

Newport-Mesa Unified School District
Office of Secondary Curriculum and Instruction
High School Course of Study

Course Title	Math Studies IB SL 1A/1B	Course Code	[Office use only]
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Transcript Title:	Math IB SL1AB	Grades Levels:	11-12	Board Adoption Date:	
Content Area:	Math	GPA Scale:	5.0	Date Course Submitted:	June 2011
Credential Req:		Graduation Subject Areas:	Math	Elective	
UC/CSU "A-G" Area Approvals:	Yes		School Site that wrote and submitted the course:		
Prerequisite(s):	Completion of Algebra 1, Geometry, Algebra 2 with grade of "C" or better				
Next course(s):					

COURSE DESCRIPTION *(catalog summary):*

The IB Math Studies Course is designed as a one-year culminating class that meets the International Baccalaureate requirements for mathematics at the Standard Level and to prepare students to sit for the IBSL Math Studies Exam. This course covers a broad spectrum of topics integrating elements of algebra, geometry, trigonometry, probability, statistics, financial math, differential calculus, logic, and functions with an emphasis on practical applications instead of mathematical theory. The students who select this course are those whose main interests lie outside of the field of mathematics therefore the curriculum is intended to promote real world applications, problem solving, research, data analysis and meaningful context for the mathematical principles.

The use of a graphic display calculator is considered an integral part of the course. A TI-83 calculator is available for use in the classroom and during examinations, however, students may wish to purchase their own calculators for future use as well as use outside of school.

The content of the curriculum is divided into 8 topic areas as follows:

Topic 1: Introduction to the graphic display calculator

Topic 2: Numbers and algebra

Topic 3: Sets, logic and probability

Topic 4: Functions

Topic 5: Geometry and Trigonometry

Topic 6: Statistics

Topic 7: Introduction to differential calculus

Topic 8: Financial mathematics

All of these topics are compulsory for the end of the year examination...

GOALS *(expected performance outcomes for students):*

Students will be expected to collect and analyze data; test hypotheses and draw conclusion regarding their validity; apply mathematical procedures to solving real-world problems, complete the required IB Standard Level exam as well as complete the IB Math Studies project.

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CALIFORNIA CONTENT STANDARDS (how the course aligns with California and/or national curriculum standards):

This course aligns with a selection of California standards from Geometry, Algebra 2 Trigonometry, Advanced Probability and Statistics and Calculus...

Geometry

The geometry skills and concepts developed in this discipline are useful to all students. Aside from learning these skills and concepts, students will develop their ability to construct formal, logical arguments and proofs in geometric settings and problems.

- 1.0 Students demonstrate understanding by identifying and giving examples of undefined terms, axioms, theorems, and inductive and deductive reasoning.
- 2.0 Students write geometric proofs, including proofs by contradiction.
- 3.0 Students construct and judge the validity of a logical argument and give counterexamples to disprove a statement.
- 4.0 Students prove basic theorems involving congruence and similarity.
- 5.0 Students prove that triangles are congruent or similar, and they are able to use the concept of corresponding parts of congruent triangles.
- 6.0 Students know and are able to use the triangle inequality theorem.
- 7.0 Students prove and use theorems involving the properties of parallel lines cut by a transversal, the properties of quadrilaterals, and the properties of circles.
- 8.0 Students know, derive, and solve problems involving the perimeter, circumference, area, volume, lateral area, and surface area of common geometric figures.
- 9.0 Students compute the volumes and surface areas of prisms, pyramids, cylinders, cones, and spheres; and students commit to memory the formulas for prisms, pyramids, and cylinders.
- 10.0 Students compute areas of polygons, including rectangles, scalene triangles, equilateral triangles, rhombi, parallelograms, and trapezoids.
- 11.0 Students determine how changes in dimensions affect the perimeter, area, and volume of common geometric figures and solids.
- 12.0 Students find and use measures of sides and of interior and exterior angles of triangles and polygons to classify figures and solve problems.
- 13.0 Students prove relationships between angles in polygons by using properties of complementary, supplementary, vertical, and exterior angles.
- 14.0 Students prove the Pythagorean theorem.
- 15.0 Students use the Pythagorean theorem to determine distance and find missing lengths of sides of right triangles.
- 16.0 Students perform basic constructions with a straightedge and compass, such as angle bisectors, perpendicular bisectors, and the line parallel to a given line through a point off the line.
- 17.0 Students prove theorems by using coordinate geometry, including the midpoint of a line segment, the distance formula, and various forms of equations of lines and circles.
- 18.0 Students know the definitions of the basic trigonometric functions defined by the angles of a right triangle. They also know and are able to use elementary relationships between them. For example, $\tan(x) = \sin(x)/\cos(x)$, $(\sin(x))^2 + (\cos(x))^2 = 1$.
- 19.0 Students use trigonometric functions to solve for an unknown length of a side of a right triangle, given an angle and a length of a side.
- 20.0 Students know and are able to use angle and side relationships in problems with special right triangles, such as 30°, 60°, and 90° triangles and 45°, 45°, and 90° triangles.

