Mathematics I, Semester A

Credits: 0.5

Course Overview and Goals

Mathematics I, Semester A, is a single-semester course designed to present mathematics as a coherent, useful, and logical subject that makes use of problem-solving skills. Linear relationships are a main focus of this course. You will graph, create, and solve linear equations and apply function notation to describe linear relationships. You will also explore foundations of geometry and coordinate geometry. You will investigate and prove theorems about lines, angles, triangles, parallelograms, and other polygons and build geometric constructions using both basic tools and technology.

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

- Solve linear equations and inequalities in one variable.
- Apply function notation to describe relationships between quantities, and interpret function notation to solve problems.
- Interpret and create graphs of linear relationships.
- Write one-variable and two-variable linear equations, and use them to solve problems.
- Describe transformations defined by changes in the slope or the *y*-intercept of linear functions.
- Prove geometric theorems using a variety of proof methods. Complete geometric constructions using a variety of tools.
- Find the distance between points, slopes of lines, and midpoints of line segments.
- Apply coordinate geometry to calculate perimeter and area of polygons.

Scope and Sequence

This document outlines the design of Mathematics I, Semester A, as well as the coverage of the Common Core State Standards: Mathematics within the course.

Common Core State Standards: Mathematics

UNIT 1: EXPRESSIONS AND EQUATIONS (DAYS 1 – 12)

In this unit, you will develop the skills to use expressions and equations to describe and solve problems.

Lesson/*CCSS Standards*	Lesson Objective
Syllabus and Orientation	Review the Student Orientation and Course Syllabus at the beginning of this course.
Expressions *CCSS.Math.Content.HSA-SSE.A.1.a*	Use expressions to model and solve problems.
Clarifying Big Ideas: Variables	Explore the different ways variables can be used.
Linear Equations *CCSS.Math.Content.HSN-Q.A.2,* *CCSS.Math.Content.HSA-CED.A.1,* *CCSS.Math.Content.HSA-REI.B.3*	Solve one-step and two-step linear equations in one variable.
Radical Expressions *CCSS.Math.Practice.MP.2,* *CCSS.Math.Content.HSN-Q.A.1*	Rewrite numerical radical expressions involving square roots.
Unit Activity: Expressions and Equations *CCSS.Math.Practice.MP.1,* *CCSS.Math.Practice.MP.3,* *CCSS.Math.Content.HSN-Q.A.1,* *CCSS.Math.Content.HSA-REI.B.3*	Use expressions and radical relationships to solve problems.

UNIT 2: LINEAR EQUATIONS AND INEQUALITIES (DAYS 13 – 29)

In this unit, you will develop the skills necessary to solve linear and absolute value equations and inequalities in real-world and mathematical contexts.

Lesson/*CCSS Standards*	Lesson Objective
Solving Linear Equations *CCSS.Math.Content.HSA-CED.A.1,* *CCSS.Math.Content.HSA-CED.A.3,* *CCSS.Math.Content.HSA-REI.A.1,* *CCSS.Math.Content.HSA-REI.B.3*	Solve multistep linear equations in one variable.

