

ALGEBRA I, SEMESTER A

COURSE OVERVIEW AND GOALS

Algebra I builds students' command of linear, quadratic, and exponential relationships. Students learn through discovery and application, developing the skills they need to break down complex challenges and demonstrate their knowledge in new situations.

Course topics include problem solving with basic equations and formulas; an introduction to functions and problem solving; linear equations and systems of linear equations; exponents and exponential functions; sequences and functions; descriptive statistics; polynomials and factoring; quadratic equations and functions; and function transformations and inverses. This course supports students as they develop computational fluency, deepen conceptual understanding, and apply mathematical knowledge. Students discover new concepts through guided instruction and confirm their understanding in an interactive, feedback-rich environment.

A range of activities allow students to think mathematically in a variety of scenarios and tasks. In discussion activities, students exchange and explain their mathematical ideas. Modeling activities ask them to analyze real-world scenarios and mathematical concepts. Journaling activities have students reason abstractly and quantitatively, construct arguments, critique reasoning, and communicate precisely. And in performance tasks, students synthesize their knowledge in novel, real-world scenarios, make sense of multifaceted problems, and persevere in solving them. This course is built to state standards. Throughout the course, students are evaluated by a variety of assessments designed to prepare them for the content, form, and depth of state exams.

There are no required or optional materials.

By the end of this course, you will be able to do the following:

- ❖ Apply algebraic properties to simplify expressions.
- ❖ Solve linear equations and inequalities in one variable.
- ❖ Examine functions presented in multiple forms.
- ❖ Interpret the graphs of functions and combine functions to solve problems.
- ❖ Interpret and create graphs of linear relationships. Write one-variable and two-variable linear equations and use them to solve problems.

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- A horizontal bar composed of several colored segments: orange, yellow, pink, purple, blue, green, and light green.
- ❖ Write systems of equations and solve them using algebraic and graphical methods.
 - ❖ Apply exponent rules to simplify expressions.
 - ❖ Write and graph exponential functions and identify their key features.
 - ❖ Identify and compare arithmetic and geometric sequences.

COURSE COMPONENTS AND GRADING RUBRIC

The table gives a breakdown of the weight for each component in the course. Weight represents the percentage of the total score coming from each activity.

Course Components	Count	Weight
Pretest. <i>A pretest is an optional assessment, typically designed for credit recovery. If a student shows mastery of a lesson objective, the student may be automatically exempted from the upcoming activities associated with the mastered objective. Each passing pretest grade is entered into the gradebook.</i>	7	0%
Practice. <i>A practice activity provides instruction similar to that found in a study so that students can practice or review skills necessary to complete their assignment with mastery.</i>	7	10%
Discussion. <i>A discussion activity is an opportunity for students to collaborate with their peers. This activity gives students the opportunity to practice speaking and listening in a clear and logical manner and to receive feedback from peers.</i>	7	5%
Journal. <i>A journal is a short reflective writing exercise that encourages students to connect historical events and ideas to their own lives and circumstances.</i>	7	5%
Project. <i>A project is a hands-on investigation that extends over several weeks.</i>	1	5%
Mastery Test. <i>A mastery test is a computer-scored lesson-level summative assessment.</i>	27	30%
Posttest. <i>A posttest appears at the end of each unit.</i>	7	15%
End-Of-Semester Test. <i>An end-of-semester test (EOS) appears at the end of each course.</i>	1	10%
Teacher-Graded Posttest. <i>A posttest that prompts students for written responses appears at the end of each unit.</i>	7	20%
Total	71	100%

**Teachers may manually adjust these weights if desired, per district grading requirements.*

UNIT 1: FOUNDATIONS OF ALGEBRA

In this unit you will classify numbers, rewrite and simplify expressions, and solve one-step equations.

Lesson and Duration	Activities	Objectives
Rational and Irrational Numbers 1 hour, 40 minutes	<i>Overview: Rational and Irrational Numbers</i> <i>Study: Rational and Irrational Numbers</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Rational and Irrational Numbers</i>	- Define rational and irrational numbers and explore their properties. - Identify types of numbers resulting from operations on rational and irrational numbers.
Algebraic Properties and Expressions 2 hours, 25 minutes	<i>Overview: Algebraic Properties and Expressions</i> <i>Study: Algebraic Properties and Expressions</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Algebraic Properties and Expressions</i> <i>Journal: Algebraic Properties and Expressions</i>	- Interpret the different parts of mathematical expressions. - Simplify expressions using the order of operations and properties of operations. - Convert mathematical language into variables and expressions. - Translate everyday language into mathematical expressions. - Define appropriate variables to model situations.
Solving Linear Equations 2 hours, 25 minutes	<i>Overview: Solving Linear Equations</i> <i>Study: Solving Linear Equations</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Solving Linear Equations</i> <i>Practice: Modeling: Solving Linear Equations</i>	- Isolate variables to solve an equation. - Solve equations involving addition, subtraction, multiplication, and division. - Identify each step in solving an equation. - Write and solve an equation representing a real-world situation.

