Common Core Mathematics III

Syllabus

Course Number: MA2007

Grade level: 9–12

Prerequisite Courses: Common Core Math I and II

Credits: 1.0

Course Description

This course synthesizes previous mathematical learning in four focused areas of instruction. First, students relate visual displays and summary statistics to various types of data and to probability distributions with a focus on drawing conclusions from the data. Then, students embark on an in-depth study of polynomial, rational, and radical functions, drawing on concepts of integers and number properties to understand polynomial operations and the combination of functions through operations. This section of instruction builds to the Fundamental Theorem of Algebra. Students then expand the study of right-triangle trigonometry they began in Mathematics II to include non-right triangles, developing the Laws of Sines and Cosines. Finally, students model an array of real-world situations with all the types of functions they have studied, including work with logarithms to solve exponential equations. As they synthesize and generalize what they have learned about a variety of function families, students appreciate the usefulness and relevance of mathematics in the real world.

Course Objectives

Throughout the course, you will meet the following goals:

- Demonstrate an understanding of polynomial, rational, radical, and trigonometric functions
- Communicate effectively using graphic, numeric, symbolic, and verbal representations
- Apply various functions learned to real world applications
- Understand and apply the Laws of Sines and Cosines to problems
- Solve and graph quadratic expressions and functions

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: Inferences and Conclusions from Data
Unit 2: Polynomials, Rational, and Radical Relationships: Part One
Unit 3: Polynomials, Rational, and Radical Relationships: Part Two
Unit 4: Polynomials, Rational, and Radical Relationships: Part Three

Unit 5: Trigonometry of General Triangles and Trigonometric Functions
Unit 6: Mathematical Modeling: Part One
Unit 7: Mathematical Modeling: Part Two
Unit 8: Mathematical Modeling: Part Three
Unit 9: Mathematical Modeling: Part Four

Unit	Lesson	Lesson Objectives
Inferences and Conclusions from Data		
	Designing a Study	
		Analyze study types and sampling methods.
		Classify sampling methods.
		Classify study types.
		Determine if a sample is biased.
	Representing Data	
		Describe a data set using measures of central tendency and range.
		Determine if a representation of data is misleading.
	Standard Deviation	
		Calculate variance and standard deviation of a sample or population.
		Determine if a value is within a given z-score.
		Interpret standard deviation as it pertains to the spread of a graph.
	Properties of Probability Distributions	
		Create probability distributions from a data set.
		Identify properties of a probability distribution.
		Solve problems using probability distributions.
	Expected Value	
		Calculate expected values.
		Use expected values to make decisions.
	Binomial Distribution	
		Calculate binomial probabilities.
		Identify a binomial experiment.
		Identify the probability of success, probability of failure, and number of trials for a binomial experiment.
	Introduction to Normal Distributions	
		Apply the z-score formula to solve problems.
		Describe normal distributions using the mean and standard deviation.
		Solve problems using the empirical rule.
	Applications with Standard Normal Distribution	
		Solve problems using the standard normal table.
	Statistical Inferences	
		Make inferences about a population from a sample.
	Hypothesis Testing	
		Determine if a result is statistically significant.
		Perform hypothesis tests on normally distributed data.
Polynomials, Rational, and Radical Relationships: Part One		
	Real Numbers	
		Classify real numbers.
		Identify the field properties of real numbers.
		Represent real numbers with variables.

Solving Quadratic Equations by Factoring
- Find real solutions for quadratic equations using the zero product property.
- Use key attributes of a quadratic function to solve word problems.

Completing The Square
- Find complex solutions to quadratic equations by completing the square.
- Recognize the pattern of a perfect-square trinomial as the square of a binomial.
- Use the square root property to solve equations.

Modeling with Quadratic Equations
- Use quadratic equations to model and solve real-world problems.

Square Root Functions
- Find the domain of a square root function.
- Find the inverse of a quadratic function.

Addition and Subtraction of Polynomials
- Perform addition and subtraction of polynomials.

Multiplication of Polynomials
- Perform multiplication of polynomials.

Sum and Difference of Two Cubes
- Factor the sum or difference of two cubes.
- Recognize a perfect cube and find its cube root.

Factoring Polynomials Completely
- Analyze polynomial expressions to factor them completely.

Division of Polynomials
- Use inverse operations to check the result of polynomial division
- Use long division to find quotients of polynomials

Polynomials, Rational, and Radical Relationships: Part Two

The Binomial Theorem
- Use the Binomial theorem to expand binomials.
- Use the Binomial theorem to find a specific term in an expansion.