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Algebra II

This discipline complements and expands the mathematical content and concepts of algebra I and geometry. Students who master algebra II will gain experience with algebraic solutions of problems in various content areas, including the solution of systems of quadratic equations, logarithmic and exponential functions, the binomial theorem, and the complex number system.

- 1.0 Students solve equations and inequalities involving absolute value.
- 2.0 Students solve systems of linear equations and inequalities (in two or three variables) by substitution, with graphs, or with matrices.
- 3.0 Students are adept at operations on polynomials, including long division.
- 4.0 Students factor polynomials representing the difference of squares, perfect square trinomials, and the sum and difference of two cubes.
- 5.0 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.
- 6.0 Students add, subtract, multiply, and divide complex numbers.
- 7.0 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.
- 8.0 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.
- 9.0 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 $y = a(x-b)^2 + c$.
- 10.0 Students graph quadratic functions and determine the maxima, minima, and zeros of the function.
- 11.0 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.
- 12.0 Students know the laws of fractional exponents, understand exponential functions, and use these functions in problems involving exponential growth and decay.
- 13.0 Students use the definition of logarithms to translate between logarithms in any base.
- 14.0 Students understand and use the properties of logarithms to simplify logarithmic numeric expressions and to identify their approximate values.
- 15.0 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.
- 16.0 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.
- 17.0 Given a quadratic equation of the form $ax^2 + by^2 + cx + dy + e = 0$, students can use the method for 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.
- 18.0 Students use fundamental counting principles to compute combinations and permutations.
- 19.0 Students use combinations and permutations to compute probabilities.
- 20.0 Students know the binomial theorem and use it to expand binomial expressions that are raised to positive integer powers.
- 21.0 Students apply the method of mathematical induction to prove general statements about the positive integers.
- 22.0 Students find the general term and the sums of arithmetic series and of both finite and infinite geometric series.

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23.0 Students derive the summation formulas for arithmetic series and for both finite and infinite geometric series.

24.0 Students solve problems involving functional concepts, such as composition, defining the inverse function and performing arithmetic operations on functions.

25.0 Students use properties from number systems to justify steps in combining and simplifying functions.

Trigonometry

Trigonometry uses the techniques that students have previously learned from the study of algebra and geometry. The trigonometric functions studied are defined geometrically rather than in terms of algebraic equations. Facility with these functions as well as the ability to prove basic identities regarding them is especially important for students intending to study calculus, more advanced mathematics, physics and other sciences, and engineering in college.

1.0 Students understand the notion of angle and how to measure it, in both degrees and radians. They can convert between degrees and radians.

2.0 Students know the definition of sine and cosine as y-and x-coordinates of points on the unit circle and are familiar with the graphs of the sine and cosine functions.

3.0 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 $\sec^2(x) = \tan^2(x) + 1$.

4.0 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.

