The Mathematics curriculum follows the Colorado Academic Standards. The courses are taught with the philosophy that students must have content mastery at a college preparatory level upon graduation. Further, mathematically proficient students must simultaneously develop the habits of mind set forth in the Standards for Mathematical Practice. Our curriculum addresses both goals in order to create students who are both fluent in mathematical computation and are also able to effectively communicate mathematical ideas, problems, and solutions. Students are required to complete three years of math courses successfully to meet Cherry Creek District’s graduation requirements. The department recommends that all students take four years of Math.

### Mathematics Flowchart

#### College Prep
- **9th grade**
  - Algebra 1

#### Honors/AP Pathway
- **9th grade**
  - Honors Geometry/PreCalc
- **10th grade**
  - Geometry
  - Honors Algebra 2/PreCalc (taken with Algebra 2)
- **11th grade**
  - Algebra 2
  - Honors College Trig (sem)
  - AP Calculus BC
  - AP Calculus AB
- **12th grade**
  - Honors College Trig (sem)
  - Honors College Algebra (sem)
  - AP Calc AB or AP Calc BC
  - Calculus 3/ Differential Equations
  - AP Calculus BC

#### Options after Algebra 2
- AP Statistics
- Math for Liberal Arts
- College Algebra
- Intro to College Algebra
Mathematics Course Descriptions

Algebra 1X
This course meets every day instead of every other day and is designed for students who need additional time and support to master the Algebra 1 content. See below for Algebra 1 content description.

| Grade Level: 9-10 | Year | Credit 1.0 Math & 1.0 Elective | Prerequisite: Approval of math coordinator and teacher recommendation |

Algebra 1
The fundamental purpose of this course is to formalize and extend the mathematics students learned in the middle grades. The content of Algebra 1 deepens and extends students’ understanding of linear and exponential relationships by contrasting them with each other, and identifying and exploring the underlying mathematical structures that they share. Students explore many examples of functions, including sequences; analyze them graphically, numerically, symbolically, and verbally; make connections between them; and identify strengths and weaknesses of these forms. Extending the statistics studied in grade 8, students apply linear models to data that exhibit a linear trend, and mathematically analyze how well the model fits the data. Additionally, students engage in methods for analyzing, solving, and applying quadratic functions and become familiar with the usefulness of multiple forms of quadratic functions. The Mathematical Practice Standards are applied to the content of this course, allowing students to experience Algebra 1 as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

| Grade Level: 9-12 | Year | Credit 1.0 | Prerequisite: Teacher recommendation |

Algebra 2
Building on their work with linear, quadratic, and exponential functions, students extend their repertoire of functions to include polynomial, rational, radical and logarithmic functions. Students work closely with the expressions that define the functions, and continue to expand and hone their abilities to model situations and to solve equations, including solving quadratic equations over the set of complex numbers. Functions are studied in relation to one another by analysis of multiple representations of functions with unrestricted domains, as well as those with restricted domains. Students further develop their statistical knowledge by studying the collection, analysis and interpretation of data, and the connections to probability. The mathematical practice standards are applied to the content of this course, allowing students to experience Algebra 2 as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

| Grade Level: 10-12 | Year | Credit 1.0 | Prerequisite: Successful completion of Geometry |

AP Statistics (W)
This is an advanced course in statistics. Topics include exploratory analysis of data, planning a study and collection of data, producing statistical models using probability distributions, and statistical inference. The pace and rigor of instruction will be geared toward preparing students for the AP Exam, which they are expected to take in the spring.

| Grade Level: 11-12 | Year | Credit 1.0 | Prerequisite: Successful completion of Algebra 2 |
AP Calculus AB (W)
This course emphasizes a multi representational approach to calculus with concepts, results, and problems being expressed graphically, numerically, analytically and verbally. Topics include graphs and limits, differentiation, applications of differentiation, integration, and applications of integration. The primary goal of this course is successful performance on the AP Calculus AB Exam.

| Grade Level | 11-12 | Year | Credit 1.0 | Prerequisite: Successful completion (C or higher) of Pre-Calculus/Trigonometry |

AP Calculus BC (W)
This is the more rigorous of the two AP calculus courses we offer. Students will learn both the theoretical foundations and proper techniques of both differential and integral calculus and apply them extensively in problem-solving contexts. The pace and rigor of instruction will be geared toward preparing students for the AP Exam, which they are expected to take in the spring.

| Grade Level | 11-12 | Year | Credit 1.0 | Prerequisite: Completion of Honors Algebra 2/Pre-Calculus and teacher recommendation |

Calculus 3 (W)
This course represents the continuation of the calculus sequence. It is a systematic approach to the understanding of multivariable calculus. Topics include: vectors and vector valued functions, functions of several variables, multiple integrals, and vector analysis.

| Grade Level | 11-12 | Semester | Credit .5 | Prerequisite: Completion of Calculus BC with a score of 3 or higher on the AP Exam |

College Algebra
This full year course topics include functions that are polynomial, rational, exponential and logarithmic. Students will study the language and behavior of functions and will solve a variety of applied problems using curve fitting techniques. A Graphing Calculator is required for this course. Students who qualify will have the opportunity to take this course for college credit through the University of Colorado at Denver or Community College of Aurora.

| Grade Level | 12 | Year | Credit 1.0 | Prerequisite: Successful completion of Algebra 2 |