Simplifying Polynomial Expressions
- Simplify expressions involving operations with polynomials.

Synthetic Division and the Remainder Theorem
- Apply the remainder theorem.
- Use synthetic division to divide a polynomial by a linear factor.

The Rational Roots Theorem
- Determine the roots of and factor a polynomial function.
- Use the rational root theorem to determine possible roots of a polynomial function.

The Fundamental Theorem of Algebra
- Apply the fundamental theorem of algebra to determine the number of roots of a polynomial function.
- Use the complex conjugate theorem to factor and solve polynomial equations.

Writing Polynomial Functions from Complex Roots
- Write polynomial functions from complex roots.

Quadratic in Form Polynomials
- Identify fourth degree equations that are quadratic in form and use an appropriate u-substitution.
- Solve fourth degree equations that are quadratic in form.

Graphing Polynomial Functions
- Graph polynomial functions using key features.

Solving Polynomial Equations using Technology
- Use technology to solve or approximate solutions of one-variable polynomial equations.

Geometric Series
- Apply geometric series to solve mathematical and real-world problems.
- Find sums of finite and infinite geometric series.

Polynomials, Rational, and Radical Relationships: Part Three

Simplifying Rational Expressions
- Simplify rational expressions using laws of integer exponents.

Multiplying and Dividing Rational Expressions
- Perform multiplication and division of rational expressions.

Adding and Subtracting Rational Expressions
- Perform addition and subtraction of rational expressions.
- Simplify complex rational expressions containing sums or differences.

Rational Equations
- Determine the reasonableness of a solution to a rational equation.
- Solve rational equations and determine extraneous solutions.
- Use rational equations to model and solve real-world problems.

Graphing Radical Functions
- Determine the domain and range of square root and cube root functions.
- Relate transformations to the graphs of square root and cube root functions to their parent function.

Radical Equations and Extraneous Roots
- Model and solve mathematical and real-world problems using radical equations, and determine extraneous roots.

Solving Equations Containing Two Radicals
- Solve equations containing two radicals, and determine extraneous solutions.

Trigonometry of General Triangles and Trigonometric Functions

Law of Sines
- Apply the law of sines to solve real-world problems.
- Complete the steps to prove the law of sines.
- Solve mathematical problems using the law of sines.

Law of Cosines
- Apply the law of cosines to solve real-world problems.
- Complete the steps to prove the law of cosines.
- Solve mathematical problems using the law of cosines.

Area and Perimeter of Triangles
- Derive the area formula A = 1/2absinC.
- Solve area and perimeter problems using A = 1/2absinC.
- Solve area and perimeter problems using Heron's formula.

Angles in Standard Position
- Determine angles that are coterminal.
- Identify characteristics of angles in standard position.

Radian Measure
- Convert between degree and radian measure.
- Use the definition of radian measure to calculate arc lengths, radii, and angle measures.

The Unit Circle
- Compare sine, cosine, and tangent values for angles having the same reference angle.
- Find the sine, cosine, and tangent values of angle measures using the unit circle.

Evaluating the Six Trigonometric Functions
- Evaluate the six trigonometric functions for angles in degrees or radians based on one or more given trigonometric function values.
- Evaluate the six trigonometric functions for angles in degrees or radians given a point on the terminal ray.

Graphing Sine and Cosine
- Analyze key features of sine and cosine functions from equations and graphs.

Modeling with Periodic Functions
- Model and solve real-world problems using periodic functions.

Mathematical Modeling: Part One

Inequalities
- Create one-variable linear inequalities in one variable and use them to solve problems.
- Solve one-variable linear inequalities, including compound inequalities, and represent the solution sets graphically and algebraically.

Literal Equations
- Determine if expressions are equivalent.
- Solve a literal equation in terms of a given variable.

Function Operations
- Combine functions using arithmetic operations, expressing the results both algebraically and graphically.
- Evaluate sums, differences, products, and quotients of functions.

Function Inverses
- Find the inverse of a function.
- Use composition to verify that functions are inverses.

Rate of Change
- Calculate the average rate of change of a function over a specified interval.
- Interpret the average rate of change of a function over a specified interval.
- Solve problems involving direct variation.

Solving Linear Systems Graphically
- Classify systems of two-variable equations as dependent, independent, consistent, or inconsistent.
- Solve systems of two-variable linear equations graphically.
- Solve systems of two-variable linear inequalities.