Lesson/*CCSS Standards*	Lesson Objective
Solving Advanced Linear Equations *CCSS.Math.Content.HSN-Q.A.1, CCSS.Math.Content.HSN-Q.A.2, CCSS.Math.Content.HSA-CED.A.1, CCSS.Math.Content.HSA-CED.A.3, CCSS.Math.Content.HSA-REI.A.1, CCSS.Math.Content.HSA-REI.B.3*	Rearrange and solve advanced linear equations in one variable.
Clarifying Big Ideas: Equal Sign and Balance	Evaluate misunderstandings about the equal sign and balance.
Solving Literal Equations *CCSS.Math.Practice.MP.2, CCSS.Math.Content.HSN-Q.A.1, CCSS.Math.Content.HSN-Q.A.3, CCSS.Math.Content.HSA-CED.A.1, CCSS.Math.Content.HSA-CED.A.4, CCSS.Math.Content.HSA-REI.A.1, CCSS.Math.Content.HSA-REI.B.3*	Solve literal equations and formulas for a specified variable.
Solving Linear Inequalities *CCSS.Math.Practice.MP.4, CCSS.Math.Content.HSN-Q.A.2, CCSS.Math.Content.HSN-Q.A.3, CCSS.Math.Content.HSA-CED.A.1, CCSS.Math.Content.HSA-CED.A.3, CCSS.Math.Content.HSA-REI.A.1, CCSS.Math.Content.HSA-REI.B.3*	Solve multistep linear inequalities in one variable and graph the solution set.
Absolute Value Equations *CCSS.Math.Practice.MP.4, CCSS.Math.Content.HSN-Q.A.2, CCSS.Math.Content.HSN-Q.A.3, CCSS.Math.Content.HSA-CED.A.1, CCSS.Math.Content.HSA-CED.A.3, CCSS.Math.Content.HSA-REI.A.1*	Solve one-variable absolute value equations.

Lesson/*CCSS Standards*	Lesson Objective
Absolute Value Inequalities *CCSS.Math.Practice.MP.4,* *CCSS.Math.Content.HSN-Q.A.2,* *CCSS.Math.Content.HSN-Q.A.3,* *CCSS.Math.Content.HSA-CED.A.1,* *CCSS.Math.Content.HSA-CED.A.3,* *CCSS.Math.Content.HSA-REI.A.1*	Solve and graph the solutions to one-variable absolute value inequalities.

UNIT 3: FUNCTIONS (DAYS 30 – 42)

In this unit, you will become familiar with how functions can describe relationships between quantities. You will combine functions and use functions to model real-world problems.

Lesson/*CCSS Standards*	Lesson Objective
Graphing Relations *CCSS.Math.Practice.MP.4,* *CCSS.Math.Content.HSN-Q.A.1,* *CCSS.Math.Content.HSN-Q.A.2,* *CCSS.Math.Content.HSA-REI.D.10,* *CCSS.Math.Content.HSF-IF.B.5,* *CCSS.Math.Content.HSF-IF.B.6*	Identify variables in real-world situations and model the relationships graphically.
Clarifying Big Ideas: Algebra and Reasoning	Consider ways to justify solutions. Explore the difference between showing a procedure and showing your thinking.
Functions *CCSS.Math.Content.HSF-IF.A.1,* *CCSS.Math.Content.HSF-IF.B.5*	Identify functions in multiple representations and relate the domains and ranges.
Function Notation *CCSS.Math.Practice.MP.4,* *CCSS.Math.Content.HSN-Q.A.1,* *CCSS.Math.Content.HSN-Q.A.2,* *CCSS.Math.Content.HSF-IF.A.1,* *CCSS.Math.Content.HSF-IF.A.2,* *CCSS.Math.Content.HSF-IF.B.5*	Use function notation to describe relationships between quantities and interpret function notation accurately to solve problems.

Lesson/*CCSS Standards*	Lesson Objective
Combining Functions *CCSS.Math.Practice.MP.7,* *CCSS.Math.Content.HSA-SSE.A.1.a,* *CCSS.Math.Content.HSA-CED.A.2,* *CCSS.Math.Content.HSF-BF.A.1.b*	Add, subtract, and multiply functions.
Unit Activity: Functions *CCSS.Math.Practice.MP.1,* *CCSS.Math.Practice.MP.4,* *CCSS.Math.Content.HSN-Q.A.1,* *CCSS.Math.Content.HSN-Q.A.2,* *CCSS.Math.Content.HSF-IF.A.1,* *CCSS.Math.Content.HSF-IF.A.2,* *CCSS.Math.Content.HSF-IF.B.4*	Use function notation to describe relationships between quantities and interpret function notation accurately to solve problems.

