

YOSEMITE HIGH SCHOOL
50200 ROAD 427 - OAKHURST, CA 93644
(559)683-4667

COURSE TITLE: ALGEBRA 2/TRIGONOMETRY
DEPARTMENT: MATHEMATICS

REQUIREMENT SATISFIED:

High School:	X	Model Curriculum Standards:	X
State College:	X	Frameworks:	X
UC Approved:	X		

GRADE LEVEL: 9-12 LENGTH OF COURSE: 1 Year CREDITS: 10

PREREQUISITE: Successful completion of Algebra 1 and Geometry with grades of "B" or better and teacher recommendation

TEXTBOOKS: Algebra and Trigonometry (Classic Edition), Paul A. Foerster

COURSE DESCRIPTION:

This course prepares the student for either IB Math Studies or Math Analysis. It covers the material in a normal Algebra 2 course, and also covers the rudiments of trigonometry.

COURSE OUTLINE/ALIGNMENT TO CALIFORNIA STATE STANDARDS AND EXPECTED SCHOOLWIDE LEARNING RESULTS:

Note: Obj=Objectives from Accelerated Math. Objectives #1-#236 are Algebra 2 objectives and Objectives #237+ are Algebra 1 Objectives. Standards are Algebra 2 unless otherwise noted.

<u>Chapter/ Text</u>	<u>Assignment Course Content/Objective</u>	<u>Standards Addressed</u>	<u>ESLRS</u>
--------------------------	--	--------------------------------	--------------

Algebra 2

UNIT 1: Review of Algebra 1 concepts including Absolute Value Equations and Inequalities Worksheet-What You Should Remember 1.3 Variables and Expressions 1.5 Equations 1.6 Inequalities Worksheet-Obj #309 Solve Absolute Value Equations Practice Test-Absolute Value Equations and Inequalities	1; Alg 1: 1,3, 4,5,6,7,9,11,20	1,2,3,4,6
UNIT 2: Systems of Equations 4.2 Solution of Systems of Linear Equations Worksheet-Solving Fractional Systems/No, Many Solutions Worksheet-Applications of Systems Worksheet-Obj #51, #54, #55 WP: Solve Systems, Number Problems; WP: Solve Systems Coin Problems; WP: Solve Systems, Mixture & Investment Problems 4.6 Systems of Linear Equations With Three or More Variables 4.10 Systems of Linear Inequalities	2	1,2,3,4,6

COURSE OUTLINE/ALIGNMENT TO CALIFORNIA STATE STANDARDS AND EXPECTED SCHOOLWIDE LEARNING RESULTS: (Continued)

<u>Chapter/ Text</u>	<u>Assignment Course Content/Objective</u>	<u>Standards Addressed</u>	<u>ESLRS</u>
Worksheet-Obj #20, #23, #48, #56 1-Variable (coordinate plane); Graph Absolute Value Inequalities (coordinate plane); Graph Systems of Equations; Solve Systems of Linear Inequalities by Graphing Practice Test-Systems of Equations			
Project: Library Research-choose topic for project			
UNIT 3: Polynomials		3,4,7,8	1,2,3,4,6
Worksheet-Review Algebra 1 Concepts Obj #110, #111 #112, #118 Add Polynomials, Subtract Polynomials, Add and Subtract Polynomials, Simplify Polynomial Expressions Using Multiplication		Alg 1: 1,4	
6.3 Properties of Exponentiation			
7.3 Special Products and Factoring			
7.4 More Factoring and Graphing			
Project: Model linear equation			
7.5 Long Division of Polynomials			
7.6 Factoring Higher Degree Polynomials- the Factor Theorem			
10.4 Graphs of Higher Degree Functions- Synthetic Substitution			
Worksheet-Obj #73, #124 Simplify Expressions With Rational Exponents, Factor Sum or Difference Two Cubes			
Worksheet-Obj #122 Factor Trinomials, $ax(x+b)(x-c)$			
Worksheet-Obj #128 WP: Polynomials			
Practice Test-Polynomials			
UNIT 4: Irrational/Complex Numbers		5,6,12	1,2,3,4,6
5.4 Imaginary and Complex Numbers			
Worksheet-Obj #81 Raise i to Powers/Worksheet- Obj #84 Operations on Complex #s			
6.4 Exponentiation for Rational Exponents			
6.5 Powers and Radicals Without Calculators			
8.3 Radicals, and Simple Radical Form			
10.2 Complex Number Review			
Worksheet-Graphing Complex Numbers			
Practice Test-Irrational/Complex Numbers			
UNIT 5: Quadratic Equations		8,9,10	1,2,3,4,6
5.1 Introduction to Quadratic Functions			
5.2 Graphs of Quadratic Functions			
5.3 x -Intercepts, and the Quadratic Formula			
5.6 Equations of Quadratic Functions From Their Graphs			
10.3 Quadratic Equations From Their Solutions- Complex Number Factors			
Project: Model quadratic equation			
Worksheet-Obj #96 Graph Quadratic Functions			
Worksheet-Obj #358 Complete the Square			
Worksheet-Simplify Square Roots			