Lesson and Duration	Activities	Objectives
Wrap-Up: Foundations of Algebra 2 hours, 55 minutes	<i>Review: Foundations of Algebra</i> <i>Discussion: Using X to Mark the Spot</i> <i>Posttest: Foundations of Algebra</i> <i>Teacher-Graded Posttest: Foundations of Algebra</i>	- Review key ideas presented in the unit. - Apply concepts and skills from the unit by completing a teacher-scored assignment. - Demonstrate mastery of concepts and skills from the unit by completing a computer-scored assessment. - Demonstrate mastery of concepts and skills from the unit by completing a teacher-scored assessment.

UNIT 2: SOLVING EQUATIONS AND INEQUALITIES

In this unit you will solve multistep linear equations and inequalities, rewrite equations in two variables, and solve problems by converting units.

Lesson and Duration	Activities	Objectives
Solving Multistep Linear Equations 2 hours, 25 minutes	<i>Overview: Solving Multistep Linear Equations</i> <i>Study: Solving Multistep Linear Equations</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Solving Multistep Linear Equations</i> <i>Practice: Modeling: Multistep Linear Equations</i>	- Isolate the variables in an equation by identifying the operations involved. - Combine like terms to simplify an equation. - Apply the order of operations for solving an equation in one variable. - Identify equations that have no solution or an infinite number of solutions. - Translate real-life problems into mathematical sentences and equations in one variable, and then solve the problem.

Lesson and Duration	Activities	Objectives
Solving Linear Inequalities 1 hour, 40 minutes	<i>Overview: Solving Linear Inequalities</i> <i>Study: Solving Linear Inequalities</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Solving Linear Inequalities</i>	- Solve a multistep inequality by isolating the variable. - Solve an inequality that involves collecting like terms. - Create inequalities in one variable and use them to solve real-world problems.
Literal Equations 1 hour, 40 minutes	<i>Overview: Literal Equations</i> <i>Study: Literal Equations</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Literal Equations</i>	- Rewrite linear equations in two variables to solve for x or y. - Solve linear equations in one variable that have coefficients represented by letters. - Rearrange formulas to solve for a quantity of interest in a real-world problem.
Measurement and Units 2 hours, 25 minutes	<i>Overview: Measurement and Units</i> <i>Study: Measurement and Units</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Measurement and Units</i> <i>Journal: Measurement and Units</i>	- Identify the difference between precision and accuracy. - Determine a level of precision appropriate to the limitations of a measurement tool. - Identify the appropriate unit for a measurement. - Solve problems involving the conversion of one unit to another. - Solve problems involving multistep unit conversion.
Performance Task 2 hours, 50 minutes	<i>Overview: Performance Task</i> <i>Study: Problem Solving with Inequalities</i> <i>Project: Performance Task: A Trade Show Booth</i>	- Analyze a series of problems involving solving and simplifying mathematical expressions using multiplication and division. - Apply various problem-solving strategies to arrive at solutions to these problems.

Lesson and Duration	Activities	Objectives
Wrap-Up: Solving Equations and Inequalities 2 hours, 55 minutes	<i>Review: Solving Equations and Inequalities</i> <i>Discussion: In Your Own Words</i> <i>Posttest: Solving Equations and Inequalities</i> <i>Teacher-Graded Posttest: Solving Equations and Inequalities</i>	- Review key ideas presented in the unit. - Apply concepts and skills from the unit by completing a teacher-scored assignment. - Demonstrate mastery of concepts and skills from the unit by completing a computer-scored assessment. - Demonstrate mastery of concepts and skills from the unit by completing a teacher-scored assessment.

UNIT 3: FUNCTIONS

In this unit you will examine properties of functions, including domain and range. You will also graph functions and combine functions.

Lesson and Duration	Activities	Objectives
Domain and Range 2 hours, 25 minutes	<i>Overview: Domain and Range</i> <i>Study: Domain and Range</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Domain and Range</i> <i>Journal: Domain and Range</i>	- Write a relation in function notation when given a verbal description. - Evaluate functions for inputs in their domains and interpret the results. - Determine whether a given mapping diagram represents a function. - Define the domain and range of a given function and understand their relationship. - Identify the domain and range of a function when given a mapping diagram.

