Unit 01 - Foundations For Algebra

Content Area: **Mathematics**
Course(s): **Algebra I**
Time Period: **September**
Length: **13 days**
Status: **Published**

Unit Overview

This unit introduces students to variables and expressions and explores real-number operations. Students will develop the answers to the Essential Questions as they learn the concepts and skills; such as, learning to write and evaluate expressions with unknown values and properties are used to simplify expressions.

Enduring Understandings

- Algebra uses symbols to represent quantities that are unknown or that vary.
- Relationships that are always true for real numbers are called properties, which are rules used to rewrite and compare expressions
- Sometimes the value of one quantity can be found if you know the value of another.
- The rules for multiplying real numbers are related to the properties of real numbers and the definitions of operations.
- You can add or subtract any real numbers using a number line model.
- You can add or subtract real numbers using rules involving absolute value.
- You can approximate the square roots of nonnegative numbers
- You can represent mathematical phrases and real-world relationships using symbols and operations.
- You can represent the relationship between the quantities in different ways, including tables, equations, and graphs.
- You can use an equation to represent the relationship between two quantities that have the same value.
- You can use powers to shorten how you represent repeated multiplication such as 2 x 2 x 2 x 2
- You can use the Distributive Property to simplify the product of a number and a sum or difference

Essential Questions

- How are properties related to algebra?
- How can you represent quantities, patterns, and relationships?
- What do parenthesis do in an arithmetic expression?
- What procedures can be used to simplify an expression?
- Why does order of operation matter when simplifying?

Standards/Indicators

MA.K-12.1	Make sense of problems and persevere in solving them.
	Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.
MA.A-SSE.A.1	Interpret expressions that represent a quantity in terms of its context.
MA.K-12.2	Reason abstractly and quantitatively.
	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
MA.A-SSE.A.1a	Interpret parts of an expression, such as terms, factors, and coefficients.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MA.K-12.4	Model with mathematics.
MA.N-RN.B.3	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be

as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

MA.K-12.5 Use appropriate tools strategically.

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

MA.K-12.6 Attend to precision.

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

MA.K-12.7 Look for and make use of structure.

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.

MA.K-12.8 Look for and express regularity in repeated reasoning.

Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when

	dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
MA.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
MA.A-CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
MA.A-REI.D.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

Student Learning Objectives (SLOs)

- Create linear equations and inequalities in one variable and use them to solve problems. Justify each step in the process and the solution.
- Interpret parts of expressions in terms of context; use the structure of an expression to identify ways to rewrite it.
- Interpret terms, factors, coefficients, and expression in terms of context.
- Model and describe constraints with linear equations and inequalities and systems of equations and/or inequalities to determine if solutions are viable or non-viable.
- Use the properties of rational and irrational numbers to explain why the sum or product of two rational numbers is rational; the sum of a rational number and an irrational number is irrational; and the product of a nonzero rational number and an irrational number is irrational.

Lesson Titles

- Combining Like Terms
- Distributive Property
- Order of Operations
- Signed Numbers
- Solving One Step Equations

Career Readiness, Life Literacies & Key Skills

TECH.9.4.2.CI.1	Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
TECH.9.4.2.CI.2	Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
TECH.9.4.2.CT.2	Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
TECH.9.4.2.DC.1	Explain differences between ownership and sharing of information.
TECH.9.4.2.DC.2	Explain the importance of respecting digital content of others.

TECH.9.4.2.DC.3	Explain how to be safe online and follow safe practices when using the internet (e.g., 8.1.2.NI.3, 8.1.2.NI.4).
TECH.9.4.2.TL.2	Create a document using a word processing application.
TECH.9.4.2.TL.3	Enter information into a spreadsheet and sort the information.

Inter-Disciplinary Connections

LA.RL.11-12.4	Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful. (e.g., Shakespeare as well as other authors.)
LA.RST.9-10.1	Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
LA.W.9-10.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
LA.W.9-10.2.A	Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
LA.WHST.9-10.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LA.W.9-10.6	Use technology, including the Internet, to produce, share, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
9-12.HS-ETS1-4.5	Using Mathematics and Computational Thinking
9-12.HS-PS1-7.5	Mathematical and computational thinking at the 9–12 level builds on K–8 and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.