UNIT 4: LINEAR RELATIONSHIPS (DAYS 43 – 61)

In this unit, you will examine how linear functions, equations, and graphs describe the characteristics of linear relationships and extend your knowledge of linear relationships to special mathematical cases, real-world situations, and linear inequalities.

Lesson/*CCSS Standards*	Lesson Objective
Slope and Graphing *CCSS.Math.Practice.MP.7,* *CCSS.Math.Content.HSA-CED.A.2,* *CCSS.Math.Content.HSF-IF.B.4,* *CCSS.Math.Content.HSF-IF.B.6,* *CCSS.Math.Content.HSF-IF.C.7.a,* *CCSS.Math.Content.HSF-LE.A.1.a,* *CCSS.Math.Content.HSF-LE.A.1.b,* *CCSS.Math.Content.HSF-LE.A.2,* *CCSS.Math.Content.HSF-LE.B.5*	Determine the slope of a line and graph a linear equation in two variables.

Lesson/*CCSS Standards*	Lesson Objective
Writing Linear Functions and Equations *CCSS.Math.Practice.MP.4,* *CCSS.Math.Practice.MP.7,* *CCSS.Math.Content.HSN-Q.A.1,* *CCSS.Math.Content.HSN-Q.A.2,* *CCSS.Math.Content.HSN-Q.A.3,* *CCSS.Math.Content.HSA-SSE.A.1.a,* *CCSS.Math.Content.HSA-CED.A.2,* *CCSS.Math.Content.HSA-CED.A.3,* *CCSS.Math.Content.HSF-IF.B.4,* *CCSS.Math.Content.HSF-IF.B.6,* *CCSS.Math.Content.HSF-LE.A.2,* *CCSS.Math.Content.HSF-LE.B.5*	Write linear functions and equations in two variables and graph them to display the relationship.
Clarifying Big Ideas: Algebra Procedures	Create problems and find solutions. Investigate a variety of solution methods and re-evaluate misunderstandings about "the right way" to solve problems.
Linear Function Transformations *CCSS.Math.Practice.MP.7,* *CCSS.Math.Content.HSA-CED.A.2,* *CCSS.Math.Content.HSF-IF.B.4,* *CCSS.Math.Content.HSF-IF.C.7.a,* *CCSS.Math.Content.HSF-BF.B.3,* *CCSS.Math.Content.HSF-LE.A.2*	Determine the effects of transforming the linear parent function and identify key features of linear functions.
Special Lines *CCSS.Math.Practice.MP.2,* *CCSS.Math.Content.HSA-CED.A.2,* *CCSS.Math.Content.HSA-REI.A.1,* *CCSS.Math.Content.HSF-IF.B.6,* *CCSS.Math.Content.HSF-IF.C.7.a,* *CCSS.Math.Content.HSF-IF.C.9,* *CCSS.Math.Content.HSF-LE.A.2,* *CCSS.Math.Content.HSG-GPE.B.5*	Write equations of parallel, perpendicular, vertical, and horizontal lines.

