



# MATHEMATICS

## 9-12

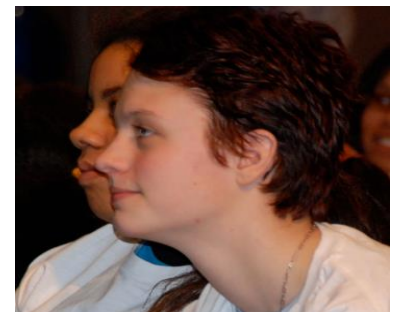
Students must pass one Regents examination in mathematics in order to graduate. The following NYS Regents examinations are offered:

- Algebra I
- Geometry
- Algebra II

Students in most mathematics courses also take periodic assessments to measure their progress toward proficiency.

Students who wish to earn a Regents Diploma with Advanced Designation must pass eight Regents exams with a score of 65 or better; three of these must be mathematics exams. In addition, the student must choose either two additional credits in a World Language and pass the Checkpoint B exam or a five-unit sequence in the Arts or Career and Technical Education (CTE).

School counselors can provide additional clarification including options for transfer students, alternative pathways, or honors designations.



Office of Instruction  
Buffalo Public Schools

## Subject Area Expectations

In order to graduate, students must earn a total of 22 course credits, including three credits in mathematics at the commencement-level. The typical core content sequence is Algebra I, Geometry, and Algebra II. While a fourth year is not required, upper level math courses, including Advanced Placement (AP), incorporate skills and knowledge that a college-bound student should possess. Students should meet with their school counselor to determine a specific course sequence that will meet graduation requirements and best suit their individual needs, taking into consideration their college and career plans.

Students who do not successfully complete core courses may be asked to participate in recovery programs to make up credits. Depending on the course the student needs to make up, credit recovery may be offered online, via summer school, or scheduled during the school year.

### ALGEBRA I (1 course credit)

This course formalizes and extends the study of algebraic concepts that students learned in the middle grades. A Regents exam is offered at the end of this course.

#### Major Emphasis Clusters – Algebra I

- Interpret the structure of expressions
- Perform arithmetic operations on polynomials
- Create equations that describe numbers or relationships
- Understand solving equations as a process of reasoning; explain the reasoning
- Solve equations and inequalities in one variable
- Represent and solve equations and inequalities graphically
- Understand the concept of a function and use function notation
- Interpret functions that arise in applications in terms of the context
- Interpret linear models

### GEOMETRY (1 course credit)

This course formalizes and extends students' geometric experiences from the middle grades. Students explore more complex geometric situations and deepen their explanations of geometric relationships. A Regents exam is offered at the end of this course.

#### Major Emphasis Clusters - Geometry

- Understand congruence in terms of rigid motions
- Prove geometric theorems
- Understand similarity in terms of similarity transformations
- Prove theorems using similarity
- Define trigonometric ratios and solve problems involving right triangles
- Use coordinates to prove simple geometric theorems algebraically
- Apply geometric concepts in modeling situations

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### TIPS FOR PARENTS

Make math part of students' daily home routine. Expect students to review or redo problems from class.

Communicate confidence in your student's ability to grow as a learner. Don't talk about your own fear of math or how hard math was for you. Fostering a growth mindset is key to a student's success.

Discuss career choices and investigate together the level of math required for college or associates degrees, technical certificates, or possible on-the-job needs. All jobs require some level of math, including nursing, operations, accounting, engineering, computer-aided design, automotive, teaching, and carpentry.

Consider using resources such as Mathalicious for enrichment or extra practice. Try Khan Academy's short video clips for the best algebra help strategies.

Work backward through geometry proofs. Determine what needs to be proven; then think through what needs to come first in order to reach that conclusion.

After completing a geometry proof or word problem one way, look for a second way to solve the same proof or problem.

### ALGEBRA II (1 course credit)

Building on their work with linear, quadratic, and exponential functions, students learn about polynomial, rational, and radical functions. Students work closely with the expressions that define the functions and continue to expand and refine their abilities to model situations and to solve equations, including solving quadratic equations over the set of complex numbers and solving exponential equations using the properties of logarithms. A Regents exam is offered at the end of this course.

#### Major Emphasis Clusters – Algebra II

- Extend the properties of exponents to rational exponents
- Write expressions in equivalent forms to solve problems
- Understand the relationship between zeros and factors of polynomials
- Understand solving equations as a reasoning process; explain the reasoning
- Represent and solve equations and inequalities graphically interpreting
- Interpret functions that arise in applications in terms of the context
- Build a function that models a relationship between two quantities
- Infer and justify conclusions from sample surveys, experiments, observations

### PRECALCULUS and advanced topics (1 course credit)

Extending their understanding of complex numbers to points in the complex plane, students come to understand that multiplying a given set of points by a complex number amounts to rotating and dilating those points in the complex plane about zero. Students study matrices as tools for performing rotations and reflections of the coordinate plane, as well as for solving systems of linear equations. Inverse functions are explored as students study the relationship between exponential and logarithmic functions and restrict the domain of the trigonometric functions to allow for their inverses.

### CALCULUS (1 course credit)

This courses includes the study of derivatives, differentiation, integration, the definite and indefinite integral, and applications of calculus. Typically, students have previously studied pre-calculus topics including trigonometry, elementary functions, and analytic geometry.

### AP CALCULUS (1 course credit)

AP Calculus is the equivalent of a college-level course designed provide students with an understanding of the concepts of calculus and experience with its methods and applications. This course includes the following topics: functions, graphs, limits, and continuity; differential calculus (including definition, application and computation of the derivative; derivative at a point; derivative as a function; and second derivatives); and integral calculus, parametric, polar and vector functions; applications of integrals and polynomial approximation and series, including series of constants and Taylor series.

### AP STATISTICS (1 course credit)

AP Calculus is the equivalent of a college-level course designed to introduce students to the major concepts and tools for collecting, analyzing and drawing conclusions from data. Students are exposed to four broad conceptual themes:

- ✓ exploring data: describing patterns and departures from patterns;
- ✓ sampling and experimentation: planning and conducting a study;
- ✓ anticipating patterns: exploring random phenomena using probability and simulation; and
- ✓ statistical inference: estimating population parameters, testing hypotheses.

**Students should consult with their counselors to discuss whether they would benefit from alternate credit-bearing opportunities, such as Survey of Geometry, Principles of Algebra, and Algebra 1 of 2 and 2 of 2.**