Calculus(H)/Calculus AP – AB/BC - Grade 12

- Understand the concept of limits
- Evaluate limits
- Understand and apply the concept of continuity
- Understand the concept of derivatives and methods of determining the derivative of a function
- Apply the derivation to sketch the graph of a curve, solve maximum and minimum and related rate problems
- Understand the concept of definite and indefinite integrals and methods to evaluate
- Solve differential equations using various methods
- Use integrals to solve area and volume problems

BC Additional Topics

- Determine and prove if an infinite series is convergent
- Differentiate, integrate or substitute a known power series to find an additional representation
- Graph, differentiate and apply parametric equations
- Graph polar equations and find their areas
- Solve problems using vectors
- Determine the arc length of a curve
- Find limits of indeterminate forms using L'Hopital Rule
- Use limits to evaluate improper integrals
- Solve work problems

AP Statistics – Grades 10, 11 & 12

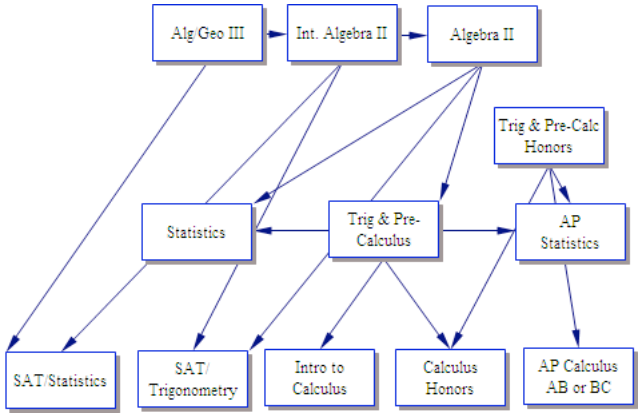
Students will be exposed to four broad conceptual themes:

- Exploring Data: Describing patterns and departures from patterns
- Sampling and Experimentation: Planning and conducting a study
- Anticipating Patterns: Exploring random events using probability and simulation
- Statistical Inference: Estimating population parameters and testing hypothesis

Mathematics Related Activities

- Math Team
- Competitions
  - New England Math League
  - American Mathematical Competition
  - Worcester Polytechnic Institute Math Competition
  - TEAMS Competition
  - Mathematics Association of Math League
- Boston University Math Day
- Mu Alpha Theta

Sequence of Courses



WESTFORD PUBLIC SCHOOLS

CURRICULUM BENCHMARKS

GRADES 11 AND 12

MATHEMATICS

Westford Academy

Compiled by the
Mathematics Curriculum Task Committee
under the direction of
Assistant Superintendent
Dr. Lorraine Tacconi-Moore

"Shaping the future one child at a time"

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Algebra/Geometry 3 - Grade 11 and 12

- Graph and analyze scatter plots and find best fit lines
- Apply the sine, cosine, and tangent trigonometric functions to calculate the measure of angles and sides of triangles and apply these concepts to solve real-life problems
- Perform operations and solve equations with radicals
- Solve and graph linear equations
- Solve and graph compound and absolute value inequalities
- Solve systems of equations using substitution, elimination, and graphing
- Solve linear programming problems
- Solve and graph quadratic functions
- Evaluate functions and composite functions
- Factor polynomial expressions
- Solve quadratic equations by completing the square, quadratic formula and factoring
- Solve everyday problems, which model quadratic functions
- Simplify rational expressions and solve rational equations
- Simplify expressions with all types of real exponents
- Solving application problems using volume, lateral area and surface area of rectangular solids, cylinders, pyramids, cones
- Data analysis including sample size evaluation
- Geometrical word problems including perimeter and area of triangles, exterior angles, vertical and adjacent angles, parallel lines and transversals, supplementary angles

Algebra 2 - Grade 11

- Perform operations and solve equations with radicals
- Graph linear, quadratic and absolute value equations using translations
- Solve compound and absolute value inequalities
- Graph inequalities and absolute value equations
- Solve systems of equations using substitution, elimination, and Cramer's Rule
- Solve linear programming problems
- Graph and solve quadratic functions
- Perform operations with imaginary and complex numbers

Algebra 2 - Grade 11 (continued)

- Use the properties of logarithms to solve equations.
- Evaluate functions and composite functions
- Find equations for linear, quadratic and inverse functions
- Factor polynomial expressions
- Solve quadratic equations by completing the square, quadratic formula and factoring
- Solve everyday problems, which model quadratic functions
- Simplify rational expressions and solve rational equations
- Simplify expressions with all types of real exponents
- Use synthetic division to divide equations, create depressed equations and graph polynomial functions

Trigonometry & Pre-Calculus - Grade 11

- Understand and use radians to solve sector problems
- Solve linear and angular velocity problems
- Understand the six trigonometric functions and the values of the trigonometric functions for special angles as they rotate through 360 degrees
- Find the values of inverse trigonometric function.
- Solve right and oblique triangles
- Graph sine and cosine functions with amplitude and periodicity factors and translations
- Solve trigonometric modeling problems, which use periodic behavior
- Simplify trigonometric expressions and prove identities
- Solve trigonometric equations
- Use sum, difference, double and half angle formulas to simplify expressions, solve equations, and prove identities
- Graph quadratic, cubic, quartic and quintic functions
- Solve quadratic, cubic, and quartic equations.
- Solve maximum and minimum problems using quadratic and cubic equations
- Graph family of functions using vertical and horizontal stretching, shrinking, reflections and translations
- Find the inverse of a function
- Graph rational equations
- Simplify and solve logarithmic and exponential functions
- Graph and determine equations of conic sections (Honors)

SAT/Statistics - Grade 12

- Review multiple topics for the SAT
- Display data using various methods such as histogram, box plot and bar charts
- Collect data using a random sampling approach
- Compute mean, median, standard deviation and standard error of a sampling distribution using technology
- Solve problems involving binomial distribution, sampling distribution of the mean and a proportion
- Develop a questionnaire, identify a population, collect and analyze data on a random sample

SAT/Trigonometry - Grade 12

- Review multiple topics for the SAT
- Review Algebra II topics
- Solve right triangle problems using the six trigonometric functions
- Simplify expressions, prove identities and solve equations using trigonometric identities
- Convert radians to degrees and vise versa
- Apply radian measure to linear and angular velocity problems
- Recognize co-terminal, primary and angles in standard position

Introduction to Calculus - Grade 12

- Graph, determine the zeros, apply Descartes Rule of signs to polynomial functions
- Graph rational and conic functions, identify asymptotes and characteristics of these functions
- Apply various trigonometric identities and laws to solution of problems
- Solve linear equations and inequalities
- Relate the slope of a tangent line to a curve to the instantaneous rate of change