Lesson/*CCSS Standards*	Lesson Objective
Direct Variation *CCSS.Math.Practice.MP.2,* *CCSS.Math.Practice.MP.8,* *CCSS.Math.Content.HSN-Q.A.1,* *CCSS.Math.Content.HSN-Q.A.2,* *CCSS.Math.Content.HSA-SSE.A.1.a,* *CCSS.Math.Content.HSA-CED.A.2,* *CCSS.Math.Content.HSA-CED.A.3,* *CCSS.Math.Content.HSA-REI.B.3,* *CCSS.Math.Content.HSF-IF.B.6,* *CCSS.Math.Content.HSF-IF.C.7.a,* *CCSS.Math.Content.HSF-BF.B.3,* *CCSS.Math.Content.HSF-LE.A.1.b,* *CCSS.Math.Content.HSF-LE.A.2,* *CCSS.Math.Content.HSF-LE.B.5*	Represent direct variation situations with graphs and equations.
Linear Inequalities *CCSS.Math.Practice.MP.4,* *CCSS.Math.Content.HSN-Q.A.2,* *CCSS.Math.Content.HSN-Q.A.3,* *CCSS.Math.Content.HSA-CED.A.3,* *CCSS.Math.Content.HSA-REI.D.12,* *CCSS.Math.Content.HSF-IF.B.6,* *CCSS.Math.Content.HSF-LE.A.2,* *CCSS.Math.Content.HSF-LE.B.5*	Write and graph linear inequalities in two variables.
Unit Activity: Linear Relationships *CCSS.Math.Practice.MP.3,* *CCSS.Math.Practice.MP.4,* *CCSS.Math.Content.HSA-SSE.A.1.a,* *CCSS.Math.Content.HSA-CED.A.2,* *CCSS.Math.Content.HSF-IF.B.4,* *CCSS.Math.Content.HSF-IF.B.6,* *CCSS.Math.Content.HSF-IF.C.7.a,* *CCSS.Math.Content.HSF-IF.C.9*	Write linear equations in two variables to represent real-world problems and compare their key features.

UNIT 5: GEOMETRIC PROOF AND CONSTRUCTIONS (DAYS 62 – 74)

In this unit, you will review some basic geometric concepts and complete mathematical and geometric proofs to prove theorems. You will create geometric constructions of plane figures, including figures inscribed in a circle..

Lesson/*CCSS Standards*	Lesson Objective
Basic Geometric Concepts *CCSS.Math.Practice.MP.6,* *CCSS.Math.Content.HSG-CO.A.1*	Define geometric terms precisely and use geometric notation.
Geometric Proofs *CCSS.Math.Practice.MP.3,* *CCSS.Math.Practice.MP.7*	Examine the structure of geometry and apply proof methods to algebraic and geometric concepts.
Clarifying Big Ideas: Geometric Proofs	Explore what does and does not constitute a geometric proof. Think about developing a proof as a logical argument supported by evidence.
Geometric Constructions with Lines and Angles *CCSS.Math.Practice.MP.5,* *CCSS.Math.Content.HSG-CO.D.12*	Complete formal geometric constructions with a variety of tools and methods.
Inscribed Polygons *CCSS.Math.Practice.MP.3,* *CCSS.Math.Practice.MP.5,* *CCSS.Math.Content.HSG-CO.D.13*	Construct and justify the construction of an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

UNIT 6: LINEAR RELATIONSHIPS IN GEOMETRY (DAYS 75 – 90)

In this unit, you will explore properties of line segments, lines, and angles and the relationships among them. You will use coordinate geometry to calculate perimeter and area of polygons and to prove geometric theorems algebraically.

Lesson/*CCSS Standards*	Lesson Objective
Distance and Midpoint *CCSS.Math.Practice.MP.2*	Develop the distance and midpoint formulas and apply them to solve problems.

Lesson/*CCSS Standards*	Lesson Objective
Parallel and Perpendicular Lines *CCSS.Math.Practice.MP.8, CCSS.Math.Content.HSG-GPE.B.5*	Prove the slope criteria for parallel and perpendicular lines and apply them to solve geometric problems.
Clarifying Big Ideas: Relationships in Diagrams	Recognize and make use of relationships in diagrams.
Using Coordinates to Compute Perimeters and Areas *CCSS.Math.Content.HSN-Q.A.1, CCSS.Math.Content.HSN-Q.A.3, CCSS.Math.Content.HSG-GPE.B.7*	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles.
Using Coordinates to Prove Geometric Theorems *CCSS.Math.Practice.MP.3, CCSS.Math.Content.HSG-GPE.B.4*	Use coordinates to prove simple geometric theorems algebraically.

Course Map

You will achieve course level objectives by completing each lesson's instruction, assignments, and assessments. For a detailed look at how the materials meet these objectives, review the course map for Semester A.