COURSE OUTLINE/ALIGNMENT TO CALIFORNIA STATE STANDARDS AND EXPECTED SCHOOLWIDE LEARNING RESULTS: (Continued)

<u>Chapter/ Text</u>	<u>Assignment Course Content/Objective</u>	<u>Standards Addressed</u>	<u>ESLRS</u>
Worksheet-Obj #97 WP: Graph Quadratic Functions			
Worksheet-Obj #101 WP: Number Problems Using Quadratic Equations			
Worksheet-Obj #173 WP: Production & Profit Problems			
Practice Test-Quadratic Equations			
UNIT 6: Exponential and Logarithmic Functions		11,12,13,14	1,2,3,4,6
6.7	Exponential Equations Solved by Brute Force		
6.8	Exponential Equations Solved by Logarithms		
6.9	Logarithms With Other Bases		
6.10	Properties of Logarithms		
6.11	Proofs of Properties of Logarithms		
Project: Model exponential equation			
6.14	Exponential and Other Functions as Mathematical Models		
Worksheet-Obj #132 Find Natural Logs of Numbers			
Worksheet-Computing Principal/Interest/Amount in Account After Time/Assets Depreciate or Appreciate With Time-Notes			
Worksheet-Obj #140 Earthquake Problems			
Worksheet-Obj #139 WP: Growth and Decay			
Worksheet-Obj #138 WP: Interest Problems			
Worksheet-Obj #133 Properties of Logs, Simplify Expressions			
Worksheet-Obj #134 Properties of Logs, Find Equivalent Logs			
Worksheet-Obj #141 Graph Exponential Functions			
Practice Test-Exponential and Logarithmic Functions			
UNIT 7: Rational Functions			
7.1	Introduction to Rational Algebraic Functions		
7.2	Rational Function Graphs-Discontinuities and Asymptotes		
7.7	Products and Quotients of Rational Expressions		
7.8	Sums and Differences of Rational Expressions		
7.9	Graphs of Rational Algebraic Functions, Again		
7.10	Fractional Equations and Extraneous Solutions		
Worksheet-Obj #145, #146 Simplify Rational Expressions, Simplify Rational Expressions by Factoring			
Practice Test-Rational Functions			
Project: Pre-IB Growth Project: collect data find equation and graph of best fit for data, analyze and present findings		3,8,10,12	1,2,3,4,6

COURSE OUTLINE/ALIGNMENT TO CALIFORNIA STATE STANDARDS AND EXPECTED SCHOOLWIDE LEARNING RESULTS: (Continued)

<u>Chapter/ Text</u>	<u>Assignment Course Content/Objective</u>	<u>Standards Addressed</u>	<u>ESLRS</u>
UNIT 8: Probability and Statistics		18,19; P&S:5,6	1,2,3,4,6
11.8	Factorials		
12.1	Introduction to Probability		
12.2	Words Associated With Probability		
12.3	Two Counting Principles		
12.4	Probabilities of Various Permutations		
12.5	Probabilities of Various Combinations		
12.6	Properties of Probability		
12.9	Statistics and Data Analysis		
	Worksheet-Obj #216 Mean and Standard Deviation		
	Worksheet-Obj #196 Fundamental Counting Principle		
	Worksheet-Obj #199 Permutations		
	Worksheet-Obj #200 Combinations		
	Worksheet-Obj #202 Probability of Single Events		
	Worksheet-Obj #204 Probability of Independent Events		
	Worksheet-Obj #206 Probability of Dependent Events		
	Practice Test-Probability and Statistics		
UNIT 9: Sequences, Series & Binomial Expansion		20,22,23	1,2,3,4,6
11.1	Introduction to Sequences		
11.2	Arithmetic and Geometric Sequences		
11.3	Arithmetic and Geometric Means		
11.4	Introduction to Series		
11.5	Arithmetic and Geometric Series		
11.6	Convergent Geometric Series		
11.9	Introduction to Binomial Series		
11.10	The Binomial Formula		
	Worksheet-Obj #193, #194 Write Geometric Series in Sigma Notation, Evaluate Geometric Series in Sigma Notation		
	Worksheet-Obj #183, #189 Find Terms of Arithmetic Sequence (formula for nth term), Find General Terms of Geometric Sequence Given First 4 Terms		
	Practice Test-Sequences, Series & Binomial Expansion Practice Test		
UNIT 10: Conics and Functions		2,9,10,17,19,24; Alg 1: 18	1,2,3,4,6
9.1	Introduction to Quadratic Relations		
9.2	Circles		
9.3	Ellipses		
9.4	Hyperbolas		
9.5	Parabolas		
	Worksheet-Obj #174 Identify Equations of Conics		
	Worksheet-Obj #158, #159 Graph Circles; Circles, General Form Equations		
	Worksheet-Obj #163, #166, #167 Graph Ellipses, Graph Hyperbolas (standard equation), Graph Hyperbolas (general equation)		
	Worksheet-Obj #170, #171, #172 Parabolas, Find Vertex From Equation; Graph Parabolas ($y=x^2$); Graph Parabolas ($x=y^2$)		

