bar Graphs](#)

COURSE: Alternate Math Elements III and Algebra Elements

DOMAIN: Statistics & Probability – Interpreting Categorical and Quantitative Data (S-ID)

CLUSTER: Summarize, represent, and interpret data on a single count or measurement variable

Standard		Performance Objectives	
A.S-ID.4 Calculate the mean of a given data set (using whole numbers 1-20).		A.S-ID.4.1 Calculate the mean of a given data set (using whole numbers 1-20).	
I Can Statements			
MOST COMPLEX ←		→ LEAST COMPLEX	
A.S-ID.4.1 (A) Calculate the mean of a given data set (using whole numbers 1-20).	A.S-ID.4.1 (B) List the steps in determining the mean of a given data set using whole numbers 1-20 (i.e., sum all the given data, divide the sum by the number of data elements).	A.S-ID.4.1 (C) Divide objects into sets, counting by singles, and indicate the number of sets.	
Real World Connections: <ul style="list-style-type: none"> • Calculate the mean price of cell phones in six different stores. • Use a rain gauge to catch rain for a week; then determine the average rainfall. • Review an electric bill for the monthly average use. 		Vocabulary: <ul style="list-style-type: none"> • Average • Calculate • Data set • Divide • Mean • Sum • Whole numbers 	
Resources: <ul style="list-style-type: none"> • Websites, articles, and other collections <ul style="list-style-type: none"> ○ Free Mathematics Tutorials, Problems and Worksheets (analyzemath.com) <ul style="list-style-type: none"> ▪ Mean, Median and Mode of a Data Set ○ Math Salamanders (Math-salamanders.com) <ul style="list-style-type: none"> ▪ Mean Worksheets ○ Math Worksheets 4 Kids (mathworksheets4kids.com) <ul style="list-style-type: none"> ▪ Average or Mean Worksheets ○ Math Worksheets (imathworksheets.com) <ul style="list-style-type: none"> ▪ Mean Worksheets ○ Common Core Sheets (commoncoresheets.com) <ul style="list-style-type: none"> ▪ Finding Mean Worksheet • Activities <ul style="list-style-type: none"> ○ Flash a sheet with 10-20 puppies on it and ask for class estimates for how many puppies there were on the sheet. Lead again into discussion on mean, median, and mode. 			

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CLUSTER: Summarize, represent, and interpret data on a single count or measurement variable

- **Videos**

- Khan Academy (khanacademy.org)
 - [Mean, median, & mode example](#)
- YouTube by Mathispower4U
 - [Find the Mean and Median of a Data Set Given in a Frequency Table \(odd\)](#)
 - [Determine the mean of the test scores.](#)
- YouTube by 5th Grade Math with Mr. J
 - [Finding Mean, Median, and Mode](#)
- YouTube by TheAnimatedClassroom
 - [The Mean, Median and Mode Toads](#)

APPENDIX A: Vocabulary

Add: To put together (two or more numbers or amounts) to calculate their total value

Addition: The process or skill of calculating the total of two or more numbers or amounts

Addition/subtraction/multiplication/division properties of equality: Two equations that have the same solution are called equivalent equations (e.g., $5 + 3 = 2 + 6$). This is shown by the equality sign $=$. Inverse operations are two operations that undo each other (i.e., addition and subtraction or multiplication and division). You can perform the same inverse operation on each side of an equivalent equation without changing the equality. The addition and subtraction property of equality states that the same number may be added (or subtracted) from both sides of an equation without changing the equation's solution (i.e., if $a = b$ then $a + c = b + c$ and $a - c = b - c$). The division property of equality states that when we divide both sides of an equation by the same non-zero number, the two sides remain equal.

Algebra: The part of mathematics in which letters and other general symbols are used to represent numbers and quantities in formulae and equations

Algebraic: Relating to or involving algebra

Algebraic expression: In mathematics, an algebraic expression is an expression built up from integer constants, variables, and the algebraic operations (addition, subtraction, multiplication, division and exponentiation by an exponent that is a rational number).

Approximate: Close to the actual, but not completely accurate or exact

Area: The amount of space a two-dimensional shape occupies, measured in squares

Arithmetic: The branch of mathematics dealing with the properties and manipulation of numbers

Arithmetic sequence: A set of things (usually numbers) that are in order. The difference between one term and the next is a constant. In an arithmetic sequence, you add the same value each time, infinitely.