5.0 Students know the definitions of the tangent and cotangent functions and can graph them.

6.0 Students know the definitions of the secant and cosecant functions and can graph them.

7.0 Students know that the tangent of the angle that a line makes with the x-axis is equal to the slope of the line.

8.0 Students know the definitions of the inverse trigonometric functions and can graph the functions.

9.0 Students compute, by hand, the values of the trigonometric functions and the inverse trigonometric functions at various standard points.

10.0 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.

11.0 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.

12.0 Students use trigonometry to determine unknown sides or angles in right triangles.

13.0 Students know the law of sines and the law of cosines and apply those laws to solve problems.

14.0 Students determine the area of a triangle, given one angle and the two adjacent sides.

15.0 Students are familiar with polar coordinates. In particular, they can determine polar coordinates of a point given in rectangular coordinates and vice versa.

16.0 Students represent equations given in rectangular coordinates in terms of polar coordinates.

17.0 Students are familiar with complex numbers. They can represent a complex number in polar form and know how to multiply complex numbers in their polar form.

18.0 Students know DeMoivre's theorem and can give nth roots of a complex number given in polar form.

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

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Advanced Placement Probability and Statistics

This discipline is a technical and in-depth extension of probability and statistics. In particular, mastery of academic content for advanced placement gives students the background to succeed in the Advanced Placement examination in the subject.

1.0 Students solve probability problems with finite sample spaces by using the rules for addition, multiplication, and complementation for probability distributions and understand the simplifications that arise with independent events.

2.0 Students know the definition of conditional probability and use it to solve for probabilities in finite sample spaces.

3.0 Students demonstrate an understanding of the notion of discrete random variables by using this concept to solve for the probabilities of outcomes, such as the probability of the occurrence of five or fewer heads in 14 coin tosses.

4.0 Students understand the notion of a continuous random variable and can interpret the probability of an outcome as the area of a region under the graph of the probability density function associated with the random variable.

5.0 Students know the definition of the mean of a discrete random variable and can determine the mean for a particular discrete random variable.

6.0 Students know the definition of the variance of a discrete random variable and can determine the variance for a particular discrete random variable.

7.0 Students demonstrate an understanding of the standard distributions (normal, binomial, and exponential) and can use the distributions to solve for events in problems in which the distribution belongs to those families.

8.0 Students determine the mean and the standard deviation of a normally distributed random variable.

9.0 Students know the central limit theorem and can use it to obtain approximations for probabilities in problems of finite sample spaces in which the probabilities are distributed binomially.

10.0 Students know the definitions of the mean, median, and mode of distribution of data and can compute each of them in particular situations.

11.0 Students compute the variance and the standard deviation of a distribution of data.

12.0 Students find the line of best fit to a given distribution of data by using least squares regression.

13.0 Students know what the correlation coefficient of two variables means and are familiar with the coefficient's properties.

14.0 Students organize and describe distributions of data by using a number of different methods, including frequency tables, histograms, standard line graphs and bar graphs, stem-and-leaf displays, scatterplots, and box-and-whisker plots.

15.0 Students are familiar with the notions of a statistic of a distribution of values, of the sampling distribution of a statistic, and of the variability of a statistic.

16.0 Students know basic facts concerning the relation between the mean and the standard deviation of a sampling distribution and the mean and the standard deviation of the population distribution.

17.0 Students determine confidence intervals for a simple random sample from a normal distribution of data and determine the sample size required for a desired margin of error.

18.0 Students determine the P-value for a statistic for a simple random sample from a normal distribution.

19.0 Students are familiar with the chi-square distribution and chi-square test and understand their uses.

Calculus

When taught in high school, calculus should be presented with the same level of depth and rigor as are entry-level college and university calculus courses. These standards outline a complete college curriculum in one variable calculus. Many high school programs may have insufficient time to cover all of the following content in a typical academic year. For example, some districts may treat differential equations lightly and spend substantial time on infinite sequences and series. Others may do the opposite. Consideration of the College Board syllabi for the Calculus AB and Calculus BC

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sections of the Advanced Placement Examination in Mathematics may be helpful in making curricular decisions. Calculus is a widely applied area of mathematics and involves a beautiful intrinsic theory. Students mastering this content will be exposed to both aspects of the subject.

