

INTRODUCTION TO ADVANCED MATHEMATICS

Prerequisite: A grade of C or better in Algebra II is recommended
Meeting time: 5 days a week, full-year, one credit
Placement: Grades 11,12, Level III

Introduction to Advanced Mathematics is a course designed for the college-bound student who has successfully completed Algebra II and wishes to extend his knowledge of mathematics with less than the in-depth treatment that is presented in Advanced Mathematics. This course will strengthen previous knowledge of geometry and algebra as well as explore more advanced mathematical concepts such as exponents, logarithms, and trigonometry.

(Agawam High School Academic Expectations: 1,3,4,5,6)

COURSE GOALS AND OBJECTIVES

1. To review and extend the concepts introduced in both Geometry and Algebra II.
2. To develop the student's ability to translate ordinary words and phrases into mathematical symbols and relationships.
3. To teach the student the commonly-used methods of problem solving.
4. To develop the student's ability to use calculators effectively.
5. To improve the student's ability to calculate in situations involving real numbers and radicals
6. To review the concepts of plane geometry, especially the formulas and calculations involving plane figures such as circles, triangles, squares and a variety of polygons.
7. To extend the student's knowledge of trigonometry and its usefulness in solving real-world problems.
8. To enhance the student's ability to use logarithms to solve complex problems.

Strand 1: Number Sense and Operations

State Standard (Grade Standard)

- Simplify numerical expressions with powers and roots, including fractional and negative exponents. (12.N.2)
- Find the approximate value for solutions to problems involving square roots and cube roots without the use of a calculator, e.g., $\sqrt{3^2 - 1} \approx 2.8$ (10.N.3)
- Use estimation to judge the reasonableness of results of computations and of solutions to problems involving real numbers. (10.N.4)

Strand 2: Patterns, Relations, and Algebra

State Standard (Grade Standard)

- Demonstrate an understanding of the trigonometric, exponential and logarithmic functions. (12.P.4)
- Perform operations on functions, including composition. Find inverses of functions. (12.P.5)
- Given algebraic, numeric and/or graphical representations, recognize functions as polynomial, rational, logarithmic, or exponential. (12.P.6)
- Find solutions to quadratic equations (with real coefficients) and apply to solutions of problems. (12.P.7)
- Solve a variety of equations and inequalities using algebraic, graphical, and numerical methods, including the quadratic formula; use technology where appropriate. (12.P.8)
- Add, subtract and multiply polynomials. Divide polynomials by monomials. (10.P.3)
- Demonstrate facility in symbolic manipulation of polynomial and rational expressions by rearranging and collecting terms, factoring, identifying and canceling common factors in rational expressions, and applying the properties of positive integer exponents. (10.P.4)

Strand 3: Geometry

State Standard (Grade Standard)

- Define the sine, cosine, and tangent of an acute angle. Apply to the solution of problems. (12.G.1)
- Derive and apply basic trigonometric identities and the laws of sines and cosines. (12.G.2)
- Apply properties of angles, parallel lines, arcs, radii, chords, tangents, and secants to solve problems. (12.G.5)
- Apply congruence and similarity correspondences and properties of the figures to find missing parts of geometric figures, and provide logical justification. (10.G.4)
- Solve simple triangle problems using the triangle angle sum property, and/or, the Pythagorean theorem. (10.G.5)
- Use the properties of special triangle to solve problems. (10.G.6)

- Draw the results, and interpret transformations on figures in the coordinate plane, e.g., translations, reflections, rotations, scale factors, and the results of successive transformations. Apply transformations to the solution of problems. (10.G.9)

Strand 4: Measurement
State Standard (Grade Standard)

- Describe the relationship between degree and radian measures, and use radian measure in the solution of problems, in particular, problems involving angular velocity and acceleration. (12.M.1)
- Use dimensional analysis for unit conversion and to confirm that expressions and equations make sense. (12.M.2)

RESOURCES

Textbook:

Keenan, Edward P. and Ann Xavier Gantert. Integrated Mathematics Course III. New York, New York; Amsco School Publications, 2000.

Teacher generated materials such as NCTM journals, note taking outlines, etc.

Technology Resources: Classroom sets of scientific and graphing calculators.

ASSESSMENT STRATEGIES

- Class participation, written and oral communication
- Class work
- Homework
- Class projects and presentations
- Notebooks/Portfolios
- Quizzes
- Tests
- Departmental Semester Exam
- School Wide and Departmental Rubrics