

Course IV Curriculum

TEXTBOOKS: *GMP IV Problem Sets* with problems from Philips Exeter Academy Mathematics Department; *eMathInstruction*, Common Core Algebra II, <https://emathinstruction.com/common-core-algebra-i/>

FUNDAMENTAL CONCEPTS OF ALGEBRA

algebraic expressions and real numbers; exponents; radicals and rational exponents; polynomials; factoring polynomials; rational expressions; equations; modeling with equations; linear inequalities and absolute value inequalities

FUNCTIONS AND GRAPHS

graphs and graphing utilities; basics of functions and their graphs; transformations of functions; combinations of functions; composite functions; inverse functions; circles; modeling with functions

LINEAR FUNCTIONS

direct variation; rate of change; forms of a line; linear modeling; inverses; piecewise linear functions; systems of equations

POLYNOMIAL AND RATIONAL FUNCTIONS

complex numbers; quadratic functions; polynomial functions and their graphs; dividing polynomials; remainder; zeros of polynomial functions; rational functions and their graphs; polynomial and rational inequalities; modeling using variation; power functions; modeling with polynomial and rational functions

EXPONENTIAL AND LOGARITHMIC FUNCTIONS

exponential functions; logarithmic functions; properties of logarithms; exponential and logarithmic equations and graphs; exponential growth and decay; modeling with exponential functions

TRIGONOMETRIC FUNCTIONS

angles and radian measure; trigonometric functions: the unit circle; right triangle trigonometry; trigonometric functions of any angle; graphs of sine and cosine functions; graphs of other trigonometric functions; inverse trigonometric functions; applications of trigonometric functions

ANALYTIC TRIGONOMETRY

verifying trigonometric identities; sum and difference formulas; double-angle, power-producing, and half-angle formulas; product-to-sum and sum-to-product formulas; trigonometric equations; the law of sines; the law of cosines

STATISTICS

probability review; variability and sampling; population parameters; normal distribution; z-scores; sample means and proportions; difference in sample means; distribution of sample means; distribution of sample proportions; margin of error; linear regression; other types of regression; confidence intervals and statistical significance

SEQUENCES AND SERIES

introduction; arithmetic and geometric sequences; summation notation; arithmetic series; geometric series; mortgage payments

POLAR COORDINATES

polar coordinates; graphs of polar equations; complex numbers in polar form; Demoivre's theorem

VECTORS

components of vectors, 3-dimensional vectors, orthogonal vectors, scalar multiplication; dot product; parametric equations

MATRICES AND DETERMINANTS (optional)

matrix solutions to linear systems; inconsistent and dependent systems and their applications; matrix operations and their applications; multiplicative inverses of matrices and matrix equations; determinants and Cramer's rule