Attributes: For math purposes, “attributes” refer to characteristics of an object or geometric shape. These include qualities of shape, color, size, side, length, etc.

Average: A number expressing the central or typical value in a set of data, in particular the mode, median, or (most commonly) the mean, which is calculated by dividing the sum of the values in the set by their number. Compare with mean.

Axis: One of the reference lines of a coordinate system (e.g., X-axis and Y-axis on a graph)

Bar graph: A graph that presents categorical data with rectangular bars with heights or lengths proportional to the values that they represent. The bars can be plotted vertically or horizontally. A vertical bar chart is sometimes called a column chart.

Base: The surface a solid object stands on, or the bottom line of a shape such as a triangle or rectangle

Braces: Synonym for brackets

Brackets: A bracket is either of two tall fore- or back-facing punctuation marks commonly used to isolate a segment of data from its surroundings. An individual bracket may be identified as a left or right bracket or, alternatively, an opening paired bracket or closing paired bracket.

Calculate: To determine or ascertain by mathematical methods; compute: to calculate the velocity of light. To determine by reasoning, common sense, or practical experience; estimate; evaluate; gauge

Calculator: A portable electronic device used to perform calculations, ranging from basic arithmetic to complex mathematics

Change: To make or become different. Convert, transform, modify, reconstruct, etc.

Chart: A graphical representation of data, in which the data is represented by symbols, such as bars in a bar chart, lines in a line chart, or slices in a pie chart. A chart can represent tabular numeric data, functions or some kinds of qualitative structure and provides different information.

Coefficient: A numerical or constant quantity placed before and multiplying the variable in an algebraic expression (e.g. 4 in $4xy$)

Compare: Estimate, measure, or note the similarity or dissimilarity between

Constant: Occurring continuously over time. A situation or state of affairs that does not change (e.g., unchanging factor, etc.).

Constant rate of change: A predictable rate at which a given variable alters over a certain period of time. For example, if a car gains 5 miles per hour every 10 seconds, then "5 miles per hour per 10 seconds" would be the constant rate of change. When graphing the constant rate of change, it is important that the variance of the x and y coordinates move in conjunction with each other. For each alteration in the horizontal X-axis, there must be a complementary change in the vertical Y-axis. So long as the change is consistent between the two, the rate of change is constant. If the change in the x and y relationship changes, even if it occurs as a statistical outlier, the graphing equation will no longer be constant.

Contrast: Being strikingly different from something else (e.g., dissimilar, divergence, variance, etc.)

Coordinate grid system: A coordinate system is a two-dimensional number line; for example, two perpendicular number lines or axes. The horizontal axis is called the x-axis and the vertical axis is called the y-axis. The center of the coordinate system (where the lines intersect) is called the origin. The axes intersect when both x and y are zero. The coordinates of the origin are (0, 0).

Coordinate pairs: An ordered pair contains the coordinates of one point in the coordinate system. A point is named by its ordered pair of the form of (x, y). The first number corresponds to the x-

coordinate and the second to the y-coordinate. To graph a point, you draw a dot at the coordinates that corresponds to the ordered pair. It's always a good idea to start at the origin. The x-coordinate tells you how many steps you have to take to the right (positive) or left (negative) on the x-axis. And the y-coordinate tells you how many steps to move up (positive) or down (negative) on the y-axis.

Coordinates: Each of a group of numbers used to indicate the position of a point, line, or plane

Corresponding: Analogous or equivalent in character, form, or function; comparable

Covariation: Correlated variation of two or more variables. Measures the strength and the direction of the relationship between the elements.

Cubed: A number multiplied by itself three times

Data: Facts and statistics collected for reference or analysis

Data points: An identifiable element in a data set. A discrete unit of information. A data point is usually derived from a measurement or research and can be represented numerically and/or graphically. The term data point is roughly equivalent to datum, the singular form of data.

Data set: A collection of data. In the case of tabular data, a data set corresponds to one or more database tables, where every column of a table represents a particular variable, and each row corresponds to a given record of the data set in question. The data set lists values for each of the variables, such as height and weight of an object, for each member of the data set. Each value is known as a datum.

