



ALGEBRA II/TRIGONOMETRY

Counselors are available to assist parents and students with course selections and career planning. Parents may arrange to meet with the counselor by calling the school's guidance department

COURSE DESCRIPTION

Algebra II/Trigonometry is designed to continue the study of topics explored in Algebra I. Topics include complex numbers; functions and graphs; systems of equations and inequalities; polynomial, logarithmic, and exponential functions and equations; and sequences and series. Topics from trigonometry include circular functions, graphs, and applications. Graphing calculators are used to enhance the understanding of realistic applications through mathematical modeling and to aid in the investigation and study of functions, equations, and inequalities. Students will take the Standards of Learning test for Algebra II. Specific dates for the spring or summer SOL test will be announced by the school. **Students cannot receive credit for both Algebra II/Trigonometry and Algebra II (MA 3135).**

PREREQUISITE

Geometry

OPTIONS FOR NEXT COURSE

Mathematical Analysis, Advanced Placement Statistics, or Advanced Placement Computer Science

REQUIRED STUDENT TEXTBOOK

Glencoe Algebra 2 (Virginia Edition). John A. Carter, Ph.D., Gilbert J. Cuevas, Ph.D., Roger Day, Ph.D., and Carol Malloy, Ph.D. Glencoe McGraw-Hill, 2012

RECOMMENDED CALCULATOR

TI-83 Plus or TI-84 Plus

Virginia Beach Instructional Objectives
Algebra II with Trigonometry – MA 3137

School Net Objective	Objective
Equations and Inequalities	
A2T.EQ.1.1	The student will solve compound inequalities, absolute value equations, and absolute value inequalities in one variable, both graphically and/or by using a compound statement. The student will write solutions to inequalities in set and interval notation. (SOL AII/T.4a).
Linear Relations and Functions	
A2T.FN.2.1	The student will be able to identify the following function families: linear, quadratic, absolute value, square root, cubic, reciprocal, exponential, logarithmic, greatest integer and sinusoidal. Students will be able to describe parent functions symbolically and graphically and identify the domain and range of each function. (SOL AII/T.6; AII/T.7a)
A2T.EQ.2.2	The student will graph linear and absolute value inequalities in two variables. (SOL AII/T.4a)
A2T.FN.2.3	The student will be able to graph piecewise-defined functions, greatest integer functions, and absolute value functions. Students will write the equation of these functions, given the graph and describe the domain and range of each function. (SOL AII/T.6; AII/T.7a, b, c)
Systems of Equations and Inequalities	
A2T.EQ.3.1	The student will be able to solve systems of linear equations in three variables.
Quadratic Functions and Relations	
A2T.FN.4.1	The student will graph quadratic functions and be able to identify the vertex, axis (or line) of symmetry, zeros, x- and y-intercepts, domain and range, and intervals over which the graph is increasing/decreasing. A transformational approach to graphing will be employed. A graphing calculator will be used as a tool to investigate the shape and behavior of quadratic functions. (SOL AII/T.6; SOL AII/T.7a, b, c, d)
A2T.ST.4.2	The student will collect and analyze data to make predictions and solve practical problems. Graphing calculators will be used to model the curve of best fit as a quadratic function. (SOL AII/T.9)
A2T.FN.4.3	The student will recognize and manipulate equivalent forms of quadratic functions including: standard form, vertex form, and intercept form. (SOL AII/T.6)
A2T.EX.4.4	The student will completely factor quadratic expressions. Students will be able to verify polynomial identities for the difference of squares and perfect square trinomials. (SOL AII/T.1d)
A2T.EQ.4.5	The student will solve quadratic equations over the set of complex numbers by graphing, factoring, using the Square Root Property, completing the square, and by using the quadratic formula. The student will recognize that the quadratic formula can be derived by applying the completion of squares to any quadratic equation in standard form. The value of the discriminant will be used to determine the number of real and complex solutions. (SOL AII/T.4b)
A2T.EX. 4.6	The student will perform operations with complex numbers and simplify the results using patterns of powers of i and identify field properties that are valid for complex numbers. (SOL AII/T.3)
A2T.FN.4.7	Given the graph of a quadratic function, the student will write the equation in standard form, vertex form, and intercept form. (SOL AII/T.6)

