Algebra I Course Map

Course Overview for Algebra

In Algebra I, students focus on the key concepts of algebraic thinking: expressions, equations, and inequalities; linear, quadratic, and exponential functions; and manipulating variables. Students learn to represent these functions as verbal statements, equations, tables, and graphs. They become practitioners of algebraic thinking by applying their learning to real-world and mathematical problems. The course also teaches students to form coherent mathematical arguments, and to articulate these arguments in clear, precise writing.

Recommended Fluencies for Algebra I:

- Analytic geometry of lines, including modeling with equations
- Add, subtract, and multiply polynomials
- Transforming expressions and chunking (seeing the parts of an expression as a single object) as used in factoring, completing the square, and other algebraic calculations
- Graphing functions and interpreting key features of graphs and fitting a data set to a curve
- Understand quantities and their relationships - using appropriate units
- Understand effects of parameter changes and apply them to create a rule modeling a function

CCSS Emphasis Seeing Structure in Expressions · Reasoning with Equations and Inequalities · Creating Equations · Reasoning Quantitatively · Interpreting and Building Functions · Interpreting Categorical and Quantitative Data · Performing operations on Polynomials · Interpreting Linear, Quadratic and Exponential Functions in terms of the situation they model

Course Competencies Students continue to interface with the Standards of Mathematical Practices that intend to guide students to the real-world, logical use of MAP. The course will also add the PARCC performance level descriptors for measuring student command of content and refer them to the sub-claims as they pertain to content, additional supporting content, apply reasoning, and exhibit accurate modeling.

Competency Sets:

Standards of Mathematical Practice
PARCC PLDs

Modules for this Course:

Module 1: Relationships Between Quantities and Reasoning with Equations
Module 2: Descriptive Statistics
Module 3: Linear and Exponential Relationships
Module 4: Polynomial and Quadratic Expressions and Equations
Module 5: Quadratic Functions and Modeling

Instructional Model and Implementation Strategies for Math

The WLA math course is a two-tiered approach to teaching on-grade level Algebra and customized learning for students based on their individual growth needs. Both courses will utilize curated learning materials compiled into learning activities called playlists. Using a block schedule, students will attend their Algebra course for 90-minutes on one day and then attend the Math Studio class. The Math Studio course is where students engage in custom made playlists based on their ability level.

Modular Playlists for Algebra: Playlists for Algebra will be made for each module written in this course map. The playlist will consist of learning materials that engage students in a conceptual, procedural, and applied understanding of each standard. A playlist might include:

- Direct instruction videos or tutoring sessions made to introduce a topic (conceptual understanding)
- List of practice problems (procedural practice)
- Performance tasks/word problem/real-world Scenarios (application)
- Small formative assessment (conceptual, procedural, and applied)

Personally Curated Playlists for Math Studio: Playlists made for students in the Math Studio courses are personally curated based on diagnostic assessments. Each student will take the Measures of Academic Progress (MAP) diagnostic test in addition to other diagnostic assessments to measure each students individual, standardized abilities. Playlists will be made that address student's growth needs starting with the most delayed skills first (farthest back in grade level). Playlists will follow a similar format to the Algebra course playlists in that they will ensure conceptual, procedural, and applied understanding of a standard.

Personalized Tutoring and Flex Models of Instruction: Teachers will use a variety of methods to capture data from students as they progress through playlists. Teachers will use these measurements to aggregate students together who need to review a concept. The teacher will arrange time within a class period to review concepts to groups of students as needed through the completion of a playlist.

Instructional Strategies Utilized in Algebra and Math Studio:

- **Accountable video-based Instruction:** videos used to introduce or review a specific concept in Math that includes practice problems and scenarios within the video ensuring that students attention and time spent. Student usage data is tracked as well as their achievement data on video-associated assessments.

- **Small Group Instruction:** direct instruction or review of a concept with a teacher in groups ranging from 2-6 students.

- **Flex Tutoring Sessions:** as students progress through a playlist they made become stuck on a specific concept, using data and flexible scheduling a facilitating teacher may group students together for remediation, review, or further explanation.

- **Adaptive Problem Sets:** Programs like ALEKS math, IXL Math, or Kahn Academy allow students to attempt a problem set for a specific standard or skill. As students answer questions correctly the problems become more rigorous, as they answer them incorrectly the software reteaches the topic and provides lower level questions. If a student is stuck with a specific skill they may flag a teacher for Flex Tutoring, Small-group instruction, or in-the-moment help.