Difference: The degree or amount by which things differ in quantity or measure; an equation describing how a variable evolves from one time to the next

Digit: A single symbol (such as "2" or "5") used alone, or in combinations (such as "25"), to represent numbers (such as the number 25) according to some positional numeral systems. The single digits (as one-digit-numerals) and their combinations (such as "25") are the numerals of the numeral system they belong to. The name "digit" comes from the fact that the ten digits of the hands correspond to the ten symbols of the common base 10 numeral system.

Divide: To separate or be separated into parts

Domain: In mathematics, the domain or set of departure of a function is the set into which all the input of the function is constrained to fall. It is the set X in the notation $f: X \rightarrow Y$.

Doubling: To make twice as much or as many

Downwards: Toward a lower point or level

Equal: Being the same in quantity, size, degree, or value

Equal intervals: Each class occupies an equal interval along the number line. They are found by determining the range of the data. The range is then divided by the number of classes, which gives the common difference. The class limits are established by starting at the lowest value and adding

the common difference to get the upper limits of the first class, adding the common difference to this to get the limit of the second class, until the upper limit of the data is reached.

Equal sign: A mathematical symbol used to indicate equality. In an equation, the equal sign is placed between two expressions that have the same value, or for which one studies the conditions under which they have the same value.

Equality: A relationship between two quantities or, more generally two mathematical expressions, asserting that the quantities have the same value, or that the expressions represent the same mathematical object. The equality between A and B is written $A = B$, and pronounced A equals B. The symbol "=" is called an equal sign.

Equation: A mathematical sentence of equality between two expressions; equations have an equal sign (e.g., $n + 50 = 75$ or $75 = n + 50$ means that $n + 50$ must have the same value as 75).

Estimate: To roughly calculate or judge the value, number, quantity, or extent of

Evaluate: To form an idea of the amount, number, or value of something; assess

Even: A number, such as 2, 6, 8, etc. divisible by two without a remainder

Exponent: A quantity representing the power to which a given number or expression is to be raised, usually expressed as a raised symbol beside the number or expression

Expression: An operation between numbers that represents a single numeric quantity. Expressions do not have an equal sign (e.g., $4r$, $x+2$, $y-1$).

Factoring: Consists of writing a number or another mathematical object as a product of several factors, usually smaller or simpler objects of the same kind. For example, 3×5 is a factorization of the integer 15, and $(x - 2)(x + 2)$ is a factorization of the polynomial $x^2 - 4$.

Function rule: A function is a relation between sets that associates to every element of a first set exactly one element of the second set. Typical examples are functions from integers to integers or from the real numbers to real numbers. Functions were originally the idealization of how a varying quantity depends on another quantity.

Functions: A special kind of relation where each x-value has one and only one y-value

Geometric: Relating to a geometry, or according to its methods

Geometry: The branch of mathematics concerned with the properties and relations of points, lines, surfaces, solids, and higher dimensional analogs

Graph: A structure amounting to a set of objects in which some pairs of the objects are in some sense "related." The objects correspond to mathematical abstractions called vertices (also called nodes or points) and each of the related pairs of vertices is called an edge (also called link or line). Typically, a graph is depicted in diagrammatic form as a set of dots or circles for the vertices, joined by lines or curves for the edges. Graphs are one of the objects of study in discrete mathematics.

Greater than: A mathematical symbol ($>$) that denotes an inequality between two values

Height: The measurement from base to top or (of a standing person) from head to foot

Horizontal: Parallel to the plane of the horizon; at right angles to the vertical

Horizontal line: A line that has the slope of zero. As you move to the right along the line, it does not rise or fall at all. As you drag the points above, you can see that when the line is horizontal, the points both have the same y-coordinate, and the slope is zero. The equation of a horizontal line is the coordinate of any point on the line.

Identify: To establish or indicate what something is

Illustration: A visual explanation of a concept or process

Increasing: Becoming greater in size, amount or degree; growing

Inequality: A mathematical sentence in which the value of the expressions on either side of the relationship symbol are unequal. Relation symbols used in inequalities include $>$ (greater than) and $<$ (less than) symbols (e.g., $7 > 3$, $x < y$).

Information: Facts provided or learned about something or someone

Input value: Input and output values relate to functions. A function is relationship that converts each input value to one and only one output value.

