Unit 1 Foundations for Algebra

Content Area: **Math**
Course(s): **CP Algebra 1, Accelerated Algebra I, Accelerated Algebra I**
Time Period: **Marking Period 1**
Length: **1**
Status: **Published**

Course Pacing Guide

Unit	MP	Weeks
Foundations for Algebra	1	1
Solving Equations	1	2
Solving Inequalitiies	1	3
An Introduction to Functions	1	2
Linear Functions	2	5
Systems of Equations and Inequalities	2	6
Exponents	3	2
Polynomials and Factoring	3	4
Quadratic Functions and Equatoins	3	2
Radical Expressions	4	3
Exponential Functions	4	3
Data Analysis and Probability	4	3

Unit Overview

This unit allows students to master representing quantities, patterns, and relationships. Students will also see how to relate certain algebraic properties.

Enduring Understandings

- Students will understand how to apply the rules of algebra to manipulate variables.
- Students will understand how to keep an equation balanced and how to solve for an unknown to solve for a solution.
- Students will understand the similarities and differences in solving inequalities versus equations.
- The students will understand the concept of a function and how we can represent functions graphically,

in a table, and by a rule.
- The students will understand the meaning of slope and the relationship it has in creating a line.
- The students will grasp the concept of a line and be able to represent it graphically and algebraically through an equation in multiple forms.
- The students will understand how to solve a system of equations and inequalities by finding the intersection or overlapping areas.
- The students will understand the laws of exponents and be able to apply them to simplify and solve problems involving them.
- The students need to understand how the inverse operations of multiplying and factoring are related in simplifying and expanding expressions, and the importance of these methods in other areas of math.
- Students will understand the distinguishing features of a quadratic model, and how to find these features graphically and algebraically.
- The students will understand how to analyze a given data set using graphs, tables, the measures of center and spread, and regression analysis.

Essential Questions

How can we write an unknown as an algebraic expression?

How can we evaluate algebraic expressions?

How can we use the properties of algebra to simplify expressions?

How can we isolate an unknown quantity?

How can we apply the concept of equations to real world applications involving proportions and percents?

Compare and contrast inequalities with equations?

Why do we need to shade a region for an inequality?

What does the line represent in the inequality?

What does the absolute value equation represent and how are they related to inequalities?

What is a function?

What distinguishes a linear function from non-linear functions?

How can we write a rule for a relation?

How is the rate of change related to slope?

What are the advantages of the different forms of an equation of a line?

How can we write an equation of a line given two points or a point and it’s slope?

How can we write a line that is either perpendicular or parallel to another line?

What does the absolute value function look like and how can we translate it?

How is this related to point slope form?

What does the solution of a system look graphically?

How can we find the solution algebraically?

How will the solutions of a system of inequalities differ from a system of linear equations?

How can we simplify an expression using the law of exponents?

Compare and contrast an exponential equation to a linear equation?

What does the graph of an exponential look like and how can we change its appearance?

How are geometric sequences related to exponential functions?

How can we rewrite an expression as a product or vice versa?

Why is re-writing an expression important?

What does the graph of the quadratic function look like and how can we find the key features of the graph?

How can we solve a quadratic equation?

What is the difference between a quadratic equation versus linear and exponential models?

How is vertex form related to point slope form and translations?

What type of model fits the scatter plot the best?

How can we make the data more visual? What are the advantages of the different types of graphs?

What are advantages and disadvantages of the different measures of center and spread?

What do the measures of center and spread tell us about the data?

New Jersey Student Learning Standards (No CCS)

MA.F-IF	Interpreting Functions
MA.F-IF.A	Understand the concept of a function and use function notation
MA.S-ID.A.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).

MA.F-IF.A.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x. The graph of f is the graph of the equation $y = f(x)$.
MA.F-IF.A.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
MA.S-ID.A.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
MA.S-ID.A.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
MA.F-IF.B	Interpret functions that arise in applications in terms of the context
MA.F-IF.B.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
MA.F-IF.B.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
MA.S-ID.B.6a	Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data.
MA.F-IF.B.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
MA.S-ID.B.6b	Informally assess the fit of a function by plotting and analyzing residuals, including with the use of technology.
MA.S-ID.B.6c	Fit a linear function for a scatter plot that suggests a linear association.
MA.F-IF.C	Analyze functions using different representations
MA.F-IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
MA.F-IF.C.7a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
MA.S-ID.C.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
MA.F-IF.C.7c	Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
MA.F-IF.C.7e	Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
MA.F-IF.C.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
MA.F-IF.C.8a	Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.
MA.F-IF.C.8b	Use the properties of exponents to interpret expressions for exponential functions.
MA.F-IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
MA.F-BF.A	Build a function that models a relationship between two quantities
MA.F-BF.A.1	Write a function that describes a relationship between two quantities.
MA.F-BF.B	Build new functions from existing functions
MA.F-BF.B.3	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs.

