

Mathematics: Algebra II/Trigonometry (Integrated Mathematics I)

Core Texts:

The Story of Mathematics, Keith Devlin

Algebra II Concepts and Applications, Glencoe McGraw-Hill

Geometry Concepts and Applications, Glencoe McGraw-Hill

Chicago School Mathematics Project, Scott Foresman

Trimester One:

Linear Functions and Relations

- Determine when a relation is a function.
- Determine the range of a function or a relation with a given domain.
- Picture a relation or function by graphing.
- Graph linear equations.
- Use the graph of the associated linear equation to graph a linear inequality.
- Determine the slope of a line through two given points.
- Determine an equation of a line through two given points.
- Determine an equation of a line when its slope and the coordinates of one of its points are given.
- Determine an equation of a line when its slope and y-intercept are given.
- Solve problems using direct variation.

Systems of Linear Equations or Inequalities

- Identify the apparent solution set of a system of linear equations in two variables from the graphs of the equations.
- Solve a system of two equations in two variables.
- Use determinants to solve a system of two linear equations in two variables.
- Solve problems by using systems of linear equations.
- Graph the solution set of a system of linear inequalities in two variables.
- Use systems of linear inequalities to solve linear programming problems in two variables.

Graphs in Space; Determinants

- Draw graphs of ordered triples.
- Determine the x-, y-, and z- intercepts of a given plane and the traces of the plane in the coordinate planes.
- Draw the space-graph of a given linear equation in three variables.
- Solve a system of three linear equations in three variables by transforming it into a simple equivalent system.
- Use determinants to solve a system of three linear equations in three variables.
- Use three variables to solve problems.
- Use properties of determinants to simplify the expansion of a determinant by minors.

Trimester Two:

Polynomials and Rational Expressions

- Apply the laws of exponents to simplify products and quotients of monomials.
- Write products of polynomials in simple form.
- Write a polynomial in factored form.
- Solve polynomial equations by factoring.
- Solve problems using factorable polynomial equations.
- Solve polynomial inequalities by factoring.
- Simplify a rational expression by factoring its numerator and denominator.

- Find the quotient and remainder when one polynomial is divided by another.
- Express a product or quotient of rational expressions as a rational expression in lowest terms.
- Transform a sum or difference of rational expressions into an equivalent rational expression in lowest terms.
- Solve problems involving equations with rational coefficients and problems with fractional equations.

Radicals and Irrational Numbers

- Use power functions in solving variation problems.
- Determine all real n th roots of a given real number.
- Determine all rational roots of an equation with integral coefficients.
- Represent a number in standard notation.
- Estimate products and quotients.
- Express a rational number as a terminating or repeating decimal, and express a repeating decimal as a fraction.
- Find rational and irrational numbers between any two given real numbers.
- Use properties of radicals to simplify algebraic expressions.
- Solve equations involving radicals.
- Simplify a square-root radical whose radicand is a negative number.
- Find the sum and difference of two complex numbers.
- Find the product and quotient (divisor not zero) of two complex numbers.

Sequences and Series

- Specify a sequence recursively or explicitly.
- Find a specified term of an arithmetic sequence when two terms, or one term and the common difference, are given.
- Insert any number of arithmetic means between two given numbers.
- Find the sum of a given arithmetic series.
- Solve problems involving arithmetic sequences and series.
- Find a specified term of a geometric sequence when two terms, or one term and the common ratio, are given.
- Insert any number of geometric means between two given numbers.
- Find the sum of a given geometric series.
- Solve problems involving geometric sequences and series.
- Find the absolute value of the difference between the limit of a convergent sequence and a term in the sequence.
- Find the sum of a convergent geometric series.

Polynomial Functions

- Solve quadratic equations by completing the square and by using the quadratic formula.
- Use the discriminant of a quadratic equation to determine the nature of the roots of the equation.
- Use the relationship between the roots and coefficients of a quadratic equation to determine the sum and product of the roots when the equation is given, and vice versa.
- Find an equation of the axis of symmetry and the coordinates of the vertex of the graph of an equation of the form $y = a(x - h) + k$, and to determine whether the vertex is a maximum or a minimum point.
- Sketch the graph of a given quadratic function.
- Solve extreme-value problems involving quadratic problems.

Solve quadratic inequalities.

- Use synthetic substitution to find the value of a given polynomial function at a given domain value.
- Use synthetic division to find the partial quotient and the remainder when a polynomial is divided by $x-c$, where $c \in \mathbb{C}$.
- Use synthetic division and depressed equations to factor polynomials and to find rational zeros of polynomial functions.
- Use the fact that imaginary roots of polynomial equations with real coefficients occur in complex conjugate pairs to solve such equations.
- Determine the possible number of positive and negative roots of a polynomial equation.
- Determine upper and lower bounds for the roots of a polynomial equation.
- Estimate the real roots of a polynomial equation.

Trimester Three:

Quadratic Relations and Systems

- Determine the distance between two points in a plane.
- Determine the midpoint of a line segment.
- Determine an equation of the line perpendicular to a given line and passing through a given point.
- Sketch graphs for second-degree equations in two variables.
- Write equations for circles, parabolas, ellipses, and hyperbolas, given appropriate properties of these curves.
- Determine a set of values in an inverse variation, given appropriate information.
- Apply inverse variations to solve word problems.
- Solve simple quadratic systems graphically.
- Solve simple quadratic systems by substitution.

Exponents and Logarithms

- Simplify an expression involving rational and real-number exponents.
- Solve an equation containing a variable in an exponent
- Identify inverses of functions.
- Convert equations from exponential to logarithmic form and vice versa.
- Evaluate certain logarithms and solve equations involving logarithms.
- Apply the laws of logarithms.
- Use a calculator or a table to find the common logarithm of a number or to find the number that has a given common logarithm.
- Use logarithms to solve exponential equations.
- Solve problems involving interest and exponential growth and decay.
- Use the number e and natural logarithms.

Permutations and Combinations

- Apply fundamental counting principles.
- Find the number of permutations of the elements of a set.
- Find the number of permutations of the elements of an r -element subset and an n -element set.
- Find the number of permutations of elements that are not all different.
- Find the number of combinations of n elements taken r at a time.
- Find the number of ways in which specified subsets can be selected from two or more given sets.

Expand a binomial.

Find a given term in a binomial expansion.

Use Pascal's triangle to expand a binomial.