Mathematics I, Semester B

Credits: 0.5

Course Overview and Goals

Mathematics I, Semester B, is a single-semester course designed to deepen and extend your understanding of linear relationships. You will begin by writing and solving systems of linear equations and inequalities. You will investigate exponential relationships, compare these to linear relationships, and solve equations with linear and exponential expressions. You will represent, compare, and analyze data sets in a variety of contexts. At the end of this course, you will explore rigid and non-rigid transformations of figures in the coordinate plane and use them to establish congruence of polygons.

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

- ❖ Write systems of equations and inequalities, and solve them using algebraic and graphical methods.
- ❖ Graph exponential functions, and identify their key features.
- ❖ Write and apply exponential functions to model situations in the real world.
- ❖ Compare functions that are represented in different ways.
- ❖ Use functions to represent sequences.
- ❖ Represent univariate data with dot plots, box plots, and histograms.
- ❖ Represent bivariate data with tables and scatter plots.
- ❖ Analyze, interpret, and justify conclusions from a set of data.
- ❖ Describe congruence in terms of rigid motions.

Scope and Sequence

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

Common Core State Standards: Mathematics

UNIT 1: SYSTEMS OF EQUATIONS AND INEQUALITIES (DAYS 1 – 16)

In this unit, you will observe that many situations can be described through systems of linear equations and inequalities. You will write systems of equations and inequalities and solve them algebraically and graphically.

Lesson/*CCSS* Standards	Lesson Objective
Syllabus and Orientation	Review the Student Orientation and Course Syllabus at the beginning of this course.
Systems of Linear Equations *CCSS.Math.Practice.MP.4,* *CCSS.Math.Practice.MP.6,* *CCSS.Math.Content.HSN-Q.A.3,* *CCSS.Math.Content.HSA-CED.A.3,* *CCSS.Math.Content.HSA-REI.C.6*	Write and graph systems of linear equations to determine the solutions.
Writing and Solving Systems Using Substitution *CCSS.Math.Content.HSA-CED.A.3,* *CCSS.Math.Content.HSA-REI.C.6,* *CCSS.Math.Content.HSF-LE.A.2*	Write and solve systems of linear equations algebraically using substitution.
Writing and Solving Systems Using Elimination *CCSS.Math.Content.HSA-CED.A.3,* *CCSS.Math.Content.HSA-REI.C.5,* *CCSS.Math.Content.HSA-REI.C.6*	Write and solve systems of linear equations algebraically using elimination.
Clarifying Big Ideas: Balance and Properties	Evaluate misunderstandings about the equal sign and balance.
Systems of Inequalities *CCSS.Math.Content.HSA-CED.A.3,* *CCSS.Math.Content.HSA-REI.D.12*	Represent the solution of a system of two linear inequalities graphically and determine solutions.

Lesson/*CCSS Standards*	Lesson Objective
Unit Activity: Systems of Equations and Inequalities *CCSS.Math.Practice.MP.1,* *CCSS.Math.Practice.MP.2,* *CCSS.Math.Practice.MP.4,* *CCSS.Math.Practice.MP.5,* *CCSS.Math.Practice.MP.6,* *CCSS.Math.Content.HSA-CED.A.3,* *CCSS.Math.Content.HSA-REI.B.3,* *CCSS.Math.Content.HSA-REI.C.6,* *CCSS.Math.Content.HSS-ID.B.6.a,* *CCSS.Math.Content.HSA-ID.B.6.c*	Write and solve a system of linear equations that represents real-world data.

UNIT 2: EXPONENTIAL RELATIONSHIPS (DAYS 17 – 33)

In this unit, you will examine exponential relationships and ways you can apply them to model real-world situations.

Lesson/*CCSS Standards*	Lesson Objective
Introduction to Exponents *CCSS.Math.Practice.MP.2,* *CCSS.Math.Content.HSF-LE.A.1.a*	Investigate exponential relationships and properties of exponents.
Graphs of Exponential Relationships *CCSS.Math.Content.HSA-CED.A.2,* *CCSS.Math.Content.HSF-IF.B.4,* *CCSS.Math.Content.HSF-IF.C.7.e*	Graph exponential functions and identify their key features.
Transforming Exponential Functions *CCSS.Math.Content.HSF-BF.B.3,* *CCSS.Math.Content.HSF-LE.A.1.a*	Describe transformations of the graph of the parent exponential function and compare exponential functions using different representations.
Clarifying Big Ideas: Algebra Flexibility	Investigate ways to justify solutions. Compare the difference between showing a procedure and showing your thinking.

