

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

Course Title		IB Mathematics: Applications and Interpretations SL				Course Code		[Office use only]			
Transcript Title:		Math App&Int IBSL AB		Grades Levels:		11-12		Board Adoption Date:		06/09/20	
Content Area:		Mathematics		GPA Scale:		5.0		Date Course Submitted:		4/2020	
Credential Required:		Math		Graduation Subject Areas:		Math		CALPADS Code:		9271	
UC/CSU “A-G” Area Approvals:			C		School Site/person that wrote and submitted the course:				NHHS/Jillian Angell		
Recommend Skills:	Pre-requisite classes: Integrated Math III or Algebra 2 (Honors suggested)										
Next course(s):	AP Calculus AB, AP Statistics										
Textbook to be used:	Mathematics: Applications and Interpretations Standard Level (Oxford)										

COURSE DESCRIPTION (*catalog summary*): IB Mathematics: Applications and Interpretation SL recognizes the increasing role that mathematics and technology play in a diverse range of fields in a data-rich world. As such, it emphasizes the meaning of mathematics in context by focusing on topics that are often used as application or in mathematical modelling. To give this understanding a firm base, this course also includes topics that are traditionally part of a pre-university mathematics course such as calculus and statistics. The course makes extensive use of technology to allow students to explore and construct mathematical models. Mathematics: Applications and Interpretation will develop mathematical thinking, often in the context of a practical problem and using technology to justify conjectures. The course is generally taken in the first or second year of a student's two-year IB Diploma Program coursework, preparing for culminating examinations in May. The course also places a focus on the practice of mathematical writing, in preparation for the Mathematical Exploration, an officially assessed component of a student's IB Diploma coursework, in which students write an 12-20 page paper exploring an area of mathematical interest and relevance. Each unit contains a writing assignment specific to the unit that grows in length and complexity with each successive unit. The curriculum for this course is aligned with the IB course "Math Applications and Interpretation Standard Level" and is broken down into five unit-categories: Number and Algebra, Functions, Geometry and Trigonometry, Probability and Statistics, and Calculus.

GOALS (*expected performance outcomes for students*):

1. Students will develop a curiosity and enjoyment of mathematics, and appreciate its elegance and power
2. Students will develop an understanding of the concepts, principles and nature of mathematics
3. Students will communicate mathematics clearly, concisely and confidently in a variety of contexts
4. Students will develop logical and creative thinking, and patience and persistence in problem solving to instill confidence in using mathematics
5. Students will employ and refine their powers of abstraction and generalization
6. Students will take action to apply and transfer skills to alternative situations, to other areas of knowledge and to future developments in their local and global communities
7. Students will appreciate how developments in technology and mathematics influence each other
8. Students will appreciate the moral, social and ethical questions arising from the work of mathematicians and the applications of mathematics

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9. Students will appreciate the universality of mathematics and its multicultural, international and historical perspectives
10. Students will appreciate the contribution of mathematics to other disciplines, and as a particular “area of knowledge” in the TOK course
11. Students will develop the ability to reflect critically upon their own work and the work of others
12. Students will independently and collaboratively extend their understanding of mathematics.

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

Statistics: Interpreting Categorical and Quantitative Data

1. Represent data with plots on the real number line (dot plots, histograms, and box plots).
2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.
5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
 - a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.
 - b. Informally assess the fit of a function by plotting and analyzing residuals.
 - c. Fit a linear function for a scatter plot that suggests a linear association.
7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
8. Compute (using technology) and interpret the correlation coefficient of a linear fit.
9. Distinguish between correlation and causation.

Statistics: Making Inferences and Justifying Conclusions

1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation.
3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
4. Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.
5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
6. Evaluate reports based on data.

Statistics: Conditional Probability and the Rules of Probability

1. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).

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2. Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.
3. Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.
4. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.
5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.
6. Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.
7. Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.
8. (+) Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B|A) = P(B)P(A|B)$, and interpret the answer in terms of the model.

Geometry: Similarity, Right Triangles, and Trigonometry

8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
9. (+) Derive the formula $A = \frac{1}{2} ab \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.
10. (+) Prove the Laws of Sines and Cosines and use them to solve problems.
11. (+) Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

Geometry: Geometric Measurement and Dimension

3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

Algebra: Seeing Structure in Expressions

1. Interpret expressions that represent a quantity in terms of its context.
 - a. Interpret parts of an expression, such as terms, factors, and coefficients.
 - b. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P.
2. Use the structure of an expression to identify ways to rewrite it
3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
 - a. Factor a quadratic expression to reveal the zeros of the function it defines.
 - b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
 - c. Use the properties of exponents to transform expressions for exponential functions.
4. Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems.

