

**2024-2025**

# Math

*Course Offerings*

## **QUANTITATIVE REASONING I**

Embark on a mathematical journey in Quantitative Reasoning I, where students pave the way for a successful math career at Asheville School. Dive into the essential realms of algebra and geometry, mastering key concepts with our newly crafted curriculum. Tailored for a fluid transition between your first and second year, this class welcomes students of diverse mathematical backgrounds. Get ready to transform into a passionate and collaborative problem-solver as we cultivate your mathematical potential.

## **QUANTITATIVE REASONING I (HONORS)**

Explore the best of both worlds in Quantitative Reasoning I Honors. This course delves into various mathematical disciplines, emphasizing geometry and algebra. Our curriculum challenges students to expand their mathematical understanding, laying a strong foundation for future courses. In the honors curriculum, we will cover a wider breadth of topics aimed at creating a smooth transition to our future honors courses. Join us and discover your next favorite math topic!

## **QUANTITATIVE REASONING II**

In Quantitative Reasoning II, we'll empower ourselves as problem-solvers with a growing toolkit of algebra skills. We'll blast beyond any word-problem woes. We'll leave the linear world behind for a quirkier quadratic dimension, mastering our factoring, expanding, and parabolic graphing skills. We'll dip our toes into the triangular waters of trigonometry. We'll prepare for the quantitative reasoning sections of standardized tests by incorporating ACT/SAT-style problems in daily warm-ups and activities. We'll solve complex math puzzles through logical deduction, and along the way we'll work collaboratively to grow as mathematicians.

## **QUANTITATIVE REASONING II (HONORS)**

During this course, students will learn traditional material from Algebra II and Geometry, with the focus being on problem solving and critical thinking. The ultimate goals are for students to develop a growth mindset, to cultivate a curiosity/passion for mathematics, and to create an excellent foundation for further study of applied mathematics.

## **PRECALCULUS**

Critical thinking skills and problem-solving drive the Precalculus curriculum. Students will practice and develop these skills while tackling mathematical problems. The year will focus on revisiting a library of functions that students may have studied in earlier classes (linear, quadratic, exponential, logarithmic, etc). These topics will prepare students to take the quantitative reasoning sections of the ACT, SAT, or other standardized tests. Our overall goal will be to cultivate a curiosity and passion for mathematics while providing students with a problem-solving foundation that they will use to solve problems in the "real world."



## **PRECALCULUS (ADV)**

This course covers similar concepts as Precalculus (Honors) but is meant for the student who is looking to move on to a more advanced Calculus course. Concepts are covered in greater detail, and the pace of the course is such that students can expect to finish into Limits, giving one a jumpstart into Calculus.

## **PRECALCULUS (HONORS)**

Honors Precalculus is designed to prepare students for Calculus AB. It largely focuses on the properties of functions with the study of trigonometric, logarithmic, and exponential functions. Students also learn about limits and other concepts essential to the study of Calculus. By the end of this course, students should be able to work with functions represented in a variety of ways (graphical, numerical, analytical, or verbal) and understand the connections among these representations. They should also be able to communicate mathematics both orally and in well-written sentences and explain solutions to problems, model a written description of a physical situation with an appropriate function, use technology to help solve problems, experiment, interpret results, verify conclusions, and determine the reasonableness of solutions.

## **STATISTICS**

The world is built on the back of data. This course explores how data is used to support change, manage growth, and even manipulate ideas. Students in this course have successfully calculated how to have the most exciting bungee jump, how to prove their favorite music artists indeed write their own songs, and how the media emphasizes certain data to sway their opinions. This course is for the student who loves numbers but dreads formulas, and it ties directly to Statistics courses they will see at the University level.

## **STATISTICS (ADV)**

Advanced Statistics is a deep dive into collecting, analyzing, and drawing conclusions from data. The course is based around applying statistical formulas and concepts to everyday problems. Students will develop critical thinking skills as they explore these problems and learn to analyze data sets using statistical techniques.

## **CALCULUS AB (ADV)**

AP Calculus AB is an introductory college-level calculus course. Students cultivate their understanding of differential and integral calculus through engaging with real-world problems represented graphically, numerically, analytically, and verbally and using definitions and theorems to build arguments and justify conclusions as they explore concepts like change, limits, and the analysis of functions.

## **CALCULUS BC (ADV)**

Calculus BC includes all topics covered in Calculus AB, plus additional topics. It is designed to qualify students for placement and credit in a course that is one course beyond what is granted for Calculus AB. By the end of the course, students should be able to work with functions represented in a variety of ways (graphical, numerical, analytical, or



verbal) and understand the connections among these representations. They should also be able to communicate mathematics, both orally and in well-written sentences, and explain solutions to problems and model a written description of a physical situation with an appropriate function, differential equation, or integral. Additionally, students should be able to use technology to help solve problems, experiment, interpret results, verify conclusions, and determine the reasonableness of solutions. Finally, students will develop an appreciation of calculus as a coherent body of knowledge.

### **ADVANCED TOPICS IN MATH (ADV)**

This post Calculus course functions as an introduction to mathematical proof, linear algebra, and ordinary differential equations with a project-based emphasis on mathematical modeling. By the end of the course, students should be able to present mathematical ideas clearly and rigorously (in writing, graphically, and through presentations). They should leave this course with a foundational and intuitive understanding of a variety of mathematical topics and be able to use the modeling process to help analyze real-life problems (or fictionalized versions like a zombie outbreak). Students learn how to use appropriate tools and techniques to help solve problems, including computational tools like spreadsheets and MATLAB. They will additionally develop skills to learn new mathematical topics independently from textbooks and other resources. In a nutshell, this course is designed to help students learn how to think like a mathematician. At the end of the year, students complete independent research projects which they display and present to the greater school community.

### **INTRODUCTION TO COMPUTER SCIENCE/COMPUTER SCIENCE PROGRAMMING**

It is no secret that computers make the world go round these days. Every major development in the last 60 years has been driven by computer science. A lot has changed since Ada Lovelace wrote the first computer program in the 19th century, but the goal of computer science remains the same. Computers are machines that are meant to amplify and extend our abilities to solve problems and improve our lives. Computer science teaches us both the theories and the mechanics of how to solve complex problems using computers. In this class, we will map out the field of computer science, discover what computers both can and cannot do, understand how computers work from the ground up, learn fundamental programming concepts by doing, practice effective design, analysis, and debugging techniques, and employ these concepts and techniques to solve problems.

### **COMPUTER SCIENCE A (ADV)**

This is a college-level course that introduces the Java programming language. The course is built around developing computer programs, or parts of programs, that correctly solve a given problem. The course emphasizes design elements that ensure programs are understandable, adaptable, and, when appropriate, reusable. At the same time, the development of computer applications is utilized as a context for introducing other important computer science concepts, including the development, analysis, and application of algorithms and fundamental data structures. To aid them in these explorations, students will delve into industry standards with regard to tools, design techniques, reading and writing documentation, and debugging strategies. In addition, students will be challenged to consider what constitutes ethical use of technology, including the development of algorithms.