COURSE OUTLINE/ALIGNMENT TO CALIFORNIA STATE STANDARDS AND EXPECTED SCHOOLWIDE
 LEARNING RESULTS: (Continued)

<u>Chapter/ Text</u>	<u>Assignment Course Content/Objective</u>	<u>Standards Addressed</u>	<u>ESLRS</u>
2.2	Graphs of Functions		
2.4	Graphs of Functions and Relations		
Worksheet-Obj #29	Determine if Relations are Functions		
4.4	$f(x)$ Terminology, and Systems as Models		
Worksheet-Obj #36	Graph Inverses of Linear Functions		
Practice Test-Conics	and Functions		

Note: Standards from here on are trigonometry standards unless otherwise noted.

Trigonometry

UNIT 1: Trigonometric and Circular Functions

13.1	Introduction to Periodic Functions	2,5,6,7,9	1,2,3,4,6
13.2	Measurement of Arcs and Rotation		
13.3	Definitions of Trigonometric and Circular Functions		
Worksheet-Obj #219, #220, #221, #223	Determine in Which Quadrant an Angle Lies; Degrees to Radians; Radians to Degrees; Find the Sine, Cosine, or Tangent		
Worksheet-Obj #224, #225	Find the CSC, Sec, or Cot; Given 1 Point, Evaluate Trig Functions		
13.4	Approximate Values of Trigonometric and Circular Functions		
13.5	Graphs of Trigonometric and Circular Functions		
13.6	General Sinusoidal Graphs		
13.7	Equations of Sinusoids From Their Graphs		
Practice Test-Trigonometric	and Circular Functions		

UNIT 2: Properties of Trigonometric and Circular Functions

14.1	Three Properties of Trigonometric Functions	3,10,11	1,2,3,4,6
14.2	Trigonometric Identities		
Worksheet-Number the Quadrants			
14.3	Properties Involving Functions of More Than One Argument		
14.4	Multiple-Argument Properties		
14.5	Half-Argument Properties		
Chapter 14 Study Guide:	Properties of Trigonometric And Circular Functions		

UNIT 3: Triangle Problems

15.1	Right Triangle Problems	12,13,14,19	1,2,3,4,6
15.2	Oblique Triangles-Law of Cosines		
15.3	Area of a Triangle		
15.4	Oblique Triangles-Law of Sines		
15.5	The Ambiguous Case		
15.6	General Solution of Triangles		

DISTRICT/STATE CONTENT STANDARDS ADDRESSED:

Algebra 2:

- 1 Students solve equations and inequalities involving absolute value.
- 2 Students solve systems of linear equations and inequalities (in two or three variables) by substitution, with graphs, or with matrices.
- 3 Students are adept at operations on polynomials, including long division.
- 4 Students factor polynomials representing the difference of squares, perfect square trinomials, and the sum and difference of two cubes.
- 5 Students demonstrate knowledge of how real and complex numbers are related both arithmetically and graphically. In particular, they can plot complex numbers as points in the plane.
- 6 Students add, subtract, multiply, and divide complex numbers.
- 7 Students add, subtract, multiply, divide, reduce, and evaluate rational expressions with monomial and polynomial denominators and simplify complicated rational expressions, including those with negative exponents in the denominator.
- 8 Students solve and graph quadratic equations by factoring, completing the square, or using the quadratic formula. Students apply these techniques in solving word problems. They also solve quadratic equations in the complex number system.
- 9 Students demonstrate and explain the effect that changing a coefficient has on the graph of quadratic functions; that is, students can determine how the graph of a parabola changes as a , b , and c vary in the equation $y = a(x - b)^2 + c$.
- 10 Students graph quadratic functions and determine the maxima, minima and zeros of the function.
- 11 Students prove simple laws of logarithms. 11.1 Students understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents. 11.2 Students judge the validity of an argument according to whether the properties of real numbers, exponents, and logarithms have been applied correctly at each step.
- 12 Students know the laws of fractional exponents, understand exponential functions, and use these functions in problems involving exponential growth and decay.
- 13 Students use the definition of logarithms to translate between logarithms in any base.
- 14 Students understand and use the properties of logarithms to simplify logarithmic numeric expressions and to identify their approximate values.
- 15 Students determine whether a specific algebraic statement involving rational expressions, radical expressions, or logarithmic or exponential functions is sometimes true, always true, or never true.

