University at Buffalo
Gifted Math Program
Graduate School of Education

Course II Curriculum

Textbooks: *eMathInstruction, Common Core Algebra I, https://emathinstruction.com/common-core-algebra-i/; Manifest Microcourses: Exponential Functions; Manifest Microcourses: Derivatives; Manifest Microcourses: Integral Functions; Manifest Microcourses: Systems of Functions*

Computational Mathematics

- COMMON MULTIPLES: finding and summing
- FIBONACCI NUMBERS: generating, filtering, and summing
- PRIME FACTORS: finding and filtering
- PALINDROMES: finding and filtering
- DIVISIBILITY: finding divisors of large numbers and finding numbers with certain divisor constraints
- LARGE PRIME FINDING: finding and indexing
- SUM OF SQUARES: finding and comparing
- LARGE NUMBER MANIPULATION: parsing, manipulating, and comparing digits

Functions And Their Meaning*

- EXPONENTIAL and LOGARITHMIC FUNCTIONS: Students learn to read, write, and model with exponential and logarithmic functions
- TRIGONOMETRIC FUNCTIONS: Students learn to read, write, and model with trigonometric functions
- DERIVATIVES: Students learn the meaning of a function's derivative in context. They learn to read, write, and model situations with functions when those contexts are described with their derivatives.
- INTEGRAL FUNCTIONS AND THE FUNDAMENTAL THEOREM OF CALCULUS: Students learn to read, write, and model situations with integral functions using the fundamental theorem of calculus as the central conceptual idea.

Algebra I with Emath Instruction

- LINEAR EXPRESSIONS, EQUATIONS, AND INEQUALITIES: solving linear equations; linear applications; linear equations with unspecified constants; solving linear inequalities; compound inequalities; interval notation; modeling with inequalities
- FUNCTIONS: function notation; graphs of functions; graph features; graphing calculator use; average rate of change; domain and range
- LINEAR FUNCTIONS AND ARITHMETIC SEQUENCES: proportional relationships; conversions; non-proportional linear relationships; slope-intercept form; modeling; horizontal and vertical lines; absolute value and step functions; graphs of linear inequalities; arithmetic sequences
- SYSTEMS OF LINEAR EQUATIONSNAD INEQUALITIES: methods of solving; properties of systems; modeling
- EXPONENTS: simplifying expressions; zero and negative exponents; exponential growth and decay; exponential functions; percent review; exponential models; linear vs exponential; geometric sequences
- POLYNOMIALS: operations on polynomials; factoring polynomials
- QUADRATIC FUNCTIONS: parabolas; transformations of parabolas; completing the square; zeros of quadratic functions; applications

- ROOTS AND IRRATIONAL NUMBERS: square roots; irrational numbers; square root function and transformations; solving quadratics using inverse operations and completing the square; quadratic formula; cube roots
- STATISTICS: graphical displays of data; quartiles and box plots; measures of central tendency; variation; frequency tables; bivariate data analysis; linear regression; other types of regression; quantifying prediction; residuals
- FUNCTIONS AND MODELING: general function transformations; discrete functions; linear and exponential models; step functions; piecewise linear functions; quadratic models; limits on the accuracy of models

The Art of Problem Solving

- EXPONENTS AND LOGARITHMS: the meaning of exponents, laws of exponents, fractional exponents, solving exponential equations using logarithms
- COMPLEX NUMBERS: the meaning of complex numbers, powers of *i*, conjugates, rationalizing denominators
- LINEAR EQUATIONS: varied solution methods, applications