Lesson/*CCSS* Standards	Lesson Objective
Modeling with Exponential Functions *CCSS.Math.Content.HSA-SSE.A.1.a,* *CCSS.Math.Content.HSA-SSE.A.1.b,* *CCSS.Math.Content.HSA-CED.A.1,* *CCSS.Math.Content.HSA-CED.A.2,* *CCSS.Math.Content.HSF-IF.B.4,* *CCSS.Math.Content.HSF-LE.B.5*	Use exponential functions to model situations in the real world.
Unit Activity: Exponential Relationships *CCSS.Math.Content.HSA-SSE.A.1.a,* *CCSS.Math.Content.HSA-SSE.A.1.b,* *CCSS.Math.Content.HSA-CED.A.2,* *CCSS.Math.Content.HSF-IF.C.9,* *CCSS.Math.Content.HSF-LE.A.1.b,* *CCSS.Math.Content.HSF-LE.A.1.c,* *CCSS.Math.Content.HSF-LE.A.2,* *CCSS.Math.Content.HSF-LE.A.3*	Write exponential functions in mathematical and real-world contexts and compare functions.

UNIT 3: RELATIONSHIPS BETWEEN FUNCTIONS (DAYS 34 – 47)

In this unit, you will examine the relationships between functions of the same or different types and solve equations that include both linear and exponential expressions.

Lesson/*CCSS* Standards	Lesson Objective
Comparing Exponential Functions *CCSS.Math.Content.HSF-IF.B.4,* *CCSS.Math.Content.HSF-IF.B.5,* *CCSS.Math.Content.HSF-IF.B.6,* *CCSS.Math.Content.HSF-IF.C.7.e,* *CCSS.Math.Content.HSF-IF.C.9*	Compare exponential functions that are represented in different ways.

Lesson/*CCSS* Standards	Lesson Objective
Solving Linear and Exponential Equations *CCSS.Math.Content.HSA-REI.D.11,* *CCSS.Math.Content.HSF-IF.C.7.e,* *CCSS.Math.Content.HSF-BF.A.1.b,* *CCSS.Math.Content.HSF-LE.A.3*	Use graphing, tables, and successive approximation to solve linear and exponential equations.
Sequences as Functions *CCSS.Math.Content.HSF-IF.A.3,* *CCSS.Math.Content.HSF-BF.A.1.a,* *CCSS.Math.Content.HSF-BF.A.2,* *CCSS.Math.Content.HSF-LE.A.2*	Construct functions to represent a sequence and the terms of the sequence that the function defines.
Clarifying Big Ideas: Variables and Unknowns	Investigate the power of variables.
Unit Activity: Relationships Between Functions *CCSS.Math.Content.HSF-IF.B.6,* *CCSS.Math.Content.HSF-IF.C.7.a,* *CCSS.Math.Content.HSF-IF.C.7.e,* *CCSS.Math.Content.HSF-IF.C.9,* *CCSS.Math.Content.HSF-LE.A.1.b,* *CCSS.Math.Content.HSF-LE.A.1.c*	Compare different representations of exponential and linear relationships.

UNIT 4: UNIVARIATE DATA (DAYS 48 – 57)

In this unit, you will be introduced to different ways of representing, analyzing, and comparing data sets.

Lesson/*CCSS* Standards	Lesson Objective
Visual Representations of Data *CCSS.Math.Practice.MP.4,* *CCSS.Math.Practice.MP.5,* *CCSS.Math.Practice.MP.6,* *CCSS.Math.Content.HSN-Q.A.1,* *CCSS.Math.Content.HSN-Q.A.2,* *CCSS.Math.Content.HSS-ID.A.1*	Represent data with dot plots, box plots, and histograms.

Lesson/*CCSS* Standards	Lesson Objective
Comparing Data Sets *CCSS.Math.Practice.MP.2,* *CCSS.Math.Practice.MP.3,* *CCSS.Math.Content.HSS-ID.A.2,* *CCSS.Math.Content.HSS-ID.A.3*	Compare multiple data sets using statistics and interpret differences in shape, center, and spread.
Unit Activity: Univariate Data *CCSS.Math.Practice.MP.5,* *CCSS.Math.Content.HSS-ID.A.1,* *CCSS.Math.Content.HSS-ID.A.2,* *CCSS.Math.Content.HSS-ID.A.3*	Analyze, interpret, and justify conclusions from a set of data.

UNIT 5: BIVARIATE DATA (DAYS 58 – 68)

In this unit, you will represent bivariate data sets in tables and as scatter plots and investigate relationships that can be modeled with linear functions.