Algebra: Arithmetic with Polynomials and Rational Expressions

1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.

Algebra: Creating Equations

1. Create equations and inequalities in one variable including ones with absolute value and use them to solve problems.

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2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Algebra: Reasoning with Equations and Inequalities

4. Solve quadratic equations in one variable. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b .
5. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.
10. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
11. Explain why the x -coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

Advanced Placement Probability and Statistics

1. 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. Students know the definition of conditional probability and use it to solve for probabilities in finite sample spaces.
3. 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. 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. Students know the definition of the mean of a discrete random variable and can determine the mean for a particular discrete random variable.
6. Students know the definition of the variance of a discrete random variable and can determine the variance for a particular discrete random variable.
7. 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. Students determine the mean and the standard deviation of a normally distributed random variable.
10. Students know the definitions of the mean, median, and mode of distribution of data and can compute each of them in particular situations.
11. Students compute the variance and the standard deviation of a distribution of data.
12. Students find the line of best fit to a given distribution of data by using least squares regression.
13. Students know what the correlation coefficient of two variables means and are familiar with the coefficient's properties.
14. 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.
19. Students are familiar with the chi-square distribution and chi-square test and understand their uses.

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Calculus

1. 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.
4. 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.
7. Students compute derivatives of higher orders.
9. 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.
11. Students use differentiation to solve optimization (maximum-minimum problems) in a variety of pure and applied contexts.
13. Students know the definition of the definite integral by using Riemann sums. They use this definition to approximate integrals.
14. Students apply the definition of the integral to model problems in physics, economics, and so forth, obtaining results in terms of integrals.
15. Students demonstrate knowledge and proof of the fundamental theorem of calculus and use it to interpret integrals as antiderivatives.
17. 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.

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

1. **Formative assessments:** questioning and practice problems during class; daily homework assignments ranging in difficulty of exercises, ranging from a simple application of the computations in the topic to the application of underpinning concepts in different contexts; mid-unit quizzes on a chapter or partial chapter.
2. **Summative assessments:** modeling lab/written assignments for each chapter building in difficulty based on the math; unit tests covering the material from the entire unit based on actual IB questions
3. **Final assessments:** final internal assessment project which is a 12-20 page paper exploring an area of mathematical interest and relevance; cumulative final exam covering entire semester/year worth of material based on actual IB questions
4. **IB Exam:** IB diploma candidates will need to take the IB exam in May to be eligible for their IB Diploma

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Unit 1	Length of Unit: 17 class periods			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Topic #4p1: Statistics Subtopics: -Descriptive Stats -Linear correlation of bivariate data -Spearman's, hypothesis testing, and chi-squared test for independence	- Data: univariate, bivariate, qualitative, quantitative, discrete, continuous - Central Tendency: mean, media, mode, outliers - Spread: range, standard deviation, variance, interquartile range (lower/upper quartile) - Sampling: population, sample, (simple) random, systematic, convenience, biased, quota, stratified - Frequency: cumulative frequency, percentile - Correlation: causation, Pearson's product-moment correlation coefficient, line of best fit, residual - Spearman's rank correlation coefficient - Hypothesis testing: Chi-Squared test, degrees of freedom, expected values	See above for verbiage. - Statistics: Interpreting Categorical and Quantitative Data #1-9 - Statistics: Making Inferences and Justifying Conclusions #1-6 - Advanced Placement Probability and Statistics #5,6,10-14,19	Any assignment in this unit will include a range of difficulties of exercises, ranging from a simple application of the computations in the topic to the application of underpinning concepts in different contexts. For example, in a section on the chi-squared test, an assignment would start with giving students different scenarios and determining if a chi-squared test is appropriate and if so, writing a null and alternative hypothesis. Exercises would move on to giving students a chi-squared value and test statistic (or alpha and p-value) and have them determine what to do with the null hypothesis. Next, students would take different situations and run the test for themselves using GDC. Finally, students could test for a trend to see if a pattern holds from year to year. Modeling tasks: (1) Collecting data from peers and presenting it graphically using technology and finding the central tendency and spread; (2) Collecting quantitative data and creating a linear regression to model the data and make predictions on unknown values; (3) Collecting qualitative data and performing a chi-squared test to test for a relationship between the variables.	-Mathematics: Applications and Interpretations Standard Level (Oxford) Chapters 3, 6, 8
Differentiation	Support -- for students who are struggling with the content	Content: Unit 1 Process: Intervention units, flexible grouping, organizers, videos, and instructional support beyond class time Product: Proficiency in Unit 1 content		