	Experiment with cases and illustrate an explanation of the effects on the graph using technology.
MA.F-LE.A	Construct and compare linear and exponential models and solve problems
MA.F-LE.A.1	Distinguish between situations that can be modeled with linear functions and with exponential functions.
MA.F-LE.A.1a	Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.
MA.F-LE.A.1b	Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
MA.F-LE.A.1c	Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
MA.F-LE.A.3	Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.
MA.F-LE.B.5	Interpret the parameters in a linear or exponential function in terms of a context.

Amistad Integration

SOC.9-12.1.1.1	Compare present and past events to evaluate the consequences of past decisions and to apply lessons learned.
SOC.9-12.1.3.3	Gather relevant information from multiple sources representing a wide range of views (including historians and experts) while using the date, context, and corroborative value of the sources to guide the selection.

Holocaust/Genocide Education

SOC.9-12.1.1.1	Compare present and past events to evaluate the consequences of past decisions and to apply lessons learned.
SOC.9-12.1.3.3	Gather relevant information from multiple sources representing a wide range of views (including historians and experts) while using the date, context, and corroborative value of the sources to guide the selection.

Interdisciplinary Connections

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.
SCI.HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
TECH.8.1.12.C.CS4	Contribute to project teams to produce original works or solve problems.

Technology Standards

TECH.8.1.12.C.CS4	Contribute to project teams to produce original works or solve problems.

TECH.8.1.12.D.CS3	Exhibit leadership for digital citizenship.
TECH.8.1.12.E.CS4	Process data and report results.
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.
TECH.8.1.12.F.CS4	Use multiple processes and diverse perspectives to explore alternative solutions.
TECH.8.2.12.C.CS2	The application of engineering design.

21st Century Themes/Careers

CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.

Financial Literacy Integration

PFL.9.1.12.C.1	Compare and contrast the financial benefits of different products and services offered by a variety of financial institutions.
PFL.9.1.12.C.2	Compare and compute interest and compound interest and develop an amortization table using business tools.
PFL.9.1.12.C.3	Compute and assess the accumulating effect of interest paid over time when using a variety of sources of credit.

Instructional Strategies & Learning Activities

- Due to the review of this chapter, use the book activities and extensions to give added dimension.
- Use graphing calculator to explore tables.
- Spend an entire day using modeling activity.
- Specifically use the extension on 3.4
- Section 3.5 discusses set notation; teacher will use throughout the chapter, but will not dedicate a specific day for it
- Spend at least one day dedicated to modeling problems
- Use the 4.3 activity/extension
- Use the 4.4 activity.extension
- 5.8 Extension Activity
- Use problems and activities from book involving modeling problems, especially the activities in 9.2 and 9.4
- Provide access to online book
- Provide access to book pages and problems through Canvas and Twitter
- Provide access to review keys

Differentiated Instruction

- Inquiry/Problem-Based Learning
- Learning preferences integration (visual, auditory, kinesthetic)

- Tiered Learning Targets
- Meaningful Student Voice & Choice
- Relationship-Building & Team-Building
- Self-Directed Learning
- Debate
- Student Data Inventories
- Goal-Setting & Learning Contracts
- Game-Based Learning
- Grouping
- Rubrics
- Jigsaws
- Learning Through Workstations
- Concept Attainment
- Flipped Classroom
- Mentoring
- Assessment Design & Backwards Planning

Formative Assessments

- Daily homework checks
- Quiz
- Chapter Test
- Exit Tickets
- Warm-ups

Summative Assessment

- Unit Test
- Unit Project

Benchmark Assessments

Students will take NJSLA Algebra 1 Benchmark A

Alternate Assessments

- Modified homework
- Modified quizzes
- Modified tests
- Modified projects

Resources & Technology

- google docs, spreadsheets, slides
- TI graphing calculator
- document camera
- chromebooks
- Promethean board
- websites: desmos, geogebra, EdPuzzle
- Canvas

