

## **Mathematics**

The Georgia mathematics curriculum focuses on actively engaging students in the development of mathematical understanding by using manipulatives and a variety of representations (e.g., concrete, symbolic, verbal, graphical), working independently and cooperatively to solve problems, estimating and computing efficiently, and conducting investigations and recording findings. There is a shift towards applying mathematical concepts and skills in the context of authentic problems and understanding concepts rather than merely following a sequence of procedures. In mathematics classrooms, students will learn to think critically in a mathematical way with an understanding that there are many different ways to a solution and sometimes more than one right answer in applied mathematics. Mathematics is the economy of information. It is the reasoned, logical connections that make mathematics manageable. Each mathematics course integrates concepts from algebra, geometry, and data analysis and probability in order to emphasize the natural connections among mathematical topics. As a result, implementation of the Georgia Performance Standards places a greater emphasis on the process standards from the National Council of Teachers of Mathematics: problem solving, reasoning, representation, connections, and communication.

Below are course descriptions for Mathematics I, Mathematics II, Mathematics III, Mathematics IV, Accelerated Mathematics I, Accelerated Mathematics II and Accelerated Mathematics III.

### **Mathematics I: Algebra / Geometry / Statistics**

This is the first in the sequence of secondary mathematics courses designed to ensure that students are college and work ready. This course requires students to:

- explore the characteristics of basic functions using tables, graphs, and simple algebraic techniques;
- operate with radical, polynomial, and rational expressions;
- solve a variety of equations, including quadratic equations with a leading coefficient of one, radical equations, and rational equations;
- investigate properties of geometric figures in the coordinate plane;
- use the language of mathematical argument and justification;
- discover, prove, and apply properties of polygons;
- utilize counting techniques and determine probability;
- use summary statistics to compare samples to populations; and
- explore the variability of data.

### **Mathematics II: Geometry / Algebra II / Statistics**

This is the second in the sequence of secondary mathematics courses designed to ensure that students are college and work ready. This course requires students to:

- represent and operate with complex numbers;
- use numerical, graphical, and algebraic techniques to explore quadratic, exponential, and piecewise functions and to solve quadratic, exponential and absolute value equations and inequalities;
- use algebraic models to represent and explore real phenomena;
- explore inverses of functions;
- use right triangle trigonometry to formulate and solve problems;
- discover, justify and apply properties of circles and spheres;
- use sample data to make informal inferences about population means and standard deviations; and
- fit curves to data and examine the issues related to curve fitting.

### **Mathematics III: Advanced Algebra / Statistics**

This is the third in the sequence of secondary mathematics courses designed to ensure that students are college and work ready. It requires students to:

- analyze polynomial functions of higher degree;
- explore logarithmic functions as inverses of exponential functions;
- solve a variety of equations and inequalities numerically, algebraically, and graphically;
- use matrices and linear programming to represent and solve problems;
- use matrices to represent and solve problems involving vertex-edge graphs;
- investigate the relationships between lines and circles;
- recognize, analyze, and graph the equations of conic sections;
- investigate planes and spheres;
- solve problems by interpreting a normal distribution as a probability distribution; and
- design and conduct experimental and observational studies.

### **Mathematics IV: Pre-Calculus – Trigonometry / Statistics**

This is a fourth year mathematics course designed to prepare students for calculus and similar college mathematics courses. It requires students to:

- investigate and use rational functions;
- analyze and use trigonometric functions, their graphs, and their inverses;
- use trigonometric identities to solve problems and verify equivalence statements;
- solve trigonometric equations analytically and with technology;
- find areas of triangles using trigonometric relationships;
- use sequences and series;
- understand and use vectors;
- investigate the Central Limit theorem; and
- use margins of error and confidence intervals to make inferences from data.

**Accelerated Mathematics I: Geometry / Algebra II / Statistics**

This is the first in the sequence of mathematics courses designed to ensure that students are prepared to take higher level mathematics courses during their high school career, including Advanced Placement Calculus AB, Advanced Placement Calculus BC, and Advanced Placement Statistics. It requires students to:

- represent and operate with complex numbers;
- explore the characteristics of basic functions utilizing tables, graphs, and simple algebraic techniques;
- operate with radical, polynomial, and rational expressions;
- solve equations, including quadratic, radical, and rational equations;
- investigate properties of geometric figures in the coordinate plane;
- use the language of mathematical argument and justification;
- discover, prove, and apply properties of polygons, circles and spheres;
- utilize counting techniques and determine probability;
- use summary statistics to compare samples to populations;
- explore variability of data; and
- fit curves to data and examine the issues related to curve fitting.

**Accelerated Mathematics II: Advanced Algebra / Geometry / Statistics**

This is the second in the sequence of mathematics courses designed to ensure that students are prepared to take higher level mathematics courses during their high school career, including Advanced Placement Calculus AB, Advanced Placement Calculus BC, and Advanced Placement Statistics. It requires students to:

- explore the characteristics of exponential, logarithmic, and higher degree polynomial functions using tables, graphs, and algebraic techniques;
- explore inverses of functions;
- use algebraic models to represent and explore real phenomena;
- solve a variety of equations and inequalities using numerical, graphical, and algebraic techniques with appropriate technology;
- use matrices to formulate and solve problems;
- use linear programming to solve problems;
- use matrices to represent and solve problems involving vertex-edge;
- use right triangle trigonometry to formulate and solve problems;
- investigate the relationships between lines and circles;
- recognize, analyze, and graph the equations of conic sections;
- investigate planes and spheres;
- use sample data to make informal inferences about population means and standard deviations;
- solve problems by interpreting a normal distribution as a probability distribution; and
- design and conduct experimental and observational studies.

**Accelerated Mathematics III: Pre-Calculus - Trigonometry / Statistics**

This is the third in the sequence of mathematics courses designed to ensure that students are prepared to take higher level mathematics courses during their high school career, including Advanced Placement Calculus AB, Advanced Placement Calculus BC, and Advanced Placement Statistics. It requires students to:

- investigate and use rational functions;
- analyze and use trigonometric functions, their graphs, and their inverses;
- find areas of triangles using trigonometric relationships;
- use trigonometric identities to solve problems and verify equivalence statements;
- solve trigonometric equations analytically and with technology;
- use complex numbers in trigonometric form;
- understand and use vectors;
- use sequences and series;
- explore parametric representations of plane curves;
- explore polar equations;
- investigate the Central Limit theorem; and
- use margins of error and confidence intervals to make inferences from data.