1.0 Students demonstrate knowledge of both the formal definition and the graphical interpretation of limit of values of functions. This knowledge includes one-sided limits, infinite limits, and limits at infinity. Students know the definition of convergence and divergence of a function as the domain variable approaches either a number or infinity:

1.1 Students prove and use theorems evaluating the limits of sums, products, quotients, and composition of functions.

1.2 Students use graphical calculators to verify and estimate limits.

1.3 Students prove and use special limits, such as the limits of $(\sin(x))/x$ and $(1-\cos(x))/x$ as x tends to 0.

2.0 Students demonstrate knowledge of both the formal definition and the graphical interpretation of continuity of a function.

3.0 Students demonstrate an understanding and the application of the intermediate value theorem and the extreme value theorem.

4.0 Students demonstrate an understanding of the formal definition of the derivative of a function at a point and the notion of differentiability:

4.1 Students demonstrate an understanding of the derivative of a function as the slope of the tangent line to the graph of the function.

4.2 Students demonstrate an understanding of the interpretation of the derivative as an instantaneous rate of change. Students can use derivatives to solve a variety of problems from physics, chemistry, economics, and so forth that involve the rate of change of a function.

4.3 Students understand the relation between differentiability and continuity.

4.4 Students derive derivative formulas and use them to find the derivatives of algebraic, trigonometric, inverse trigonometric, exponential, and logarithmic functions.

5.0 Students know the chain rule and its proof and applications to the calculation of the derivative of a variety of composite functions.

6.0 Students find the derivatives of parametrically defined functions and use implicit differentiation in a wide variety of problems in physics, chemistry, economics, and so forth.

7.0 Students compute derivatives of higher orders.

8.0 Students know and can apply Rolle's theorem, the mean value theorem, and L'Hôpital's rule.

9.0 Students use differentiation to sketch, by hand, graphs of functions. They can identify maxima, minima, inflection points, and intervals in which the function is increasing and decreasing.

10.0 Students know Newton's method for approximating the zeros of a function.

11.0 Students use differentiation to solve optimization (maximum-minimum problems) in a variety of pure and applied contexts.

12.0 Students use differentiation to solve related rate problems in a variety of pure and applied contexts.

13.0 Students know the definition of the definite integral by using Riemann sums. They use this definition to approximate integrals.

14.0 Students apply the definition of the integral to model problems in physics, economics, and so forth, obtaining results in terms of integrals.

15.0 Students demonstrate knowledge and proof of the fundamental theorem of calculus and use it to interpret integrals as antiderivatives.

16.0 Students use definite integrals in problems involving area, velocity, acceleration, volume of a solid, area of a surface of revolution, length of a curve, and work.

17.0 Students compute, by hand, the integrals of a wide variety of functions by using techniques of integration, such as substitution, integration by parts, and trigonometric substitution. They can also combine these techniques when appropriate.

18.0 Students know the definitions and properties of inverse trigonometric functions and the expression of these functions as indefinite integrals.

19.0 Students compute, by hand, the integrals of rational functions by combining the techniques in standard 17.0 with the algebraic techniques of partial fractions and completing the square.

20.0 Students compute the integrals of trigonometric functions by using the techniques noted above.

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21.0 Students understand the algorithms involved in Simpson's rule and Newton's method. They use calculators or computers or both to approximate integrals numerically.

22.0 Students understand improper integrals as limits of definite integrals.

23.0 Students demonstrate an understanding of the definitions of convergence and divergence of sequences and series of real numbers. By using such tests as the comparison test, ratio test, and alternate series test, they can determine whether a series converges.

24.0 Students understand and can compute the radius (interval) of the convergence of power series.

25.0 Students differentiate and integrate the terms of a power series in order to form new series from known ones.

26.0 Students calculate Taylor polynomials and Taylor series of basic functions, including the remainder term.

27.0 Students know the techniques of solution of selected elementary differential equations and their applications to a wide variety of situations, including growth-and-decay problems.