A2T.EQ.4.8	The student will solve nonlinear systems of equations, including linear-quadratic and quadratic-quadratic, algebraically and graphically. Graphing calculators will be used as a tool to visualize graphs and predict the number of solutions. (SOL AII/T.5)
Polynomials and Polynomial Functions	
A2T.EX.5.1	The student will divide a polynomial expression by a monomial or a binomial using long division and synthetic division. (SOL AII/T.1a)
A2T.FN.5.2	The student will identify the general shapes of graphs of polynomial functions. (SOL AII/T.6)
A2T.FN.5.3	The student will analyze and sketch polynomial functions, describe the end behavior, define intervals over which a function is increasing/decreasing, determine the domain and range, and locate relative minimum/maximum values. (SOL AII/T.7a-f)
A2T.ST.5.4	The student will collect and analyze data to make predictions and solve practical problems. Graphing calculators will be used to model the curve of best fit as a polynomial function. (SOL AII/T.9)
A2T.EX.5.5	The student will factor higher degree polynomials completely including the sum and difference of cubes. Students will be able to verify polynomial identities for the sum and difference of cubes. (SOL AII/T.1d)
A2T.EQ.5.6	The student will determine the number and type of roots for polynomial equations and solve by factoring and applying other techniques for solving quadratic equations. (SOL AII/T.4b)
A2T.FN.5.7	The student will determine the number and type of roots for polynomial equations and find the zeros of a polynomial function. (SOL AII/T.7b)
A2T.FN.5.8	The student will examine and describe the relationships among solutions, zeros, x-intercepts of a graph, and factors of a polynomial function. (SOL AII/T.8)
Inverses and Radical Functions and Relations	
A2T.FN.6.1	The student will find the sum, difference, product, quotient, and composition of multiple functions. (SOL AII/T.7h)
A2T.FN.6.2	The student will find the inverse of a function or relation both algebraically and graphically and be able to determine if two functions or relations are inverses. (SOL AII/T.7.g)
A2T.FN.6.3	The student will be able to graph a square root function using a transformational approach and identify the domain and range. (SOL AII/T.6; AII/T.7a)
A2T.EX.6.4	The student will be able to add, subtract, multiply, divide, and simplify radical expressions containing rational numbers and variables and expressions containing rational exponents. The student will write radical expressions as expressions containing rational exponents and vice versa. (SOL AII/T.1b,c)
A2T.EQ.6.5	The student will solve equations containing radical expressions and determine if an extraneous solution to an equation exists. (SOL AII/T.4.d)
Exponential and Logarithmic Functions	
A2T.FN.7.1	The student will be able to recognize multiple representations of exponential and logarithmic functions including: determining the domain and range, graphing using a transformational approach and a graphing calculator, naming the equation of the asymptote of the graph, describing the end behavior of the function, and writing the equation given a graph or table of values. (SOL AII/T.6; AII/T.7a,e,f; AII/T.9)
A2T.EQ.7.2	The student will use properties of exponents and logarithms to solve equations, including converting logarithmic equations to exponential equations and vice versa; simplifying logarithmic expressions, including common and natural logarithms; and solving problems involving exponential growth and decay. (SOL AII/T.7.b; AII/T.6; AII/T.7d)