- **Problem-based Discussions:** Use of a real-world scenario that requires specific Math skills to solve where students must collaborate on how to go about solving the problem then attempt to solve the problem as a group.

- **Multi-step Performance Tasks:** a multi-step problem that uses an application of multiple Math skills or concepts to solve an outcome many times using real-world scenarios.

- **Digital Formative Assessments:** using digital hosting software within a Learning Management System (such as Canvas) or an formative assessment engine (Formative at goformative.com) students can take a digitally-based assessment and get results immediately.

- **Project-based Learning**: teaching method in which students gain knowledge and skills by working for an extended period of time to investigate and respond to an engaging and complex question, problem, or challenge.

Methods of Assessment in the Algebra Course

Students will be assessed in a variety of methods throughout the Algebra course with assessments ranging in length, depth, and style. Assessments in some cases will seek to emulate the PARCC assessment and in other instances assess students' abilities to apply their skills in other environments. Below is a list of assessment types for the Algebra Course:

Digital Formative Assessments (Exit Tickets): students will take small digital assessments at the end of each playlist within a module. These assessments provide small, instantaneous feedback to students on their learning.

Performance-based Assessments for PARCC Performance Level Descriptors: students will be given multi-step problems to solve that integrate the standards prescribed in the PARCC Performance Level Descriptors. Assessments will be given when each student has learned the concepts categorized within a sub-claim and use a single question stimulus with multiple steps for solving the problem. For example, as students complete all standards in the Expressions strand of Algebra I they will be given a Performance-based Assessment that addressed that sub-claim following the rubric set out in the Performance-Level Descriptors:

PARCC
Performance Level Descriptors – Algebra I

	Algebra I: Sub-Claim A The student solves problems involving the Major Content for the grade/course with connections to the Standards for Mathematical Practice.			
	Level 5: Exceeds Expectations	**Level 4: Meets Expectations**	**Level 3: Approaches Expectations**	**Level 2: Partially Meets Expectations**
Expressions A-SSE.1-1 A-SSE.1-2 A-SSE.2-1 A-SSE.2-4 A.APR.1-1	Writes and **analyzes** equivalent numerical and polynomial expressions in one variable, using addition, subtraction, multiplication and factoring, **including multi-step problems.**	Writes equivalent numerical and polynomial expressions in one variable, using addition, subtraction, multiplication **and factoring.**	Writes equivalent numerical and polynomial expressions in one variable, using addition, subtraction and multiplication.	Writes equivalent numerical and polynomial expressions in one variable, using addition, subtraction and multiplication.
	Interprets parts of **complicated** exponential and quadratic expressions that represent a quantity in terms of its context	**Interprets parts of exponential and quadratic expressions that represent a quantity in terms of its context.**	Identifies components of exponential **and quadratic** expressions.	Identifies components of exponential expressions.

Modular Assessments: At the completion of a module students will take a Modular assessment that assesses the conceptual, procedural, and applied portions of a standard.

Interim Assessments: At the completion of every interim students will take interim assessments. These assessments emulate PARCC-styled assessments and assess all materials covered up to that point of the year.

Project Artifacts and Exhibitions: Throughout each interim students will be asked to investigate a challenge or problem aligned to the interim topic and complete a project that addresses the topic while also integrating skills learned in each course. Each project will have a course-specific artifact or exhibition that is assessed by the course teacher.

Standards Coverage

Interim Session	Date Range	Standards Covered
1	**Aug 29-Nov 3** (47 days)	**Module 1: Relationships Between Quantities and Reasoning with Equations** **Major:** A.SSE.1, A.CED.1-3, A.REI.1, A.REI.3 **Supporting:** N.Q.1-3
2	**Nov 7-Feb 3** (48 Days)	**Module 2: Descriptive Statistics** S.ID.1-3, S.ID.5,6, S.ID.7-9 **Module 3: Linear and Exponential Relationships** **Major:** A.REI.5,6, F.IF1-3, F.IF.4, **Supporting:** N.RN.1,2, A.REI.5,6, F.IF.7&9, F.BF.3
3	**Feb 6-Apr 12** (47 Days)	**Module 3: Linear and Exponential Relationships** **Module 4: Polynomial Expressions, Equations and Functions** A.SSE.1,2, A.SSE.3, A.APR.1, A.CED.1,2,4, A.REI.4, A.REI.5-7
4	**Apr 24-June 30** (45 days)	**Module 4: Polynomial Expressions, Equations and Functions** **Module 5: Quadratic Functions and Modeling** N.RN.3, F.IF.4-6, F.IF.7-9, F.BF.1, F.BF.3,4, F.LE.1-3, F.LE.5-6