EVALUATION *(how the effectiveness of the course will be monitored and assessed):*

Students will be evaluated on unit quizzes and tests at the end of each unit for a grade for the class.

For the IB Diploma or Certificate Students will be evaluated through:

External assessment

Written papers:

Paper 1.1

15 compulsory short-response questions based on the whole syllabus

Paper 2 1

5 compulsory extended-response questions based on the whole syllabus

These papers are externally set and externally marked. Together they contribute 80% of the final mark for the course. These papers are designed to allow students to demonstrate what they know and what they can do.

Internal assessment

Project:

The project is an individual piece of work involving the collection of information or the generation of measurements, and the analysis and evaluation of the information or measurements. This is a year-long effort in which students formulate a hypothesis, gather and analyze data, organize and report their findings in a report with graphics and conclusion demonstrating an understanding of the mathematical concepts that support the validity of the study.

The specific purposes of the project are to:

- develop students' personal insight into the nature of mathematics and to develop their ability to ask their own questions about mathematics
- encourage students to initiate and sustain a piece of work in mathematics
- enable students to acquire confidence in developing strategies for dealing with new situations and problems

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- provide opportunities for students to develop individual skills and techniques and to allow students with varying abilities, interests and experiences to achieve a sense of personal satisfaction in studying mathematics
- enable students to experience mathematics as an integrated organic discipline rather than fragmented and compartmentalized skills and knowledge
- enable students to see connections and applications of mathematics to other areas of interest
- provide opportunities for students to show, with confidence, what they know and what they can do.

The project is internally assessed by the teacher and externally moderated by the IBO and is worth 20% of the students grade and they will be evaluated on the Standard Level Math Studies Examination given in May.

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Unit 1	Length of Unit : 2 class sessions			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Introduction to graphic display calculator: <i>Become familiar with the numerical, graphical and listing capabilities of the graphing calculator</i>	<i>Window Zoom Trace list</i>	<i>ALGEBRA II: 2.0; 8.0; 9.0; 10.0</i>	<i>Textbook and IB provided supplementary activities including: 1-All arithmetic calculations 2-Appropriate choice of “window”; use of “zoom” and “trace” (or equivalent) to locate points to a given accuracy 3-Enter data in lists 4-Explain commonly used buttons</i>	<i>TI-83 or TI-84 graphing calculator</i>
Differentiation	Support -- for students who are struggling with the content	<i>Content: additional practice activities Process: individual assistance to students Product: “loaner” calculators available for student use on campus and for HW</i>		
	Extension – for high achieving students.	<i>Content: describe use of additional function keys to small groups or class Process: help students who are unfamiliar with graphing calculator Product: compute solutions and produce graphs on calculator</i>		
Evaluation	Formative Assessments (ongoing & mid-lesson): <i>Students will perform basic calculations with the calculator and continue to use this technology in variety of chapters in the curriculum</i>			
	Summative Assessments (unit final evaluation): <i>Appropriate and accurate use of technology on homework and tests.</i>			

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Unit 2	Length of Unit : 4 weeks			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Numbers and Algebra: <i>Introduction to basic elements of mathematics</i>	<i>Integers Real numbers Significant figures Units of measure Sequence Series Quadratic formula</i>	<i>ALGEBRA II: 2.0; 5.0; 8.0; 20.0; 22.0;</i>	<i>1-approximate decimals to given significant digits. 2-express numbers in scientific notation 3- convert between different units of measure 4-compute simple and compound interest problems 5-find given nth term in arithmetic and geometric sequence and series 6-solve pairs of linear equations in 2 variables</i>	<i>Text: chapter 2 Graphing calculator</i>
Differentiation	Support -- for students who are struggling with the content	Content: <i>review solving systems of equations; binomial expansion theorem</i> Process: <i>additional practice</i> Product: <i>create step chart to use as guide for tests</i>		
	Extension – for high achieving students.	Content: <i>apply formulas to higher order equations</i> Process: <i>be group leader during group work</i> Product: <i>present work to other students</i>		
Evaluation	Formative Assessments (ongoing & mid-lesson): <i>May include but not limited to homework, class quizzes and practice; checking for understanding</i>			
	Summative Assessments (unit final evaluation): <i>Typically include, but not limited to chapter and unit tests and unit</i>			