A2T.ST.7.3	The student will collect and analyze data, determine the equation of the curve of best fit, make predictions, and solve real-world problems, using mathematical models. Mathematical models will include polynomial, exponential, and logarithmic functions. Graphing calculators will be used as a tool to model the curve of best fit. (SOL AII/T.9)
Rational Functions and Relations	
A2T.EX.8.1	The student will be able to add, subtract, multiply, divide, and simplify rational expressions. (SOL AII/T.1.a)
A2T.FN.8.2	The student will be able to graph rational functions and identify the domain, range, zeros, and asymptotes of rational functions. (SOL AII/T.6; AII/T.7a, b, e)
A2T.EQ.8.3	The student will be able to solve equations containing rational algebraic expressions algebraically and check solutions graphically. (SOL AII/T.4.c)
A2T.EQ.8.4	The student will be able to model and solve real-world problems by using inverse variation, joint variation, and a combination of direct and inverse variation. (SOL AII/T.10)
Sequences and Series	
A2T.EX.9.1	The student will define and distinguish between sequences and series, including arithmetic and geometric sequences, and arithmetic and geometric series. (SOL AII/T.2)
A2T.EX.9.2	The student will apply the properties of arithmetic or geometric sequences and series to solve real-world problems, including computing the common difference or ratio, writing the first n terms, and finding the n^{th} term, and evaluating summation formulas. Notations will include Σ and a_n . (SOL AII/T.2)
A2T.EX.9.3	The student will, when given the formula, find the sum of a convergent infinite series. (SOL AII/T.2)
A2T.EX.9.4	The student will generalize patterns in a sequence using explicit and recursive formulas. (SOL AII/T.2)
Probability and Statistics	
A2T.ST.10.1	The student will distinguish between permutations and combinations. Students will use permutations and combinations to find probabilities and use technology to solve real-world problems. (SOL AII/T.12)
A2T.ST.10.2	The student will identify properties of a normal distribution and apply those properties to determine probabilities associated with areas under the standard normal curve. A graphing calculator or a standard normal probability table will be used to determine probabilities or percentiles based on z-scores. (SOL AII/T.11)
Trigonometric Functions and Identities	
A2T.TR.11.1	The student, given the value of one trigonometric function, will find the values of the other trigonometric functions, using definitions and properties of trigonometric functions. (SOL AII/T.14)
A2T.TR.11.2	The student will use and convert between degree measures and radian measures. The student will draw and find angles in standard position. The student will find co-terminal angles. (SOL AII/T.15)
A2T.TR.11.3	The student will use right triangles to evaluate trigonometric functions. The student will find the six trigonometric function values for any angle including special angles (30° , 60° , 45°) and general angles. The students will use equal co-functions of complements. The students will find and use reference angles to evaluate trigonometric functions. (SOL AII/T.13, AII/T.15)
A2T.TR.11.4	The student will use the Law of Sines and the Law of Cosines to solve triangles. The students will find the area of a triangle using two sides and an included angle. (SOL AII/T.16, AII/T.21)
A2T.TR.11.5	The student will find values of trigonometric functions based on the unit circle without a calculator and use the properties of periodic functions to evaluate trigonometric functions. (SOL AII/T.13, AII/T.15)

A2T.TR.11.6	The student will describe and graph the six trigonometric functions and recognize their domain and range. Given one of the six trigonometric functions in standard form, determine the amplitude, period, phase shift, vertical shift, and asymptotes and will be able to sketch a graph using transformations for at least a two-period interval. (SOL AII/T.18a-d)
A2T.TR.11.7	The student will understand and use the inverse sine, cosine, tangent functions. The student will find values of inverse trigonometric functions. The student will solve equations by using inverse trigonometric functions. (SOL AII/T.19)
A2T.TR.11.8	The student will use trigonometric identities to find trigonometric values and simplify expressions. The student will verify trigonometric identities by transforming one side of an equation into the form of the other side. (SOL AII/T.17)
A2T.TR.11.9	The student will solve trigonometric equations and basic trigonometric inequalities that include infinite solutions, extraneous solutions, and restricted domain solutions. (SOL AII/T.20)



MISSION STATEMENT

The Virginia Beach City Public Schools, in partnership with the entire community, will empower every student to become a life-long learner who is a responsible, productive and engaged citizen within the global community.

DEPARTMENT OF CURRICULUM AND INSTRUCTION

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