Intercept: The distance from the origin to a point where a graph crosses a coordinate axis

Interpret: To explain the meaning of (information, words, or actions)

Intersect: To divide (something) by passing or lying across it

Label: A classifying phrase or name applied to something to categorize it

Length: The measurement or extent of something from end to end; the greater of two or the greatest of three dimensions of a body

Less than: To a smaller extent, amount or degree; smaller in size, amount, degree, etc; not so large, great or much; a smaller amount or quantity ($<$)

Line: In mathematics, the term linear function refers to two distinct, although related, notions: In calculus and related areas, a linear function is a polynomial function of degree zero or one or is the zero polynomial. In linear algebra and functional analysis, a linear function is a linear map.

Line graph: A graphical representation using points connected by line segments to show how something changes over time

Line plot: A line plot is a graph that shows the frequency of data occurring along a number line. Line plots provide a quick and easy way to organize data and are best used when comparing fewer than 25 different numbers.

Line segment: The part of a line that connects two points that has definite end points

Linear: Arranged in or extending along a straight or nearly straight line

Linear function: In mathematics, the term linear function refers to two distinct, although related, notions. In linear algebra and functional analysis, a linear function is a linear map.

Locate: To discover the exact place or position of

Manipulative: An object which is designed so that a learner can perceive some mathematical concept by manipulating it, hence its name. The use of manipulatives provides a way for children to learn concepts through developmentally appropriate hands-on experience.

Math signs (+, -, =): Basic signs for addition (+) and subtraction (-)

Math symbols (e.g. <, >, =, ≠, ÷, ×, etc.): Math signs meaning the following: less than (<), greater than (>), equal (=), not equal to (≠), divided by (÷), multiply by (×), etc.)

Mean: The average; To find the mean, add up all the numbers and then divide by the number of numbers.

Measurement tools (e.g., ruler, yardstick, measuring tape, cubes, etc.): Tools used to measure things such as rulers, yardsticks, measuring tape, measuring cubes, etc.

Measurement words: Words used to describe measurements such as inches, feet, yards, ounces, cup, quart, pounds, etc.

Models: pictorial or tactile aids used explore mathematical ideas and solve mathematical problems. Manipulatives can be used to model situations

More than: To a greater extent, amount or degree; larger in size, amount, degree, etc.; greater or much more, a larger quantity. (>)

Multiples: Numbers that can be divided by another number without a remainder

Multiply: To obtain from (a number) another that contains the first number a specified number of times. (e.g., I asked you to multiply fourteen by nineteen)

Negative numbers: Negative numbers are usually written with a minus sign in front. A negative number is a real number that is less than zero. Negative numbers represent opposites. If positive represents a movement to the right, negative represents a movement to the left.

Number: An arithmetical value, expressed by a word, symbol, or figure, representing a particular quantity and used in counting and making calculations and for showing order in a series or for identification

Number line: A number line is a picture of a graduated straight line that serves as abstraction for real numbers. Every point of a number line is assumed to correspond to a real number, and every

real number to a point. The integers are often shown as specially marked points evenly spaced on the line.

Numerator: The top number in a fraction

Odd: Regarding whole numbers, as in 3 and 5, an odd number has one left over as a remainder when it is divided by two.

Operations: Addition, subtraction, multiplication, and division

Order of operations: The order of operations (or operator precedence) is a collection of rules that reflect conventions about which procedures to perform first in order to evaluate a given mathematical expression.

Ordered pair: Two numbers written in a certain order, usually written in parentheses like this: (12,5). Which can be used to show the position on a graph, where the "x" (horizontal) value is first, and the "y" (vertical) value is second. Which can be used to show the position on a graph, where the "x" (horizontal) value is first, and the "y" (vertical) value is second. So (12,5) is 12 units along, and 5 units up.

Origin: Point or place where something begins, arises, or is derived

Output: Point or place where something begins, arises, or is derived

Parentheses: A word, clause, or sentence inserted as an explanation or afterthought into a passage that is grammatically complete without it, in writing usually marked off by curved brackets, dashes, or commas

Pattern: A repeated decorative design

Percent: A number or ratio expressed as a fraction of 100. It is often denoted using the percent sign, "%," or the abbreviation "pct"; sometimes the abbreviation "pc" is also used. A percentage is a dimensionless number (pure number).

Perimeter: The continuous line forming the boundary of a closed geometric figure

Perpendicular lines: Lines that intersect, forming right angles

Picture graph: A pictorial display of data with symbols, icons, and pictures to represent different quantities. The symbols, icons, and pictures of a picture graph typically represent concepts or ideas, or stand in for a larger quantity of something. For example, a single stick man on a picture graph could represent a million people in a city's population.