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Unit 3	Length of Unit : 5 weeks			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Sets, Logic and probability: <i>understand sets and appropriate notation; principles of logic; analyze random events</i>	<i>Subset Intersection Union Complement conjunctions Disjunctions conditional</i>	<i>ADVANCED PROBABILITY AND STATISTICS : 1.0; 2.0;</i>	<i>1-represent data using Venn diagrams with up to 3 subsets of the universal set 2- use symbolic notation for propositions 3- use truth tables to provide proof for properties of connectives; concepts of contradictions 4- determine probability of events and complementary events 5- apply the laws of probability to solve problems</i>	<i>Text: chapter 9; 10, 11 Graphing calculator</i>
Differentiation	Support -- for students who are struggling with the content	<i>Content: use manipulative activities involving cards, dice, and coins for grouping and sorting data Process: work in groups or pairs Product: create a “glossary” of notation and terms with examples</i>		
	Extension – for high achieving students.	<i>Content: use binomial theorem to calculate probability for two-outcome events Process: direct instruction and group work Product: present solutions to real-world problems to class</i>		
Evaluation	Formative Assessments (ongoing & mid-lesson): <i>May include but not limited to homework, class quizzes and practice; checking for understanding</i>			
	Summative Assessments (unit final evaluation): <i>Typically include, but not limited to chapter and unit tests and unit</i>			

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Unit 4	Length of Unit : 6 weeks			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Functions: increase understanding of functions as applied to practical situations	Domain Range Vertex Intercepts Symmetry Amplitude period	ALGEBRA II: 8.0; 12.0; TRIGONOMETRY: 2.0	1-Determine domain and range and graph linear and quadratic functions 2-identify vertex, symmetry and intercepts 3-use laws of exponential functions for solve growth and decay problems 4-accurately graph sine and cosine functions identifying the amplitude and period of the graph	Text: chapter 3, 4 Extensive use of graphing calculator in this unit
Differentiation	Support -- for students who are struggling with the content	Content: review graphing and solving quadratics Process: group work Product: create an “atlas” of graphs color coding correlation between elements of the equation and elements of the graph		
	Extension – for high achieving students.	Content: apply exponential functions and logarithms to advanced real world problems Process: direct instruction and group work Product: research real-world applications of growth and decay; investment and interest income situations and present to class		
	Formative Assessments (ongoing & mid-lesson): May include but not limited to homework, class quizzes and practice; checking for understanding			
	Summative Assessments (unit final evaluation): Typically include, but not limited to chapter and unit tests and unit			

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Unit 5	Length of Unit : 5 weeks			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Geometry and Trigonometry: <i>draw clear 2-dimensional diagrams; apply geometric and trigonometric techniques to problem solving</i>	<i>Plane Midpoint Intercepts Parallel Perpendicular Prism Cylinder Sphere Cone cube</i>	<i>GEOMETRY: 9.0; 15.0; 19.0 TRIGONOMETRY: 12.0; 13.0; 14.0</i>	<i>1-find gradient; points of intersection and equation for parallel and perpendicular lines 2- use sine, cosine and tangent and Pythagorean theorem to find sides and angles of triangles 3- apply law of sines and law of cosines and trigonometric formulas for area of a triangle 4- find area and volume of 3 dimensional solids 5- find lengths of lines joining vertices and midpoints of 2-dimensional drawings</i>	<i>Text: chapter 5, 6 Graphing calculator</i>
Differentiation	Support -- for students who are struggling with the content	<i>Content: use manipulative activities with real 3-dimensional objects for visualization and measurement Process: group work Product: cut 2 dimensional “nets” into 3 dimensional solids to compute area and volume</i>		
	Extension – for high achieving students.	<i>Content: derive formulas for area and volume Process: lead group work Product: demonstrate variety of proofs and applications for Pythagorean theorem based on area of the extended sides; find area and volume of oblique solids</i>		
Evaluation	Formative Assessments (ongoing & mid-lesson): <i>May include but not limited to homework, class quizzes and practice; checking for understanding</i>			
	Summative Assessments (unit final evaluation): <i>Typically include, but not limited to chapter and unit tests and unit</i>			