Solving Linear Systems by Elimination
- Solve systems of two-variable linear equations using elimination.

Linear Programming
- Maximize a function given constraints.
- Represent and solve real-world problems using linear programming.

Solving One-Variable Equations with Systems

Solve a one-variable linear or quadratic equation by graphing a related system of equations.

Mathematical Modeling: Part Two

Negative Exponents

Evaluate numeric expressions using laws of integer exponents.
Simplify single-variable expressions using laws of integer exponents.

Graphing Exponential Functions

Determine the domain and range of exponential functions.
Graph exponential functions.
Identify exponential functions.

Solving Exponential Equations by Rewriting the Base

Solve exponential equations by rewriting bases.

Graphing Logarithmic Functions

Determine the domain and range of logarithmic functions.
Identify and analyze the graphs of logarithmic functions.
Identify logarithmic functions.

Evaluating Logarithmic Expressions

Evaluate common logarithms using a calculator.
Evaluate logarithmic expressions by converting between logarithmic and exponential forms.
Solve logarithmic equations by converting between logarithmic and exponential forms.

Solving Logarithmic Equations using Technology

Rewrite logarithmic expressions using the change of base algorithm.
Solve a one-variable equation containing logarithms by transforming it into a system of equations.

Properties of Logarithms

Evaluate, expand, and simplify logarithmic expressions using properties of logarithms.

Solving Equations using Properties of Logarithms

Apply properties of logarithms to solve logarithmic equations.
Determine extraneous solutions of logarithmic equations.

Base e

Analyze exponential and logarithmic functions in base e to determine key features of the graph.
Apply properties of logarithms and exponents to solve exponential and logarithmic equations having base e.
Determine the domain and range of exponential and logarithmic functions in base e.

Solving Exponential and Logarithmic Equations

Solve exponential and logarithmic equations using inverses, properties, and algorithms.

Modeling with Exponential and Logarithmic Equations

Model and solve real-world problems using exponential and logarithmic functions.

Rewriting Exponential Functions

Use alternative forms of an exponential function to highlight different information about that function and the real-world situation it models.
Write exponential functions and expressions in equivalent forms, using the properties of exponents to justify steps.

Mathematical Modeling: Part Three

Absolute Value Functions
- Analyze absolute value functions to determine key features of the graph.
- Model and solve mathematical and real-world problems with absolute value functions.

Absolute Value Inequalities
- Rewrite absolute value inequalities as compound inequalities.
- Solve absolute value inequalities graphically and algebraically.

Piecewise Defined Functions
- Determine the domain, range, and continuity of piecewise defined functions.
- Evaluate piecewise defined functions.
- Graph piecewise defined functions.

Step Functions
- Analyze step functions to determine key features of the graph.
- Evaluate step functions.
- Use step functions to model real-world problems.

Joint and Combined Variation
- Find constants of variation.
- Model and solve problems involving joint and combined variation.

Transformations of Functions
- Analyze a function rule or graph to determine transformations of the parent function.
- Identify a function as belonging to a family of functions.

Domain and Range
- Determine the domain and range of a function in both mathematical and real-world contexts.

Analyzing Compositions of Functions
- Determine the domain and range of the composition of functions.
- Find compositions of functions from a variety of function families.

Modeling with Functions
- Find the equation of a function that best models a data set.
- Use function models to solve problems.

Performance Task: Production Schemes
- Determine the reasonableness of a function model.
- Use an appropriate function model to describe random data.
- Use function models to make predictions about situations.

Mathematical Modeling: Part Four

Trapezoids and Kites
- Apply properties of kites to solve mathematical and real-world problems.
- Apply properties of trapezoids to solve mathematical and real-world problems.
- Complete proofs involving properties of trapezoids and kites.

Area of Composite Figures
- Calculate the area of composite 2-D figures, including real-world applications.
- Decompose composite 2-D figures.
- Write an expression that represents the area of a composite 2-D figure.

Density and Design Problems

Solve problems involving density of an area.
Use geometric concepts to solve design problems.

Three-Dimensional Figures and Cross Sections

Classify a 3-D figure and identify the characteristics (base, edge, etc.).
Determine the 3-D figure generated by a rotation of a 2-D figure.
Determine the horizontal and vertical cross-sections of 3-D figures.

Volume of Prisms

Calculate the volume or an unknown measure of a right prism based on a mathematical or real-world model.
Calculate the volume or an unknown measure of an oblique prism based on a mathematical or real-world model.
Write expressions to represent the volumes or unknown measures of right and oblique prisms.