



Cornerstone Academy
A Christ-Centered Classical School

Mathematics Department
Curriculum Guide
2009-2010

MATHEMATICS DEPARTMENT

The structure of the department curriculum is defined by the axiomatic nature of mathematics along with the varying needs of our student body. Mathematics is an integral part of the natural world God created. It is our desire that each Cornerstone student will see evidence of His order and reason as they master the concepts taught in each course.

PLACEMENT: In order to provide the best opportunity for each student's success in mathematics, placement prerequisites have been established for each mathematics course. The administration will use the criteria described in this guide to place secondary mathematics students in the appropriate course. Parents and students are encouraged to discuss the demands of each course and the family support needed by the student to meet these demands.

Placement in the subsequent course requires a passing grade of $\geq 70\%$.

Placement in honors or advanced courses requires:

- Passing the prerequisite course with a final grade of $\geq 90\%$
or the prerequisite honors course with a final grade of $\geq 80\%$
- Passing the *Concept Mastery Standard* with a grade of $\geq 75\%$
- *Teacher Recommendation*.

The *Concept Mastery Standard* is a tool applied to a student's final exam. It is a list of the specific concepts taught in prerequisite courses that should be mastered prior to enrolling in a subsequent course. The tool is also used to evaluate and improve instruction in the classroom.

A *Teacher Recommendation* is based on a student's organizational skills, maturity, conscientious regard toward homework, study habits, desire to achieve higher grades, work ethic in the classroom, and understanding of the mathematical concepts and skills needed for success in the subsequent course.

SUMMER COURSEWORK: The Cornerstone Academy mathematics curriculum requires all secondary students enrolled in Honors or AP mathematics courses to complete summer coursework due on the second day of school and subject to testing.

ASSIGNMENTS: Homework is a crucial part of the curriculum and is assigned for each school and home-study day. The student should allow study time each day to complete his assignments in order to be prepared for the next class. Generally, the student can expect to have quizzes, numerous homework checks, and three to five major tests during a grading period. Comprehensive semester and final examinations are given in all mathematics courses. Only seniors may be exempted from a final exam with the teacher's permission.

TECHNOLOGY: Scientific calculators are traditionally introduced in Pre-Algebra, but are not required for this course. Scientific calculators are required for Algebra I and Geometry. However, the use of calculators is only permitted as assigned by the teacher.

Use of a graphing calculator is permitted for Geometry and is required for Algebra II and all courses subsequent to Algebra II. Technology is incorporated in the curriculum to enhance the teaching and learning of mathematics. Students in advanced mathematics courses are expected to have regular access to graphing calculators.

SEQUENCE: In the pages that follow, you will find a flow chart that describes the **typical** sequence of courses for students at Cornerstone Academy, course descriptions, and placement prerequisites for each course.



MATHEMATICS DEPARTMENT



Grade 7

Pre-Algebra

Pre-Algebra Honors

Grade 8

Algebra 1A

Algebra I Honors

Grade 8, 9

Algebra 1B

Grade 9

Algebra I

Grade 9, 10

Geometry

Geometry Honors

Grade 10, 11

Algebra II

Algebra II Honors

Grade 11, 12

Algebra III

Pre-Calculus Honors

Grade 11, 12

Grade 12

Calculus AB AP

MATHEMATICS DEPARTMENT

CURRICULUM GUIDE

PRE-ALGEBRA

Grades 6 – 9

Prerequisite Course: 7th Grade Math

This course is designed to facilitate the student's transition from concrete arithmetic concepts to abstract algebraic concepts. The emphasis is on building a solid algebraic foundation through arithmetic review, geometry topics, operations with real numbers, variables and expressions, equations, solving application problems, proportions, percents, measurements, graphing, and polynomials. This course is a prerequisite for Algebra I.

PRE-ALGEBRA HONORS

Grades 6 – 9

Prerequisite Course: 7th Grade Math

Teacher recommendation and summer coursework required.

This course is intended for students who have demonstrated proficiency in middle-school mathematics and have mastered fundamental operations with real numbers. Pre-Algebra Honors is an accelerated course that covers all topics normally taught in pre-algebra, as well as additional topics from geometry and algebra. This course is designed to prepare students for a comprehensive and in-depth study of algebra and is a prerequisite for Algebra I.

ALGEBRA IA

Grades 7 – 9

1 Credit

Prerequisite Course: Pre-Algebra

This course is the first of a two-year sequence of courses: Algebra IA and IB. It is designed for students that have a strong foundation in the fundamental operations of the real number system. Algebra IA enables the student to execute algebraic manipulations and applications through topics including: fundamental operations, functions and graphs, integers, rational numbers, equations in one variable, equations in two variables, simultaneous equations, laws of exponents, and polynomials.

ALGEBRA IB (This course in combination with Algebra IA carries up to the high school transcript as an Algebra I Honors credit when taken in grades 7 & 8 or grades 8 & 9.)

Grades 8 – 10

1 Credit

Prerequisite Course: Algebra IA

This course is the second of a two-year sequence of courses, Algebra IA and IB. It is designed for students that have a strong background in the fundamental operations of the real number system and proficiency in performing basic algebraic manipulations. In Algebra IB the student will become proficient in the mechanical skills of algebra through a review of topics covered in Algebra IA in addition to an in-depth study of exponents, polynomials, factoring, fractions, square roots, quadratic equations, real numbers, fractional equations, inequalities, and number sequences. This course is a prerequisite for Geometry and Algebra II.

ALGEBRA I (This credit in Grade 8 carries up to the high school transcript.)