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Unit 6	Length of Unit : 6 weeks			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Statistics: <i>develop techniques to describe and analyze data</i>	<i>Frequency Interval continuous, discrete range modal correlation</i>	<i>ADVANCED PROBABILITY AND STATISTICS :3.0; 10.0; 11.0; 13.0; 14.0</i>	<i>1-classify data as discrete or continuous 2- create and analyze frequency tables; use histograms and stem/leaf plot diagrams; box/whisker plots 3- find measures of central tendency including mean, median and mode; 4- use measure of dispersion including percentiles and quartiles, range and standard deviation 4- determine the correlation coefficient for given data</i>	<i>Text: chapter 12, 13 Graphing calculator</i>
Differentiation	Support -- for students who are struggling with the content	<i>Content: collect real data and find measures of central tendency Process: work in groups and pairs Product: write a “graphic organizer” of steps needed to compute measures of central tendency</i>		
	Extension – for high achieving students.	<i>Content: represent same data using a variety of graphing formats Process: keep a journal of uses of different representational forms for data Product: produce graphs of bi-modal data</i>		
Evaluation	Formative Assessments (ongoing & mid-lesson): <i>May include but not limited to homework, class quizzes and practice; checking for understanding</i>			
	Summative Assessments (unit final evaluation): <i>Typically include, but not limited to chapter and unit tests and unit</i>			

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Unit 7	Length of Unit : 4 weeks			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Intro to differential calculus: introduce concept of gradient; apply concept of derivative to solving practical problems	Gradient Tangent Derivative Limit Increasing Decreasing Maximum Minimum	CALCULUS: 1.0; 2.0; 4.0	1-use the limit process to examine the behavior of the gradient of the line between two points as one point approaches the other 2- find the 1 st and 2 nd derivative of a given function 3-examine increasing and decreasing functions and the relationship to the derivative 4-determine maxima and minima and points of inflection and their relationship to 1 st and 2 nd derivative	Text: chapter 14 Graphing calculator
Differentiation	Support -- for students who are struggling with the content	Content: additional work with limits Process: additional practice with one step problems Product: write up color coded procedure map for use with homework and tests		
	Extension – for high achieving students.	Content: use 1 st and 2 nd derivatives to identify points of inflections and zeros Process: group work; direct instruction Product: graph higher order equations based of data obtained from derivatives		
Evaluation	Formative Assessments (ongoing & mid-lesson): May include but not limited to homework, class quizzes and practice; checking for understanding			
	Summative Assessments (unit final evaluation): Typically include, but not limited to chapter and unit tests and unit			

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Unit 8	Length of Unit : 3 weeks			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Financial Mathematics: <i>build a firm understanding of financial transactions and apply any correct method to problem solving</i>	<i>Interest Depreciation Inflation compound</i>	<i>ALGEBRA II: 12.0; 13.0</i>	<i>1-convert currency transactions and commissions 2- determine capital, rate of interest, time period, and appreciation and depreciation 3- construct and use tables to determine loan repayment; investment; savings; and inflation</i>	<i>Text: chapter 8 Graphing calculator</i>
Differentiation	Support -- for students who are struggling with the content	Content: <i>use manipulative materials to assist with conversions</i> Process: <i>additional practice</i> Product: <i>create graphic organizer for use with homework and tests</i>		
	Extension – for high achieving students.	Content: <i>apply to real world problems; derive formulas</i> Process: <i>direct instruction; group work; use logarithms to calculate terms of compounding</i> Product: <i>present findings to class</i>		
Evaluation	Formative Assessments (ongoing & mid-lesson): <i>May include but not limited to homework, class quizzes and practice; checking for understanding</i>			
	Summative Assessments (unit final evaluation): <i>Typically include, but not limited to chapter and unit tests and unit</i>			