Lesson and Duration	Activities	Objectives
Identifying Functions 1 hour, 40 minutes	<i>Overview: Identifying Functions</i> <i>Study: Identifying Functions</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Identifying Functions</i>	- Identify a function's domain and range values in an input-output table. - Determine whether a relation is a function, given a table of values. - Determine whether a graph is a function by using the vertical line test.
Graphs of Functions 2 hours, 25 minutes	<i>Overview: Graphs of Functions</i> <i>Study: Graphs of Functions</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Graphs of Functions</i> <i>Practice: Modeling: Graphs of Functions</i>	- Graphically define the domain and range of a function. - Identify intervals in which a function is increasing, decreasing, or constant. - Relate points on a graph to input/output values by evaluating a function for inputs in its domain. - Relate the domain of a function to its graph and the relationship it describes.
Adding and Subtracting Functions 1 hour, 40 minutes	<i>Overview: Adding and Subtracting Functions</i> <i>Study: Adding and Subtracting Functions</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Adding and Subtracting Functions</i>	- Add two or more functions to form a new function. - Subtract two or more functions to form a new function. - Apply the arithmetic of functions to solve problems.
Wrap-Up: Functions 2 hours, 55 minutes	<i>Review: Functions</i> <i>Discussion: Relating to Functions</i> <i>Posttest: Functions</i>	- Review key ideas presented in the unit. - Apply concepts and skills from the unit by completing a teacher-scored assignment.

Lesson and Duration	Activities	Objectives
	<i>Teacher-Graded Posttest: Functions</i>	- Demonstrate mastery of concepts and skills from the unit by completing a computer-scored assessment. - Demonstrate mastery of concepts and skills from the unit by completing a teacher-scored assessment.

UNIT 4: LINEAR EQUATIONS

In this unit, you will examine and graph linear equations and inequalities.

Lesson and Duration	Activities	Objectives
Slope <i>2 hours, 25 minutes</i>	<i>Overview: Slope</i> <i>Study: Slope</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Slope</i> <i>Journal: Slope</i>	- Identify slope as a measure of the change in the y-variable with respect to the x-variable. - Apply the slope formula to ordered pairs on a line. - Calculate and interpret the rate of change of a function from a graph. - Recognize relationships in which one quantity changes at a constant rate relative to another.
Slope-Intercept Equation of a Line <i>2 hours, 25 minutes</i>	<i>Overview: Slope-Intercept Equation of a Line</i> <i>Study: Slope-Intercept Equation of a Line</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Slope-Intercept Equation of a Line</i>	- Write and graph equations in the form $y = mx + b$. - Recognize that the graph of a linear equation in the form $y = mx + b$ shows the set of all of its solutions plotted in the coordinate plane. - Evaluate a linear function for inputs in its domain when using function notation.

Lesson and Duration	Activities	Objectives
	<i>Practice: Modeling: Slope-Intercept Equation of a Line</i>	- Graph an equation representing a real-world linear relationship, and identify the meaning of the slope and y-intercept. - Compare the slopes and y-intercepts of linear functions represented in different ways.
Point-Slope Equation of a Line 1 hour, 40 minutes	<i>Overview: Point-Slope Equation of a Line</i> <i>Study: Point-Slope Equation of a Line</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Point-Slope Equation of a Line</i>	- Find the equation for a line given its slope and any point on the line. - Find the point-slope equation given two points on the line. - Convert an equation from point-slope form to slope-intercept form. - Solve a real-world problem by graphing and writing an equation that describes the relationship.
Parallel and Perpendicular Lines 1 hour, 40 minutes	<i>Overview: Parallel and Perpendicular Lines</i> <i>Study: Parallel and Perpendicular Lines</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Parallel and Perpendicular Lines</i>	- Write the equation of a line that is parallel to a given line using the point-slope formula. - Write the equation of a line that is perpendicular to a given line using the point-slope formula. - Solve a real-world problem by writing and graphing equations of parallel and perpendicular lines.
Linear Inequalities 1 hour, 40 minutes	<i>Overview: Linear Inequalities</i> <i>Study: Linear Inequalities</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Linear Inequalities</i>	- Identify points in the solution set of a linear inequality. - Determine whether the boundary line for a given inequality is graphed with a solid or dashed line.