Module 1: Relationships Between Quantities and Reasoning with Equations

In this module students analyze and explain precisely the process of solving an equation. Through repeated reasoning, students develop fluency in writing, interpreting, and translating between various forms of linear equations and inequalities and make conjectures about the form that a linear equation might take in a solution to a problem. They reason abstractly and quantitatively by choosing and interpreting units in the context of creating equations in two variables to represent relationships between quantities. They master the solution of linear equations and apply related solution techniques and the properties of exponents to the creation and solution of simple exponential equations.

# of Days	Standards	Supporting Standards	Course Resources	Assessments
47	A.SSE.1, A.CED.1-3, A.REI.1, A.REI.3	RN.B.3 N.Q.1-3	EngageNY Illustrative Math Formative MARS LearnZillion	Interim 1 Formative Exit Tickets (goformative.com)

Module 2: Descriptive Statistics

In this module students connect their experience displaying numerical data and summarizing that data using measures of center and variability. Students learn more formal means of assessing whether or not a model fits the data. Students use regression techniques to describe approximately linear relationships between quantities. Using graphical representations students use knowledge of context to make judgments about the appropriateness of linear models and look at residuals to analyze the goodness of fit.

# of Days	Standards	Supporting Standards	Course Resources	Assessments
20	S.ID.1-3, S.ID.5,6, S.ID.7-9		EngageNY Illustrative Math Formative MARS LearnZillion	Interim 2 Formative Exit Tickets (goformative.com)

Module 3: Linear and Exponential Functions

In this module students focus on linear and exponential relationships in two variables by developing a solid understanding of functions. Students master function notation and conceptual understanding of domain and range. Students interpret arithmetic sequences as linear functions and geometric sequences as exponential functions as they learn to model functions graphically, numerically, symbolically and verbally. They can translate between representations as well as understand the limitations of each representation. They move beyond viewing functions as input/output processes and begin to view functions as objects in their own right. When functions describe relationships between quantities arising from a context, students learn to reason within the context of the units used to represent those quantities. Through repeated reasoning, students develop fluency writing, interpreting and translating linear equations and inequalities in two variables.

# of Days	Standards	Supporting Standards	Course Resources	Assessments
27 days (Interim 2) **17 days (Interim 3)**	A.REI.10-12, F.IF.1-3, F.IF.4	N.RN.1,2, A.REI.5,6 F.IF.7&9, F.BF.3	EngageNY Illustrative Math Formative MARS LearnZillion	Interim 2 & 3 Formative Exit Tickets (goformative.com)

Module 4: Polynomial and Quadratic Expressions and Equations

In this module students build on and extend their knowledge of exponents. Students apply understanding of numbers to their ability to see structure in and create quadratic and exponential expressions. They create and solve equations, inequalities, and systems of equations involving quadratic expressions and determine the value of the function it defines. Students understand that polynomials for a system analogous to the integers they choose and produce equivalent forms of an expression.

# of Days	Standards	Supporting Standards	Course Resources	Assessments
30	A.SSE.1,2, A.SSE.3, A.APR.1, A.CED.1,2,4, A.REI.4, A.REI.5-7		EngageNY Illustrative Math Formative MARS LearnZillion	Interim 3 & 4 Formative Exit Tickets

Module 5: Quadratic Functions and Modeling

In this module students explore distinctions between rational and irrational numbers. They consider quadratic functions, comparing the key characteristics of quadratic functions to those of linear and exponential functions. Students use these functions to model various phenomena. They learn to anticipate the graph of a quadratic function by interpreting various forms of quadratic expressions. They analyze real solutions of quadratic equations as zeros of a related quadratic function. Students learn that when quadratic equations do not have real solutions the number solution must be extended so that solutions exist, analogous to the way in which extending whole numbers to the negative numbers allows x+1 =0 to have a solution. Students expand their experience with functions to include more specialized functions – absolute value, step, and piecewise functions.

# of Days	Standards	Supporting Standards	Course Resources	Assessments
47	N.RN.3, F.IF.4-6, F.IF.7-9, F.BF.1, F.BF.3,4, F.LE.1-3, F.LE.5-6		EngageNY Illustrative Math Formative (goformative.com) MARS LearnZillion	Interim 4 Formative Exit Tickets