Grades 7 – 10

1 Credit

Prerequisite Course: Pre – Algebra
(Please note, Algebra I when taken in grade 7 or 8 is considered an advanced course and requires a final grade of $\geq 80\%$ in Pre-algebra, $\geq 75\%$ Concept Mastery, and Teacher Recommendation. This course does not require summer coursework.)

This course is intended for students who have mastered fundamental operations with real numbers and have demonstrated proficiency in basic algebraic operations. Algebra I is an accelerated course that provides students with instruction on algebraic concepts including functions and graphs, integers, rational numbers, equations in one variable, equations in two variables, simultaneous equations, exponents, polynomials, factoring, fractions, square roots, quadratic equations, real numbers, fractional equations, inequalities, and number sequences. This course is a prerequisite for Geometry and Algebra II.

ALGEBRA I HONORS (This credit in Grade 8 carries up to the high school transcript.)

Grades 7 – 10

1 Credit, Honors

Prerequisite Course: Pre – Algebra
Teacher recommendation and summer coursework required.

This course is intended for students who have mastered fundamental operations with real numbers and have demonstrated proficiency in basic algebraic operations. Algebra I Honors is an accelerated course that provides students with a comprehensive and in-depth study of abstract algebraic concepts including functions and graphs, integers, rational numbers, equations in one variable, equations in two variables, simultaneous equations, exponents, polynomials, factoring, fractions, square roots, quadratic equations, real numbers, fractional equations, inequalities, and number sequences. This course is a prerequisite for Geometry and Algebra II.

GEOMETRY (This credit in Grade 8 carries up to the high school transcript.)

Grades 8 – 11 (Geometry and Algebra II may be taken concurrently. Departmental approval required.)

1 Credit

Prerequisite Course: Algebra I

This course is designed to further develop a student's deductive reasoning skills through a study of the basic structure of geometry. The topics covered in this course will require application of algebraic skills to geometric relationships and development of formal proofs. Topics include an introduction to geometry, the nature of deductive reasoning, lines and angles, congruence, inequalities, parallel lines, quadrilaterals, transformations, area, similarity, right triangle trigonometry, circles, concurrence theorems, regular polygons and the circle, and geometric solids. This course is a prerequisite for Algebra II and Pre-Calculus.

GEOMETRY HONORS (This credit in Grade 8 carries up to the high school transcript.)

Grades 8 – 11 (Geometry and Algebra II may be taken concurrently. Departmental approval required.)

1 Credit, Honors

Prerequisite Course: Algebra I

Teacher recommendation and summer coursework required.

Geometry Honors is an accelerated course for students proficient in Algebra. This is a comprehensive and in-depth study of the topics listed in the geometry course description in addition to non-Euclidean geometries and complex proofs. Exercises will emphasize the history of geometry, advanced constructions, and geometric applications. This course is a prerequisite for Algebra II and Pre-Calculus.

ALGEBRA II

Grades 9 – 12

1 Credit

Prerequisite Courses: Algebra I and Geometry

This course is an in-depth extension of the concepts taught in Algebra I. It includes the study of linear equations, quadratic relations, exponents, logarithms, inequalities, real and complex numbers, matrices, conic sections, sequences, series, and probability. Studies will emphasize application of advanced algebra to basic geometry and problem-solving. Graphing calculators are introduced in this course.

ALGEBRA II HONORS

Grades 9 – 12

1 Credit, Honors

Prerequisite Courses: Algebra I and Geometry

Teacher recommendation and summer coursework required.

This course is an accelerated and comprehensive study of the topics listed in Algebra II. Studies will emphasize advanced application and theoretical comprehension of algebra as it applies to geometry and problem-solving. Graphing calculators are required for this course. Algebra II Honors is a prerequisite for Pre-Calculus Honors.

ALGEBRA III

Grades 10 – 12

1 Credit

Prerequisite Courses: Algebra II and Geometry

This course is a study of advanced topics in mathematics. It focuses on reviewing and advancing the concepts taught in Algebra II through application. Studies will cover an introduction to the trigonometric concepts of Pre-Calculus. Algebra III serves as a bridge for the concepts taught in Algebra II and Pre-Calculus. A graphing calculator is required.

PRE-CALCULUS HONORS (The State of Florida does not give honors credit to this course.)

Grades 10 – 12

1 Credit, Honors

Prerequisite Courses: Algebra II and Geometry

Teacher recommendation and summer coursework required.

Pre-calculus Honors is an advanced mathematics course intended to prepare the student for a college-level Calculus course. Functions and graphing are emphasized, and students are expected to utilize advanced problem-solving skills. Students engage in an extensive examination of polynomial, logarithmic, exponential, and trigonometric functions, as well as a rigorous study of vectors, parametric equations, sequences, series, and limits. This emphasis provides a solid foundation for the student aspiring to higher mathematics. A graphing calculator is a required tool for this course. This course is a prerequisite for Calculus AB AP.

ADVANCED PLACEMENT CALCULUS AB

Grades 12

1 Credit, Advanced Placement

Prerequisite Course: Pre-calculus

Teacher recommendation and summer coursework required.

This course is intended for students with the skills and diligence for a college-level mathematics course. Topics indicating the scope of the course include limits of functions (including one-sided limits), analysis of graphs, asymptotic and unbounded behavior, continuity, concept of the derivative, derivative at a point, derivative as a function, second derivatives, applications of derivatives, computation of derivatives, Riemann sums, interpretations and properties of definite integrals, applications of integrals, fundamental theorem of calculus, techniques of antidifferentiation, applications of antidifferentiation, and numerical approximations to definite integrals. This course covers content as specified by the College Board, and is intended to be a demanding course comparable to the calculus courses at colleges and universities. Students are expected to take the Advanced Placement Examination to seek placement or college credit.