Lesson/*CCSS* Standards	Lesson Objective
Two-Way Frequency Tables *CCSS.Math.Practice.MP.2,* *CCSS.Math.Content.HSS-ID.B.5,* *CCSS.Math.Content.HSS-ID.C.9*	Construct two-way frequency tables for categorical data and interpret measures and associations within the data, including relative frequencies.
Representing Data *CCSS.Math.Practice.MP.3,* *CCSS.Math.Practice.MP.4,* *CCSS.Math.Practice.MP.5,* *CCSS.Math.Content.HSN-Q.A.2,* *CCSS.Math.Content.HSA-CED.A.2,* *CCSS.Math.Content.HSF-LE.A.2,* *CCSS.Math.Content.HSS-ID.B.6.a,* *CCSS.Math.Content.HSA-ID.B.6.c,* *CCSS.Math.Content.HSS-ID.C.9*	Represent data using scatter plots and the equation of the line of best fit.

Lesson/*CCSS* Standards	Lesson Objective
Using Models from Data *CCSS.Math.Practice.MP.4,* *CCSS.Math.Practice.MP.5,* *CCSS.Math.Content.HSA-SSE.A.1.a,* *CCSS.Math.Content.HSA-CED.A.2,* *CCSS.Math.Content.HSF-LE.A.2,* *CCSS.Math.Content.HSF-LE.B.5,* *CCSS.Math.Content.HSS-ID.B.6.a,* *CCSS.Math.Content.HSS-ID.B.6.b,* *CCSS.Math.Content.HSA-ID.B.6.c,* *CCSS.Math.Content.HSS-ID.C.7,* *CCSS.Math.Content.HSS-ID.C.8*	Evaluate the reasonableness of mathematical models and use them to make predictions.
Unit Activity: Bivariate Data *CCSS.Math.Practice.MP.2,* *CCSS.Math.Practice.MP.5,* *CCSS.Math.Content.HSA-REI.B.3,* *CCSS.Math.Content.HSF-LE.B.5,* *CCSS.Math.Content.HSS-ID.B.6.a,* *CCSS.Math.Content.HSA-ID.B.6.c,* *CCSS.Math.Content.HSS-ID.C.7,* *CCSS.Math.Content.HSS-ID.C.8*	Draw a scatter plot and the line of best fit to analyze a situation.

UNIT 6: TRANSFORMATIONS AND CONGRUENCE (DAYS 69 – 90)

In this unit, you will study properties of triangles and perform rigid and non-rigid transformations of two-dimensional figures to establish congruence of triangles. You will also use rigid transformations to explore and establish symmetry of plane figures.

Lesson/*CCSS* Standards	Lesson Objective
Transformations *CCSS.Math.Practice.MP.5,* *CCSS.Math.Practice.MP.8,* *CCSS.Math.Content.HSG-CO.A.2,* *CCSS.Math.Content.HSG-CO.A.4,* *CCSS.Math.Content.HSG-CO.A.5*	Develop definitions of transformations and determine transformations that result in congruent figures.

Lesson/*CCSS Standards*	Lesson Objective
Rigid Transformations *CCSS.Math.Practice.MP.5,* *CCSS.Math.Practice.MP.8,* *CCSS.Math.Content.HSG-CO.A.2,* *CCSS.Math.Content.HSG-CO.A.5,* *CCSS.Math.Content.HSG-CO.B.6*	Represent transformations on the coordinate plane and specify a sequence of transformations to carry a given figure onto another.
Clarifying Big Ideas: Congruence and Equality	Examine the differences between congruence and equality.
Triangle Properties *CCSS.Math.Practice.MP.7,* *CCSS.Math.Practice.MP.8*	Determine different triangle properties and use them to solve problems involving triangles.
Triangle Congruence *CCSS.Math.Content.HSG-CO.B.7,* *CCSS.Math.Content.HSG-CO.B.8*	Explain how the criteria for triangle congruence follow from the definition of congruence in terms of rigid motions.
Symmetry *CCSS.Math.Content.HSG-CO.A.3*	Describe the rotations and reflections that carry a given polygon onto itself.
Unit Activity: Transformations and Congruence *CCSS.Math.Practice.MP.2,* *CCSS.Math.Practice.MP.4,* *CCSS.Math.Content.HSG-CO.A.2,* *CCSS.Math.Content.HSG-CO.B.8*	Write functions to represent transformations; apply transformations to real-life situations; and determine valid criteria for establishing triangle congruency.

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 B.