Differential Equations Honors (W)
Differential equations are widely used as a tool for modeling diverse phenomena ranging from population growth to elementary particles. Topics include first order equations, linear equations with constant coefficients, higher order equations, Laplace transforms, systems of equations, and applications. Students who qualify will have the opportunity to take both of these courses for college credit through the University of Colorado Denver.

| Grade Level | 11-12 | Semester | Credit .5 | Prerequisite: Completion of Calculus BC with a score of 3 or higher on the AP Exam |
Geometry
The high school Geometry course formalizes and extends students’ geometric experiences from the middle grades. Students explore more complex geometric situations and deepen their explanations of geometric relationships, moving toward formal mathematical arguments and proof. In this course, rigid and non-rigid transformations (including translations, reflections, rotations, and dilations) are the frame through which students build and prove the concepts of congruence and similarity. Students apply similar reasoning to geometric constructions. Previous experiences with proportional reasoning and the Pythagorean theorem lead students to understand the trigonometry of right triangles. The geometry of two and three-dimensional figures is the focus, including work and analysis in the coordinate plane. The Mathematical Practice Standards are applied to the content of this course, allowing students to experience Geometry as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

<table>
<thead>
<tr>
<th>Grade Level:</th>
<th>9-12</th>
<th>Year</th>
<th>Credit 1.0</th>
<th>Prerequisite:</th>
<th>Successful completion of Algebra 1</th>
</tr>
</thead>
</table>

Honors Geometry/Pre-Calculus (W)
For students interested in studying Advanced Placement Calculus in high school and/or STEM related careers post-graduation, condensed courses are offered so that students do not need to take two math classes in one year. In this more rigorous and fast-paced course, students will study all of the content of the Geometry course as outlined. Additionally, the Pre-Calculus topics that connect mathematically to the concepts of Geometry will be included. These topics include, but are not limited to, Law of Sines and Cosines, the study of the unit circle, and vectors. The Mathematical Practice Standards will again be an integral part of the course, supporting students in having conceptual understanding, procedural skill and fluency, and an ability to fully apply their understanding of mathematics.

<table>
<thead>
<tr>
<th>Grade Level:</th>
<th>9-10</th>
<th>Year</th>
<th>Credit 1.0</th>
<th>Prerequisite:</th>
<th>Completion of Algebra 1 with an A and teacher recommendation</th>
</tr>
</thead>
</table>

Honors Algebra 2/Pre-Calculus (W)
For students interested in studying Advanced Placement Calculus in high school and/or STEM related careers post-graduation, condensed courses are offered so that students do not need to take two math classes in one year. In this more rigorous and fast-paced course, students will study all of the content of the Algebra 2 course as outlined above. Additionally, the PreCalculus topics that connect mathematically to the concepts of the Algebra 2 course will be included. These topics include trigonometric functions and graphs, trig identities, parametric and polar equations. The Mathematical Practice Standards will again be an integral part of the course, supporting students in having conceptual understanding, procedural skill and fluency, and an ability to fully apply their understanding of mathematics.

<table>
<thead>
<tr>
<th>Grade Level:</th>
<th>10-11</th>
<th>Year</th>
<th>Credit 1.0</th>
<th>Prerequisite:</th>
<th>Successful completion of Honors Geometry/Pre-Calculus</th>
</tr>
</thead>
</table>
**Honors College Algebra (W)**

This one semester course is designed for students who intend to take calculus in college. Topics include functions that are polynomial, rational, exponential and logarithmic. Students will study the language and behavior of functions and will solve a variety of applied problems using curve fitting techniques. A Graphing Calculator is required for this course. Students who qualify will have the opportunity to take this course for college credit through the University of Colorado at Denver or Community College of Aurora.

| Grade Level: | 12 | Semester | Credit .5 | Prerequisite: | Successful completion of Algebra 2 and teacher recommendation |

**Honors College Trigonometry (W)**

Topics in trigonometry, analytic trigonometry, and elementary functions designed for students who intended to take the calculus sequence. Included will be angle measure and trigonometric functions of acute angles, analytic trigonometry, fundamental trigonometric functions and identities, vectors, parametric equations and the polar coordinate system. Graphing Calculators are used extensively. Applications are emphasized. Students who qualify will have the opportunity to take this course for college credit through the University of Colorado at Denver or Community College of Aurora.

| Grade Level: | 10-12 | Semester | Credit .5 | Prerequisite: | Teacher recommendation and concurrent enrollment in Algebra |

**Introduction to College Algebra**

This full year College Algebra prep course topics include an introduction to functions that are polynomial, rational, exponential and logarithmic. Students will study the language and behavior of functions and will solve a variety of applied problems. At the end of the course students will be prepared to take College Algebra. A Graphing Calculator is required for this course.

| Grade Level: | 12 | Year | Credit 1.0 | Prerequisite: | D in Algebra 2. (Not higher or lower. Students with combination grades such as D/C will be considered on a case by case basis.) |

**Math for Liberal Arts**

This one semester course is designed to give liberal arts students the skills required to understand and interpret quantitative information that they encounter in the news and in their studies, and to make quantitatively based decisions in their lives. Topics include a survey of logic and analyses of arguments, identifying fallacies in reasoning, working with numbers and units, linear and exponential relations, and essentials of probability and statistics. There is an emphasis on applications in the areas of economics, finance, environmental sciences, health, music and science. This course is only offered second semester.

| Grade Level: | 12 | Semester | Credit .5 | Prerequisite: | Successful completion of Algebra 2 |