

Common Core Mathematics I

Syllabus

Course Number: MA2005

Grade level: 9–12

Prerequisite Courses: Common Core Math 8

Credits: 1.0

Course Description

This course formalizes and extends middle-school mathematics, deepening students' understanding of linear relationships. The course begins with a review of relationships between quantities, building from unit conversion to a study of expressions, equations, and inequalities. Students contrast linear and exponential relationships, including a study of sequences, as well as applications such as growth and decay. Students review one-, two-, and multi-step equations, formally reasoning about each step using properties of equality. Students extend this reasoning to systems of linear equations. Students use descriptive statistics to analyze data before turning their attention to transformations and congruency theorems. Equations and figures in the coordinate plane assist in connecting Algebra and Geometry through coordinates. The structure and content of this course naturally guides students to experience mathematics as a rational, beneficial subject which challenges students to critically think through problem situations.

Course Objectives

Throughout the course, you will meet the following goals:

- Analyze and interpret the structure of expressions and write expressions in equivalent forms to solve problems
- Communicate effectively using graphic, numeric, symbolic, and verbal representations
- Recognize the graph of given data as being linear or exponential
- Solve equations and inequalities in one variable and represent and solve equations and inequalities graphically
- Create and solve equations that describe numbers or relationships
- Model and solve problems with linear systems graphically

Student Expectations

This course requires the same level of commitment from you as a traditional classroom course would. Throughout the course, you are expected to spend approximately 5–7 hours per week online on the following activities:

- Interactive lessons that include a mixture of instructional videos and tasks
- Assignments in which you apply and extend learning in each lesson
- Assessments, including quizzes, tests, and cumulative exams

Communication

Your teacher will communicate with you regularly through discussions, email, chat, and system announcements. You will also communicate with classmates, either via online tools or face to face, as you collaborate on projects, ask and answer questions in your peer group, and develop your speaking and listening skills.

Grading Policy

You will be graded on the work you do online and the work you submit electronically to your teacher. The weighting for each category of graded activity is listed below.

Grading Category	Weight
Lesson Quizzes	20%
Unit Tests	30%
Cumulative Exams	20%
Assignments	20%
Projects	10%

Scope and Sequence

When you log into Edgenuity, you can view the entire course map—an interactive scope and sequence of all topics you will study. The units of study are summarized below:

Unit 1: Relationships Between Quantities

Unit 2: Linear and Exponential Relationships: Part One

Unit 3: Linear and Exponential Relationships: Part Two

Unit 4: Linear and Exponential Relationships: Part Three

- Unit 5:** Reasoning with Equations: Part One
- Unit 6:** Reasoning with Equations: Part Two
- Unit 7:** Descriptive Statistics
- Unit 8:** Congruence, Proof, and Constructions: Part One
- Unit 9:** Congruence, Proof, and Constructions: Part Two
- Unit 10:** Connecting Algebra and Geometry Through Coordinates

Unit	Lesson	Lesson Objectives
------	--------	-------------------

Relationships Between Quantities**Quantitative Reasoning**

Describe a quantitative relationship shown in a table or graph, including graphs without scales.

Interpret a graph given with or without a scale to determine the quantitative relationship it describes.

Dimensional Analysis

Use dimensional analysis to convert units and compare quantities, attending to limitations on the unit of measurement.

Simplifying Expressions

Evaluate expressions using the order of operations and the field properties of real numbers.

Identify parts of an algebraic expression.

Simplify expressions using the order of operations and the field properties of real numbers.

Writing and Solving Equations in Two Variables

Determine a two-variable linear equation that represents a scenario, identifying constraints on the variables in terms of the context.

Solve for an unknown quantity in a two-variable linear equation, given one of the values.

Writing and Graphing Equations in Two Variables

Construct a table of values and a graph for a two-variable linear equation that models a situation, pointing out solutions that are viable or not viable based on the context.

Interpret graphs and rates by examining the quantities represented by each axis.

Write a two-variable linear equation to model a quantitative relationship, describing the constraints of the model based on the context.

Linear and Exponential Relationships: Part One**Introduction to Functions**

Analyze a mapping diagram, table, graph, or scenario to recognize functional relationships.

Determine the domain and range of a functional relationship given in a mapping diagram, table, graph, or scenario.

Function Notation

Identify the input and output of a functional relationship, pointing out constraints on the domain and range.