Lesson and Duration	Activities	Objectives
		- Identify the half plane that represents the solution to a given inequality. - Graph the solution to a linear inequality in two variables as a half plane.
Wrap-Up: Linear Equations 2 hours, 55 minutes	<i>Review: Linear Equations</i> <i>Discussion: A Slippery Slope</i> <i>Posttest: Linear Equations</i> <i>Teacher-Graded Posttest: Linear Equations</i>	- Review key ideas presented in the unit. - Apply concepts and skills from the unit by completing a teacher-scored assignment. - Demonstrate mastery of concepts and skills from the unit by completing a computer-scored assessment. - Demonstrate mastery of concepts and skills from the unit by completing a teacher-scored assessment.

UNIT 5: SYSTEMS OF LINEAR EQUATIONS

In this unit, you will solve linear systems of equations and inequalities using multiple methods.

Lesson and Duration	Activities	Objectives
Two-Variable Systems: Graphing 1 hour, 40 minutes	<i>Overview: Two-Variable Systems: Graphing</i> <i>Study: Two-Variable Systems: Graphing</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Two-Variable Systems: Graphing</i>	- Recognize what it means when two lines have zero, one, or infinitely many points in common. - Solve systems of equations using graphs. - Recognize that the solution of a system of equations is the point where their graphs intersect.

Lesson and Duration	Activities	Objectives
		- Analyze real-world problems by writing and graphing systems of linear equations. - Identify or approximate solutions to systems of equations by using tables.
Two-Variable Systems: Substitution 1 hour, 40 minutes	<i>Overview: Two-Variable Systems: Substitution</i> <i>Study: Two-Variable Systems: Substitution</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Two-Variable Systems: Substitution</i>	- Determine when to use substitution instead of graphing to solve a system of equations. - Solve systems of linear equations by substitution. - Test the solution to a system of equations by using substitution. - Write equations to represent a real-world relationship, and solve the system of equations to answer a question.
Two-Variable Systems: Elimination 2 hours, 25 minutes	<i>Overview: Two-Variable Systems: Elimination</i> <i>Study: Two-Variable Systems: Elimination</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Two-Variable Systems: Elimination</i> <i>Journal: Two-Variable Systems: Elimination</i>	- Identify when to use elimination instead of graphing or substitution to solve systems of equations. - Add or subtract a value on both sides of an equation to eliminate terms. - Manipulate equations in standard form using multiplication to create equal or opposite coefficients. - Solve systems of equations using the elimination method. - Prove that performing operations such as multiplication and addition on a system of equations produces a system with the same solution.

Lesson and Duration	Activities	Objectives
		Solve a system of equations with infinite solutions algebraically and graphically.
Two-Variable Systems of Inequalities 2 hours, 25 minutes	<i>Overview: Two-Variable Systems of Inequalities</i> <i>Study: Two-Variable Systems of Inequalities</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Two-Variable Systems of Inequalities</i> <i>Practice: Modeling: Two-Variable Systems of Inequalities</i>	- Graph half planes to find common solutions to systems of inequalities. - Identify graphs of half planes in which there are no common solutions. - Create a system of inequalities to represent real-world constraints, and use this system to solve a problem.
Wrap-Up: Systems of Linear Equations 2 hours, 55 minutes	<i>Review: Systems of Linear Equations</i> <i>Discussion: What's the Solution?</i> <i>Posttest: Systems of Linear Equations</i> <i>Teacher-Graded Posttest: Systems of Linear Equations</i>	- Review key ideas presented in the unit. - Apply concepts and skills from the unit by completing a teacher-scored assignment. - Demonstrate mastery of concepts and skills from the unit by completing a computer-scored assessment. - Demonstrate mastery of concepts and skills from the unit by completing a teacher-scored assessment.

UNIT 6: EXPONENTS AND EXPONENTIAL FUNCTIONS

In this unit, you will simplify exponential expressions and examine exponential functions and their graphs.

Lesson and Duration	Activities	Objectives
Exponents 1 hour, 40 minutes	<i>Overview: Exponents</i> <i>Study: Exponents</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Exponents</i>	• Apply the laws of exponents to simplify an expression. • Rewrite expressions containing radicals and rational exponents, using properties of exponents. • Rewrite a radical as an expression with rational exponents.
Exponential Functions 2 hours, 25 minutes	<i>Overview: Exponential Functions</i> <i>Study: Exponential Functions</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Exponential Functions</i> <i>Practice: Modeling: Exponential Functions</i>	• Define exponential growth and decay. • Write a specific function, given a description of a relationship, by using the general formula for an exponential function. • Evaluate exponential functions for a given input. • Interpret the parameters of an exponential function in the context of a real-world problem.
Graphs of Exponential Functions 2 hours, 25 minutes	<i>Overview: Graphs of Exponential Functions</i> <i>Study: Graphs of Exponential Functions</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Graphs of Exponential Functions</i> <i>Journal: Graphs of Exponential Functions</i>	• Identify the y-intercept and the point $(1, b)$ for graphs of functions $f(x) = b^x$, and then determine whether the graph is increasing or decreasing. • Determine whether an exponential function is an increasing or decreasing function when given its base. • Find the domain, range, and y-intercept of exponential functions. • Identify the exponential function that represents a given graph. • Interpret the parameters of a real-world function, given its graph.