Pie chart: (or a circle chart) A circular statistical graphic, which is divided into slices to illustrate numerical proportion. In a pie chart, the arc length of each slice (and consequently its central angle and area), is proportional to the quantity it represents. While it is named for its resemblance to a pie which has been sliced, there are variations on the way it can be presented.

Pie graph: A pie graph (or a circle chart) is a circular statistical graphic, which is divided into slices to illustrate numerical proportion. In a pie chart, the arc length of each slice (and consequently its central angle and area), is proportional to the quantity it represents. While it is named for its resemblance to a pie which has been sliced, there are variations on the way it can be presented.

Place value: The value of a digit depending on its place in a number

Point: Usually refers to an element of some set called a space. More specifically, in Euclidean geometry, a point is a primitive notion upon which the geometry is built, meaning that a point cannot be defined in terms of previously defined objects. That is, a point is defined only by some properties, called axioms, that it must satisfy. In particular, the geometric points do not have any length, area, volume or any other dimensional attribute.

Positive numbers: A number that is bigger than zero. A positive number can be written with a "+" symbol in front of it, or just as a number (mainly without, but it is not unheard of to use the symbol). Positive numbers are written to the right of zero on a number line.

Predictions: Something predicted; forecast

Product: A result of multiplying, or an expression that identifies factors to be multiplied. Thus, for instance, 30 is the product of 6 and 5 (the result of multiplication).

Quantity: The amounts or number of a material or immaterial thing not usually estimated by spatial measurement

Quotient: A result obtained by dividing one quantity by another

Range: The area of variation between upper and lower limits on a scale

Rate: A measure, quantity, or frequency, typically one measured against some other quantity or measure

Rate of change: The ratio between two related quantities in different units. If the denominator of the ratio is expressed as a single unit of one of these quantities, and if it is assumed that this quantity can be changed systematically (i.e., is an independent variable), then the numerator of the ratio expresses the corresponding rate of change in the other (dependent) variable.

Ratio: The quantitative relation between two amounts showing the number of times one value contains or is contained within the other

Rational number: A rational number is a number that can be expressed as the quotient or fraction p/q of two integers, a numerator p and a non-zero denominator q . Since q may be equal to 1, every integer is a rational number.

Ratios: The quantitative relation between two amounts showing the number of times one value contains or is contained within the other

Real world: Existing or occurring in reality; drawn from or drawing on actual events or situations: real life

Real-world problem: Informal "real-world" mathematical problems are questions related to a concrete setting, such as "Adam has five apples and gives John three. How many has he left?". Such questions are usually more difficult to solve than regular mathematical exercises like " $5 - 3$ ", even if one knows the mathematics required to solve the problem. Known as word problems, they are used in mathematics education to teach students to connect real-world situations to the abstract language of mathematics.

Recognize: Identify (someone or something) from having encountered them before; know again

Rectangle: A four-sided polygon (a flat shape with straight sides) where every angle is a right angle (90°); opposite sides are parallel and of equal length

Recursive rule: Used to define the elements in a set, in terms of other elements in the set. A recursive formula designates the starting term, a_1 , and the n th term of the sequence, and, as an expression containing the previous term (the term before it), a_{n-1} .

Regular shape: A polygon is regular when all angles are equal, and all sides are equal.

Relation: The way in which two or more concepts, objects, or people are connected; a thing's effect on or relevance to another

Repeated: Done or occurring again several times in the same way

Repeating: To do (something) again, either once or a number of times

Represent: To serve as a sign or symbol of; to correspond to

Representation: The act or action of representing; the state of being represented. The substitution of something in place of something else.

Round: Having every part of the surface or circumference equidistant from the center

Rule: An accepted procedure. A determinate method of performing a mathematical operation and obtaining a certain result.

Scale: Something graduated, especially when used as a measure or rule: such as an indication of the relationship between the distances on a map and the corresponding actual distances. A series of marks or points at known intervals used to measure distances (such as the height of the mercury in a thermometer); a ruler.