Interpret function notation that models a real-world situation.

Use function notation to represent a functional relationship.

Evaluating Functions

Analyze a function represented by an equation, table, or graph to determine the output when given the input, and vice versa.

Find input and output values of two functions graphed in the same coordinate plane.

Write the inverse of a given linear function.

Analyzing Graphs

Use the graph of a function to determine the key aspects, using interval notation where applicable.

Analyzing Tables

Given a table of values for a continuous function, make predictions about the key features of the graph of the function.

Unit	Lesson	Lesson Objectives
------	--------	-------------------

Recognizing Patterns

- Analyze a sequence of numbers to determine the pattern, and identify whether it is arithmetic or geometric.
- Use a recursive rule to calculate a term of a sequence.
- Write a recursive rule for a sequence.

Linear and Exponential Relationships: Part Two**Introduction to Linear Functions**

- Calculate the rate of change of a function and, if constant, the initial value of the function.
- Determine if a relationship is linear by analyzing the rate of change.

Slope of a Line

- Determine the slope of a line from a graph, table of values, or ordered pairs.
- Identify if the slope of a linear relationship is zero, positive, negative, or undefined.
- Interpret slope in the context of real-world scenarios.

Slope-Intercept Form of a Line

- Analyze how a change in a parameter of a linear function affects its graph or the scenario it represents.
- Identify the slope and y -intercept of a linear function, and use them to graph the function.
- Write a linear function, in slope-intercept form, for a given relationship.

Point-Slope Form of a Line

- Graph a line given its equation in point-slope form, identifying the slope and intercepts.
- Write the equation of a line given its slope and a point on the line in point-slope form, and express the relationship as a function.

Writing Linear Equations

- Use linear models to solve problems.
- Write two-variable linear equations in different forms using varying pieces of information about the relationships.

Special Linear Relationships

- Determine if a relationship is a direct variation.
- Find the constant of variation in a direct variation.
- Write an equation for a direct variation.
- Write recursive and explicit rules for arithmetic sequences using function notation.

Linear and Exponential Relationships: Part Three**Exponential Growth Functions**

- Graph an exponential growth function, and state the domain and range.
- Identify an exponential growth function given tables, graphs, and function rules, determining the rate of change.
- State the domain and range of an exponential growth function.
- Write an exponential growth function to model a real-world problem, pointing out constraints in the modeling context.

Unit	Lesson	Lesson Objectives
------	--------	-------------------

Exponential Decay Functions

Graph an exponential decay function, and state the domain and range.

Identify an exponential decay function given tables, graphs, and function rules, determining the rate of change.

Relate exponential growth and decay functions using laws of exponents and reflections over the y -axis.

Write an exponential decay function to model a real-world problem, pointing out constraints in the modeling context.

Vertical Stretches and Shrinks of Exponential Functions

Determine the parameters and create an equation for a vertically dilated exponential growth or decay function given a table, equation, or scenario.

Graph a vertically dilated exponential growth or decay function given a table, equation, or scenario.

Reflections of Exponential Functions

Analyze key aspects of exponential functions that have been reflected across an axis.

Graph reflections of exponential functions.

Translations of Exponential Functions

Analyze key aspects of exponential functions that have been translated.

Graph translations of exponential functions.

Geometric Sequences

Graph and analyze geometric sequences as a special case of exponential functions with the domain restricted to natural numbers.

Write recursive and explicit rules for geometric sequences using function notation.

Reasoning with Equations: Part One**Solving Linear Equations: Variable on One Side**

Create one-variable linear equations, having the variable on one side only, to model and solve problems.

Determine the input value that produces the same output value for two functions from a table or graph.

Explain the steps used to solve a one-variable linear equation having the variable on one side only.

Solve one-variable linear equations having the variable on one side only, pointing out solutions that are viable or not viable in a modeling context.

Solving Linear Equations: Variables on Both Sides

Create one-variable linear equations, having the variable on both sides, to model and solve problems.

Explain the steps used to solve a one-variable linear equation having the variable on both sides.

Solve one-variable linear equations having the variable on both sides using tables, graphs, or algebra, pointing out solutions that are viable or not viable in a modeling context.

Solving Linear Equations: Distributive Property

Create one-variable linear equations involving the distributive property to model and solve problems.

Determine if a one-variable linear equation has zero, one, or infinite solutions.

Solve one-variable linear equations involving the distributive property.