Lesson and Duration	Activities	Objectives
Wrap-Up: Exponents and Exponential Functions 2 hours, 55 minutes	<i>Review: Exponents and Exponential Functions</i> <i>Discussion: Exponential Potential</i> <i>Posttest: Exponents and Exponential Functions</i> <i>Teacher-Graded Posttest: Exponents and Exponential Functions</i>	- Review key ideas presented in the unit. - Apply concepts and skills from the unit by completing a teacher-scored assignment. - Demonstrate mastery of concepts and skills from the unit by completing a computer-scored assessment. - Demonstrate mastery of concepts and skills from the unit by completing a teacher-scored assessment.

UNIT 7: SEQUENCES AND FUNCTIONS

In this unit, you will solve problems involving arithmetic and geometric sequences.

Lesson and Duration	Activities	Objectives
Arithmetic Sequences 2 hours, 25 minutes	<i>Overview: Arithmetic Sequences</i> <i>Study: Arithmetic Sequences</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Arithmetic Sequences</i> <i>Journal: Arithmetic Sequences</i>	- Define and identify an arithmetic sequence. - Write the explicit and recursive formulas for an arithmetic sequence. - Solve problems about arithmetic sequences using the explicit and recursive formulas. - Find a specific term in an arithmetic sequence. - Find the common difference between terms of an arithmetic sequence. - Translate between the explicit and recursive formulas for an arithmetic sequence.

Lesson and Duration	Activities	Objectives
Geometric Sequences 2 hours, 25 minutes	<i>Overview: Geometric Sequences</i> <i>Study: Geometric Sequences</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Geometric Sequences</i> <i>Practice: Modeling: Geometric Sequences</i>	- Define and identify a geometric sequence. - Write the explicit and recursive formulas for a geometric sequence. - Apply the explicit and recursive formulas to solve problems about geometric sequences. - Find a specific term in a geometric sequence. - Find the common ratio between terms of a geometric sequence. - Translate between the explicit and recursive formulas for a geometric sequence.
Understanding Number Sequences 1 hour, 40 minutes	<i>Overview: Understanding Number Sequences</i> <i>Study: Understanding Number Sequences</i> <i>Checkup: Practice Problems</i> <i>Mastery Test: Understanding Number Sequences</i>	- Identify the formula for finding the n^{th} term of an arithmetic sequence. - Solve real-world problems using arithmetic sequences. - Identify the formula for finding the n^{th} term of a geometric sequence. - Solve real-world problems using geometric sequences. - Solve problems using pyramidal numbers and Fibonacci numbers.
Exponential and Linear Growth 1 hour, 40 minutes	<i>Overview: Exponential and Linear Growth</i> <i>Study: Exponential and Linear Growth</i> <i>Checkup: Practice Problems</i>	- Determine if a table of data represents a linear or exponential function. - Identify the common difference of a linear function.

Lesson and Duration	Activities	Objectives
	<i>Mastery Test: Exponential and Linear Growth</i>	- Identify the common ratio for an exponential function. - Recognize that exponential growth eventually overtakes linear growth. - Distinguish between exponential growth and decay. - Identify linear and exponential functions from graphs, tables, and verbal descriptions.
Wrap-Up: Sequences and Functions 2 hours, 55 minutes	<i>Review: Sequences and Functions</i> <i>Discussion: What's the Difference?</i> <i>Posttest: Sequences and Functions</i> <i>Teacher-Graded Posttest: Sequences and Functions</i>	- Review key ideas presented in the unit. - Apply concepts and skills from the unit by completing a teacher-scored assignment. - Demonstrate mastery of concepts and skills from the unit by completing a computer-scored assessment. - Demonstrate mastery of concepts and skills from the unit by completing a teacher-scored assessment.

SEMESTER WRAP-UP

In this unit, you will review the concepts and skills presented in the course and take a semester exam.

Lesson and Duration	Activities	Objectives
Semester Wrap-Up 1 hour, 20 minutes	<i>Review: Semester Review</i> <i>End-of-Semester Test: Semester Exam</i>	- Review key ideas presented in the semester. - Demonstrate mastery of concepts and skills from the semester by completing a computer-scored assessment.



Course Overview and Syllabus