- 16 Students demonstrate and explain how the geometry of the graph of a conic section (e.g., asymptotes, foci, eccentricity) depends on the coefficients of the quadratic equation representing it.
- 17 Given a quadratic equation of the form $ax^2+by^2+cx+dy+e=0$, students can use the method of completing the square to put the equation into standard form and can recognize whether the graph of the equation is a circle, ellipse, parabola, or hyperbola. Students can then graph the equation.
- 18 Students use fundamental counting principles to compute combinations and permutations.
- 19 Students use combinations and permutations to compute probabilities.
- 20 Students know the binomial theorem and use it to expand binomial expressions that are raised to positive integer powers.
- 21 Students apply the method of mathematical induction to prove general statements about the positive integers.
- 22 Students find the general term and the sums of arithmetic series and of both finite and infinite geometric series.
- 23 Students derive the summation formulas for arithmetic series and for both finite and infinite geometric series.
- 24 Students solve problems involving functional concepts, such as composition, defining the inverse function and performing arithmetic operations on functions.
- 25 Students use properties from number systems to justify steps in combining and simplifying functions.

Trigonometry:

- 1 Students understand the notion of angle and how to measure it, in both degrees and radians. They can convert between degrees and radians.
- 2 Students know the definition of sine and cosine and y- and x-coordinates of points on the unit circle and are familiar with the graphs of the sine and cosine functions.
- 3 Students know the identity $\cos^2(x)+\sin^2(x)=1$: (3.1) Students prove that this identity is equivalent to the Pythagorean theorem (i.e., students can prove this identity by using the Pythagorean theorem and, conversely, they can prove the Pythagorean theorem as a consequence of this identity). (3.2) Students prove other trigonometric identities and simplify others by using the identity $\cos^2(x)+\sin^2(x)=1$. For example, students use this identity to prove that $\sec^2(x)=\tan^2(x)+1$.
- 4 Students graph functions of the form $f(t)=A \sin(Bt+C)$ or $f(t)=A \cos(Bt+C)$ and interpret A, B, and C in terms of amplitude frequency, period, and phase shift.
- 5 Students know the definitions of the tangent and cotangent functions and can graph them.

- 6 Students know the definitions of the secant and cosecant and can graph them.
- 7 Students know that the tangent of an angle that a line makes with the x-axis is equal to the slope of the line.
- 8 Students know the definitions of the inverse trigonometric functions and can graph the functions.
- 9 Students compute, by hand, the values of the trigonometric functions and the inverse trigonometric functions at various standard points.
- 10 Students demonstrate an understanding of the addition formulas for sines and cosines and their proofs and can use those formulas to prove and/or simplify other trigonometric identities.
- 11 Students demonstrate an understanding of half-angle and double-angle formulas for sines and cosines and can use those formulas to prove and/or simplify other trigonometric identities.
- 12 Students use trigonometry to determine unknown sides or angles in right triangles.
- 13 Students know the law of sines and law of cosines and apply those laws to solve problems.
- 14 Students determine the area of a triangle, given one angle and the two adjacent sides.

Trigonometry Standards 15, 16, 17, and 18 are covered in IB Math Studies.

- 19 Students are adept at using trigonometry in a variety of applications and word problems.

Probability and Statistics:

- 5 Students determine the mean and the standard deviation of a normally distributed random variable.
- 6 Students know the definitions of the mean, median, and mode of a distribution of data and can compute each in particular situations.

OUTCOMES:

Students will demonstrate basic competency in course standards by achieving a minimum 70% proficiency in coursework.

INSTRUCTIONAL STRATEGIES:

Direct instruction
Group work
Individual instruction
Peer tutoring

ASSESSMENT:

Teacher prepared tests and quizzes

Department-wide benchmark assessments including unit, mid-term, and final exams

Review of student work samples including class work and homework

Student demonstrations

Other informal assessments

Individual student growth/decay projects including presentations

1/96

Revised: 4/98; 1/03; 8/03; 1/04; 7/08