Solving Mixture Problems

Use a table to organize information given in mixture problems.

Write and solve one-variable linear equations to model and solve mixture problems.

Unit	Lesson	Lesson Objectives
------	--------	-------------------

Literal Equations

Rearrange a literal equation to highlight a quantity of interest and use it to solve problems.

Solving Absolute Value Equations

Create absolute value equations to model and solve problems.

Solve absolute value equations using tables or algebra, pointing out solutions that are viable or not viable in a modeling context.

Solving One-Variable Inequalities

Explain the steps used to solve a multistep one-variable linear inequality.

Graph the solution sets of one-variable linear inequalities.

Solve multistep one-variable linear inequalities.

Introduction to Compound Inequalities

Relate the solution set of a compound inequality to its graph.

Write compound inequalities to model problems.

Reasoning with Equations: Part Two**Solving Systems of Linear Equations: Graphing**

Analyze a system of linear equations to determine if it has one solution, no solution, or infinitely many solutions.

Use technology to find or approximate the solution of a system of linear equations graphically.

Solving Systems of Linear Equations: Substitution

Interpret the solution of a system of linear equations in a modeling context.

Solve a system of linear equations using substitution.

Solving Systems: Introduction to Linear Combinations

Interpret the solution of a system of linear equations in a modeling context.

Solve systems of linear equations using linear combinations, limiting the systems to those that do not require multiples of both equations.

Verify that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.

Solving Systems of Linear Equations: Linear Combinations

Interpret the solution of a system of linear equations in a modeling context.

Solve a system of linear equations using linear combinations.

Graphing Two-Variable Linear Inequalities

Relate the graph of a two-variable linear inequality to its algebraic representation.

Solving Systems of Linear Inequalities

Determine a system of two-variable linear inequalities given a solution set.

Graph a system of two-variable linear inequalities.

Identify solutions of a system of two-variable linear inequalities.

Unit	Lesson	Lesson Objectives
------	--------	-------------------

Modeling with Systems of Linear Inequalities

- Create a system of two-variable linear inequalities to model a problem.
- Graph the solutions to a system of two-variable linear inequalities.
- Interpret the solutions to a system of two-variable linear inequalities in a modeling context.

Descriptive Statistics**Describing Data**

- Determine if a sample fairly represents the population as a whole or if there is bias.
- Identify various data collection methods and analyze various displays of data.
- Informally describe the shape, center, and variability of a distribution based on a dot plot, histogram, or box plot.

Two-Way Tables

- Calculate relative frequencies and display them in a two-way relative frequency table.
- Display data in a two-way frequency table given a scenario or Venn diagram, and identify joint and marginal frequencies.
- Interpret joint and marginal relative frequencies in the context of the data.

Relative Frequencies and Association

- Create conditional relative frequency tables, by row and by column.
- Determine whether there is an association between two variables by analyzing conditional relative frequencies.
- Interpret conditional relative frequencies in the context of the data.

Measures of Center

- Calculate the mean and median for a set of data using technology when appropriate.
- Compare the mean and median of a set of data that is symmetrical and for a set of data that is not symmetrical, determining which is a better measure of center for a given data set.
- Create a dot plot or histogram for a set of data.
- Discuss the effect of outliers on measures of center.

Box Plots

- Analyze box plots for symmetry and outliers.
- Compare box plots.
- Create and interpret box plots.

Standard Deviation

- Analyze a normal distribution curve to determine statistical measures.
- Analyze histograms for skewness and symmetry.
- Calculate variance and standard deviation for a given data set.

Line of Best Fit

- Determine if a data set shows a correlation and, if so, the type of correlation.
- Use a line of best fit to make a prediction.
- Use technology to determine the line of best fit for a data set, and interpret the parameters of the model in context.

Unit	Lesson	Lesson Objectives
------	--------	-------------------

Analyzing Residuals

Analyze the residual plot to determine whether the function is an appropriate fit for a linear model.

Compute the residuals for a set of data and a line of best fit.

Determine the residual plot for a given scatterplot and line of best fit.

Strength of Correlation

Analyze data to draw conclusions about correlation and causation.

Calculate the correlation coefficient for a linear model using technology.

Interpret the strength of a linear model based on the correlation coefficient.

Regression Models

Determine an exponential, quadratic, or linear model for a given data set using technology.

Identify limitations of models in real-world contexts.

