

Mathematics

Mount Madonna School provides the opportunity for students to become Algebra ready by eighth grade, and for all high school students to complete at least one Advanced Placement math class by the time they graduate. High school students are required to take four years of college preparatory mathematics. The middle school program focuses on developing students' confidence around mathematical thinking, while allowing students to progress at a pace that reflects their motivation and interest. The goal of our math program is to allow math to “sing” for every student. Students progress as they are ready and should graduate as lifelong users of mathematics.

6th and 7th Grade Math

In sixth and seventh grades students learn all the skills needed to prepare them for a rigorous Algebra course in the eighth grade. Students learn through direct instruction, paired and group work, exploration and discussion, and use of visual diagrams and hands-on manipulatives. Students are assigned regular homework assignments, weekly quizzes, and unit assessments. Units include Ratios, Rates and Proportional Reasoning; Percents; Arithmetic including Fractions and Decimals; Rational Numbers; Expressions, Equations and Inequalities; Geometry; and Statistics and Probability. In seventh grade, students participate in a “Tiny Home” project where they create a blueprint and scale model of a tiny home of their own design.

Math Lab for Grades 6 and 7

This class is an additional math period for sixth and seventh graders each week where students are provided time for extra practice or to explore math at a deeper level. Instruction and learning during Math Lab is presented in exploratory challenges, extra practice in units as needed, math games, hands-on activities, and engineering projects. The class prepares students to be successful in Algebra I and I/II courses in the eighth grade.

Algebra I

This course provides students with a strong foundation for further studies of mathematics. Students learn to recognize and apply advanced tools for attacking word problems and increase their ability to use observation and reasoning skills. Topics covered include Rational Expressions, Manipulating and Factoring Polynomials, Manipulating and Applying Fractions, Functions and Linear Equations, Systems of Linear Equations, Inequalities, Rational and Irrational Numbers, including Radical Expressions, and the Quadratic Formula.

Algebra II with Honors Option

In this class, students build on what they have learned in their Algebra I course and deepen their interaction with the fundamentals of mathematics. Topics include Linear Equations and Functions, Polynomials, Rational and Irrational Numbers, Quadratic Functions and Graphing, Geometry, and

Exponential and Logarithmic Functions. Honors students reach deeper into the material and explore more challenging applications of the material being presented.

Algebra I/II

In this class, students who demonstrated readiness through their sixth and seventh grade years are invited in eighth grade to progress rapidly through Algebra I in the first semester. In the second semester, students review, perfect and expand their skills through the Algebra II concepts. Entrance to this course requires the seventh grade teacher's recommendation, a personal statement about the student's readiness, and strong performance in sixth and seventh grade math courses and on the standardized math test. We administer the NWEA MAP Growth math test for middle school students multiple times a year.

Concepts are explored through direct instruction, but also through discussions that explore the purpose and value of learning the given skills. Math is presented as a tool we use to help explore and describe our world. Students have regular homework assignments, occasional quizzes, and summative assessments at the end of each chapter. They are encouraged to work together, but also develop independent problem solving skills and regularly reflect on their progress, looking at what is supporting their progress and what they want to change in order to grow.

Geometry with Honors Option

In Geometry, students maintain and use their Algebra skills while applying those skills to Geometric problems and reasoning. Students practice proofs and advanced problem-solving skills. All the basic postulates of Euclidean Geometry are covered; students also study the Pythagorean Theorem, Coordinate Geometry, Surface Area, Perimeter and Volume, and Solid Geometry. Honors students take a more theoretical approach; non-honors students follow more hands-on learning, media and blogs.

Precalculus with Honors Option

This class covers the knowledge and skills necessary to prepare students for a college-level Calculus class. Some major topics include Transformations of Functions, Solving and Graphing Advanced and Inverse Trigonometric Functions,

Polar Coordinates and Vectors, Analytical Geometry, early Linear Algebra with Matrices, Solid Geometry treated as Coordinate Geometry, Probability, Sequences and Series, and the concepts of Limits and Rates of Change. Honors students are expected to show a deeper knowledge of all material and take more challenging weekly exams.

AP Calculus AB and AP Calculus BC

These courses are college-level mathematics courses focused on preparing students to take either the AP Calculus AB or Calculus BC exams. They each follow curriculum currently recommended and approved by the

College Board. Topics include Functions, Limits, Derivatives and their Applications, Techniques of Integration, Applications of Integrals and Infinite Series. AP Calculus AB covers Limits, Derivatives, basic Integrals and their Applications. AP Calculus BC revisits many of the AB topics with more complex applications and interpretations and focuses on advanced Integration Methods, Calculus of Parametric Equations and Infinite Series.

Students use technology to plot and analyze functions, and to program basic coding languages . Students apply concepts to physics, chemistry, biology and engineering problems. This curriculum is designed to prepare students for college level math, science and engineering courses.

AP Statistics and Statistics

Curriculum for this course follows AP Statistics curriculum approved by the College Board and is designed to introduce students to the uses of analytical data. This course draws connections between all aspects of the statistical process, including Exploring Data, Sampling and Experimentation, Anticipating Patterns, and Statistical Inference. Additionally, using the vocabulary of statistics this course will teach students how to use and communicate statistical methods, results and interpretations using a year-long project of their own design. The year-long project includes creating a survey on a topic of their choice, administering it to students and sometimes faculty and staff at the school, and then using spreadsheet tools to analyze the results. They ultimately draw conclusions from the data using methods and tools learned throughout the year, create a rigorous written summary of their project, as well as orally present their findings. The AP and non-AP classes are taught in the same classroom as one course. Students electing not to take the Advanced Placement course have different expectations on homework and take different exams, although the same material is presented to all the students.