Sequence: A continuous or connected series; to arrange in a sequence

Series: The indicated sum of a usually infinite sequence of numbers

Set: A group or collection of things that go together (e.g., a group of four stars)

Shrinking: Becoming smaller in size or amount

Side: In most general terms, a line segment that is part of the figure; it is connected at either end to another line segment, which, in turn, may or may not be connected to still other line segments

Similar shapes: Objects of the same shape but different sizes in which the corresponding angles are the same

Simple graph: A graph with three vertices and three edges. A pair $G = (V, E)$, where V is a set whose elements are called vertices (singular: vertex), and E is a set of two-sets (sets with two distinct elements) of vertices, whose elements are called edges (sometimes links or lines).

Simple one-step equation: Equations involving fractions, integers, and decimals. Perform the basic arithmetic operations: addition, subtraction, multiplication and division to solve the equations.

Simple sequence: A set of things, usually numbers, arranged in a particular order. Each number in the sequence is called a term (or sometimes "element" or "member").

Single: Only one, not of several

Skip counting: A mathematics technique taught as a kind of multiplication in reform mathematics textbooks such as TERC. In older textbooks, this technique is called counting by twos (threes, fours, etc.).

Slope: The steepness/incline/grade of a line

Solution: A means of solving a problem; a process of solving a problem; an answer to a problem

Solve: Find a solution, explanation, or answer to a problem

Square: A four-sided polygon (a flat shape with straight sides) where all sides have equal length and every angle is a right angle (90°). Being of a specified length in each of two equal dimensions.

Squared: Being or converted to a unit of area equal in measure to a square each side of which measures one unit of a specified unit of length

Subtraction: The operation of deducting one number from another

Successive: Following in order; following each other without interruption

Sum: The whole amount; the result of adding numbers; aggregate

Symbol: Something that stands for or suggests something else by reason of relationship, association, convention, or accidental resemblance

Symbolic: Relating to or constituting a symbol

Table: A systematic arrangement of data usually in rows and columns for ready reference

Tally: A score or point made; to list or check off something

Term: A word or group of words designating something, especially in a particular field such as math

Three-dimensional geometric shape: Study of solid figures in three-dimensional space: cube, rectangular prism, sphere, cone, cylinder, and pyramid

Title: Name of a graph or table

Trend: A general direction in which something is developing or changing

Two-dimensional shape: Study of two-dimensional figures in a plane; drawings of square, rectangle, circle, triangle, pentagon, hexagon, and octagon

Unknown: A symbol (such as x , y , or z) in a mathematical equation representing an unknown quantity

Upwards: Toward a higher place, point, or level

Value: A numerical quantity that is assigned or is determined by calculation or measurement

Variability: Lack of consistency or fixed pattern; liability to vary or change

Variable: A symbol for an unknown number to be solved; it is usually a letter like x or y (e.g., in $x + 3 = 7$, x is the variable)

Vertex: The common endpoint of two or more rays or line segments

Vertical: The direction aligned with the direction of the force of gravity, up or down, as materialized with a plumb line

Vertical line: A line on the coordinate plane where all points on the line have the same x -coordinate

Vertical line test: A visual way to determine if a curve is a graph of a function or not. A function can only have one output, y , for each unique input, x . If a vertical line intersects a curve on an xy -plane more than once then for one value of x the curve has more than one value of y , and so, the curve does not represent a function. If all vertical lines intersect a curve at most once then the curve represents a function.

Volume: The amount of space a three-dimensional shape occupies, measured in cubes

Whole numbers: A number without fractions, an integer

Width: The measurement or extent of something from side to side

X-axis: The principal or horizontal axis of a system of coordinates, points along which have a value of zero for all other coordinates

X-coordinate: The horizontal value in a pair of coordinates: how far along the point is

X-intercept: Where a line crosses the x -axis of a graph

X-value: In a graph you have (X and Y) coordinates also known as an ordered pair. The x-value is the number assigned to x.

Y-axis: Also called axis of ordinates. In a plane Cartesian coordinate system, the axis, usually vertical, along which the ordinate is measured and from which the abscissa is measured. The axis along which values of y are measured and at which both x and y equal zero.

Y-coordinate: The vertical value in a pair of coordinates. How far up or down the point is. The Y Coordinate is always written second in an ordered pair of coordinates (x, y) such as (12,5).

Y-intercept: Where a line crosses the Y-axis of a graph

Y-value: In a graph you have (X and Y) coordinates also known as an ordered pair. The y-value is the number assigned to y.