Interpret the graph of a regression model in the context of the problem.

Use a linear, quadratic, or exponential regression model to make a prediction.

Performance Task: Super Survey Simulator**Congruence, Proof, and Constructions: Part One****Euclidean Geometry**

Analyze descriptions and diagrams that illustrate basic postulates about points, lines, and planes.

Identify and name undefined terms of point, line, plane, and distance along a line.

Defining Terms

Identify and name a pair of parallel lines, a pair of perpendicular lines, a ray, an angle, an arc, a circle, and a line segment.

Use undefined terms to precisely define parallel lines, perpendicular lines, ray, angle, arc, circle, and line segment.

Measuring Length and Angles

Apply the protractor postulate and angle addition postulate to calculate angle measures.

Apply the ruler postulate and segment addition postulate to calculate the lengths of line segments.

Identify a midpoint or bisector of a line segment or angles.

Performance Task: Constructions**Introduction to Transformations**

Identify the type of transformation given a pre-image and an image.

Determine if a transformation is isometric and identify corresponding parts of the pre-image and image.

Reflections

Describe the properties of and write rules for reflections.

Determine the image or pre-image of a figure after a given reflection.

Develop the definition of a reflection using constructions.

Unit	Lesson	Lesson Objectives
------	--------	-------------------

Translations

- Determine the image or pre-image of a figure after a given translation.
- Develop the definition of a translation using constructions.
- Write the rule that describes a given translation.

Rotations

- Describe the properties of and write rules for rotations.
- Determine the image or pre-image of a figure after a given rotation.
- Develop the definition of a rotation using constructions.

Compositions

- Determine the image of a figure after a given composition of transformations.
- Determine the rule that describes a given composition of transformations.

Symmetry

- Identify reflectional symmetry in geometric figures and the number of lines of symmetry.
- Identify rotational symmetry and its order in geometric figures.

Congruence, Proof, and Constructions: Part Two**Congruent Figures**

- Determine if figures are congruent and, if so, identify their corresponding parts.
- Determine unknown measures of congruent figures.
- Write congruency statements for transformed figures.

Triangle Congruence: SAS

- Complete the steps to prove triangles are congruent using SAS.
- Determine the isometric transformations that would map one triangle onto another triangle given that two corresponding sides and the included angle are congruent.
- Identify the sides and angle that can be used to prove triangle congruency using SAS.

Triangle Congruence: ASA and AAS

- Complete the steps to prove triangles are congruent using ASA or AAS.
- Determine the isometric transformations that would map one triangle onto another triangle given that two pairs of corresponding angles and one pair of corresponding sides are congruent.
- Identify the side and angles that can be used to prove triangle congruency using ASA or AAS.

Triangle Congruence: SSS and HL

- Complete the steps to prove triangles are congruent using SSS or HL.
- Determine the isometric transformations that would map one triangle onto another triangle given that three corresponding sides are congruent.
- Identify the parts that can be used to prove triangle congruency using SSS or HL.

Performance Task: Congruency Proofs**Performance Task: Circle Constructions**

Unit	Lesson	Lesson Objectives
------	--------	-------------------

Connecting Algebra and Geometry Through Coordinates**Slopes of Parallel and Perpendicular Lines**

Complete the steps to prove the slope criteria for parallel and perpendicular lines using coordinate geometry.

Determine if two lines are parallel or perpendicular.

Use slope criteria to find additional points on a line parallel or perpendicular to a given line.

Writing Linear Equations

Write the equation of a line parallel to a given line that goes through a particular point.

Write the equation of a line perpendicular to a given line or segment that goes through a particular point.

Figures in the Coordinate Plane

Apply coordinate algebra proofs to triangles and quadrilaterals.

Calculate the perimeter of a triangle or quadrilateral given the coordinates of the vertices.

Equation of a Circle

Determine if a given point lies on a circle.

Determine the equation of a circle.

Identify the center and radius from the equation of a circle, including equations given in general form.

Area of Triangles and Parallelograms

Solve problems involving areas of triangles and parallelograms.

Perimeter and Area of Rhombi, Trapezoids, and Kites

Calculate the perimeter of a rhombus, trapezoid, or kite given the coordinates of the vertices.

Solve problems involving the area of a rhombus, trapezoid, and kite given the coordinates of the vertices.

Solve problems involving the area of a rhombus, trapezoid, and kite.