BOE Approved Texts

Algebra 1 Common Core, Peasron 9780133185485

Closure

- Low-Stakes Quizzes - Give a short quiz using technologies like Kahoot or a Google form.
- Have students write down three quiz questions (to ask at the beginning of the next class).
- Have students dramatize a real-life application of a skill.
- Ask a question. Give students ten seconds to confer with peers before you call on a random student to answer. Repeat.
- Have kids orally describe a concept, procedure, or skill in terms so simple that a child in first grade would get it.
- Direct kids to raise their hands if they can answer your questions. Classmates agree (thumbs up) or disagree (thumbs down) with the response.
- Have kids create a cheat sheet of information that would be useful for a quiz on the day's topic.
- Kids write notes to peers describing what they learned from them during class discussions.
- Have students fill out a checklist with the objectives for the day.
- Have students complete an exit ticket without putting their name on it. Hand back exit tickets the next day in class and have students correct as a warm up.
- Ask students to write what they learned, and any lingering questions on an "exit ticket". Before they leave class, have them put their exit tickets in a folder or bin labeled either "Got It," "More Practice, Please," or "I Need Some Help!"

- After writing down the learning outcome, ask students to take a card, circle one of the following options, and return the card to you before they leave: "Stop (I'm totally confused. Go (I'm ready to move on.)" or "Proceed with caution (I could use some clarification on . . .)"

ELL

- Alternate Responses
- Advance Notes
- Extended Time
- Teacher Modeling
- Simplified Written and Verbal Instructions
- Frequent Breaks
- E-Dictionaires
- Google Translate

Special Education

- Shorten assignments to focus on mastery of key concepts.
- Specify and list exactly what the student will need to learn to pass.
- Evaluate the classroom structure against the student's needs (flexible structure, firm limits, etc.).
- Keep workspaces clear of unrelated materials.
- Keep the classroom quiet during intense learning times.
- Reduce visual distractions in the classroom (mobiles, etc.).
- Provide a computer for written work.
- Seat the student close to the teacher or a positive role model.
- Provide an unobstructed view of the chalkboard, teacher, movie screen, etc.
- Keep extra supplies of classroom materials (pencils, books) on hand.
- Maintain adequate space between desks.
- Give directions in small steps and in as few words as possible.
- Number and sequence the steps in a task.
- Have student repeat the directions for a task.
- Provide visual aids.
- Go over directions orally.
- Provide a vocabulary list with definitions.
- Permit as much time as needed to finish tests.
- Allow tests to be taken in a room with few distractions (e.g., the library).
- Have test materials read to the student, and allow oral responses.
- Divide tests into small sections of similar questions or problems.

- Allow the student to complete an independent project as an alternative test.
- Allow take-home or open-book tests.
- Show a model of the end product of directions (e.g., a completed math problem or finished quiz).
- Stand near the student when giving directions or presenting a lesson.
- Mark the correct answers rather than the incorrect ones.
- Permit a student to rework missed problems for an additional credit grade.
- Average grades out when assignments are reworked, or grade on corrected work.

504

- preferential seating
- extended time on tests and assignments
- reduced homework or classwork
- verbal, visual, or technology aids
- modified textbooks or audio-video materials
- behavior management support
- adjusted class schedules or grading
- verbal testing
- excused lateness, absence, or missed classwork
- pre-approved nurse's office visits and accompaniment to visits
- occupational or physical therapy

At Risk

- Have student restate information
- Provision of notes or outlines
- Concrete examples
- Assistance in maintaining uncluttered space
- Weekly home-school communication tools (notebook, daily log, phone calls or email messages)
- Peer or scribe note-taking
- Lab and math sheets with highlighted instructions
- Graph paper to assist in organizing or lining up math problems
- Use of manipulatives
- No penalty for spelling errors or sloppy handwriting
- Follow a routine/schedule
- Teach time management skills

- Verbal and visual cues regarding directions and staying on task
- Adjusted assignment timelines
- Visual daily schedule
- Immediate feedback
- Work-in-progress check
- Pace long-term projects
- Preview test procedures
- Cue/model expected behavior
- Use peer supports and mentoring
- Chart progress and maintain data

Gifted and Talented

- Offer the Most Difficult First
- Pretest for Volunteers
- Offer choice
- Speak to Student Interests
- Allow G/T students to work together
- Tiered learning
- Focus on effort and practice
- Encourage risk taking