Instructional Strategies, Learning Activities, and Levels of Blooms/DOK

- #1- Blooms Knowledge - Remember previously learned information
- #2 - Blooms Comprehension - Demonstrate an understanding of facts
- #3 - Blooms Application - Apply Knowledge to actual situations
- #4 - Blooms Analysis - Break down objects or ideas into simpler parts and find evidence to support generalizations
- #5 - Blooms Synthesis - Compile component ideas into a new whole or propose alternative solutions
- #6 - Blooms Evaluation - Make and defend judgments based on internal evidence or external criteria
- Intro lesson with Google slides or SmartNotebook Lesson
- review of solving one step equations
- Review of the rules of combining like terms

- review of the rules of order of operations
- Review of the rules of signed numbers
- Review of the rules of the distributive property
- review warm up
- students will work as a team and explain their work
- Students will work independently on examples
- students will work on mathxl
- tutoring during Delsea One

Modifications

ELL Modifications

- Assess ELL students continuously using formative methods
- Flexibility with time frames and deadlines
- Intentional scheduling/grouping with student/teacher who speaks same language when possible
- Offer resources for specific topics in primary language (Youtube web resources)
- One on one with student who speaks the same language during Delsea One
- Repeat, reword, clarify
- tutoring during Delsea One
- Use google translator, especially for application problems
- using technology, such as but not limited to: graphing calculator and desmos

IEP & 504 Modifications

- Allowing co-teaching with general education and special education teacher in the same classroom for possible small group instruction
- Assessments will allow for calculator use and/or other math tools
- Assessments will allow for corrections in the form of a re-take in order to reteach the material
- Assessments will focus on specific vocabulary and keywords
- If not in a co-teaching setting, allow time for collaboration between regular and special education teachers on ways to differentiate instruction
- Keep updated videos on google classroom for reinforcement outside of the classroom
- Modeling and showing several examples
- Non-verbal redirection of behaviors
- Providing study guides that don't lead too much extraneous information
- Scaffolded notes
- Speaking to students privately when redirecting behaviors

- tutoring during Delsea One

G&T Modifications

- Ask students' higher level questions that require students to look into causes, experiences, and facts to draw a conclusion or make connections to other areas of learning
- Employ differentiated curriculum to keep interest high
- Encourage students to make transformations- use a common task or item in a different way.
- Invite students to explore different points of view on a topic of study and compare the two
- Provide additional rigorous challenge problems for advanced students
- Refrain from having them complete more work in the same manner
- tutoring during Delsea One
- Videos that offer extra practice and examples in all areas are posted on google classroom and taken from: mathispower4u

At Risk Modifications

- Refer students to Organizational Management
- Require Delsea One tutoring
- Stay in contact with parents/guardians and guidance counselors on student progress
- tutoring during Delsea One

Alternate Assessment

Performance tasks

Project-based assignments

Problem-based assignments

Presentations

Benchmark Assessment

Skills-based assessment- math practice

Formative Assessment

- connecting previous lessons
- connecting vocabulary with root words
- Discussion including vocab review/recall
- evaluate your understanding of the lesson
- Guided Review
- homework/classwork
- Mathxlforschool
- NJSLA Math type of question
- pass out of class
- SAT question of the day
- Skill needed to do lesson
- teacher observation
- think-pair-share
- turn to your partner and discuss
- Use What You Know - type of question
- video clip
- Warm up Review
- White Boards

Summative Assessment

- Benchmark Assessment
- Marking Period Assessment
- Unit Test on Foundations of Algebra

Resources & Materials

- Colored pencil/highlighters
- Google Slides
- Mathispower4u video clip to introduce or demonstrate concepts
- Pearson 2015 Algebra 1 Textbook
- Teacher generated worksheets
- White board paddles

Technology

- Chromebooks

- Desmos
- Edpuzzle
- Equatio
- Google Classroom
- Google Forms
- Graphing calculator
- Mathway
- Mathxlforschool
- PearDeck
- Remind
- Video clips

TECH.8.1.12	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.12.A.4	Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.

Computer Think and Design

CS.K-2.8.1.2.CS.3	Describe basic hardware and software problems using accurate terminology.