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	Extension – for high achieving students.	Content: Unit 1 Process: Robust and differentiated problem solving and solutions to real world/modeling problems Product: Above expectations on Unit 1 content		
Evaluation	Formative Assessments (ongoing & mid-lesson): -Daily questioning -Daily homework from the textbook -Quiz after each chapter (subtopic) -Mini-labs (modeling activities) after each chapter (subtopic)			
	Summative Assessments (unit final evaluation): -Test with IB questions at the end of unit -Full lab (modeling activity) at end of unit with full lab write-up			

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Unit 2	Length of Unit 9 class periods			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Topic #4p2: Probability Subtopics: -Probability -Binomial distributions -Normal distributions	- Experiment: trials, outcome, event, expected value - Sample space: Venn diagram, sample space diagram - Mutually exclusive - Complementary - Independent - Discrete probability distribution: Normal distribution, binomial distribution	See above for verbiage. - Statistics: Conditional Probability and the Rules of Probability #1-8 - Advanced Placement Probability and Statistics #1-8	Any assignment in this unit will include a range of difficulties of exercises, ranging from a simple application of the computations in the topic to the application of underpinning concepts in different contexts. For example, given collected data, students will arrange the information in an appropriate sample space diagram. They will then use that data and diagram to calculate the probabilities that certain events occur including independent vs dependent events and conditional probability. Modeling Tasks: Conduct an experiment using a fair coin to calculate the probability that a situation will occur using experimental probability.	-Mathematics: Applications and Interpretations Standard Level (Oxford) Chapter 7
Differentiation	Support -- for students who are struggling with the content	Content: Unit 2 Process: Intervention units, flexible grouping, organizers, videos, and instructional support beyond class time Product: Proficiency in Unit 2 content		
	Extension – for high achieving students.	Content: Unit 2 Process: Robust and differentiated problem solving and solutions to real world/modeling problems Product: Above expectations on Unit 2 content		
Evaluation	Formative Assessments (ongoing & mid-lesson): -Daily questioning -Daily homework from the textbook -Quiz after each chapter (subtopic) -Mini-labs (modeling activities) after each chapter (subtopic)			

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	Summative Assessments (<i>unit final evaluation</i>): -Test with IB questions at the end of unit -Full lab (modeling activity) at end of unit with full lab write-up		

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Unit 3	Length of Unit 12 class periods			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Topic #3: Geometry and Trigonometry Subtopics: -Trigonometry -3D geometry -Coordinate geometry -Voronoi diagrams	- Trigonometry: Pythagorean theorem, sine rule, cosine rule, angle of elevation, angle of depression 3D Geometry: sector, solids, volume, surface area - Coordinate Geometry: midpoint, distance formula, gradient, Voronoi diagrams	See above for verbiage. - Geometry: Similarity, Right Triangles, and Trigonometry #8-11 - Geometry: Geometric Measurement and Dimension #3	Any assignment in this unit will include a range of difficulties of exercises, ranging from a simple application of the computations in the topic to the application of underpinning concepts in different contexts. For example, in an assignment on the geometry of circles, a common assignment would begin with a number of exercises on using formulae to compute measurements of circles, then extend the skills with practice connecting their prior knowledge of triangle geometry by working with diagrams including circles and triangles together, and finish with a multi-part problem that requires students to pull together a variety of prior knowledge. Modeling tasks: (1) Use clinometers to measure the angles of inclination of the bell tower and other objects around campus and use triangle trigonometry to calculate their height; (2) Use Voronoi diagrams to predict needed sites for some service	-Mathematics: Applications and Interpretations Standard Level (Oxford) Chapters 2, 4
Differentiation	Support -- for students who are struggling with the content	Content: Unit 3 Process: Intervention units, flexible grouping, organizers, videos, and instructional support beyond class time Product: Proficiency in Unit 3 content		
	Extension – for high achieving students.	Content: Unit 3 Process: Robust and differentiated problem solving and solutions to real world/modeling problems Product: Above expectations on Unit 3 content		

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Evaluation	Formative Assessments (<i>ongoing & mid-lesson</i>): -Daily questioning -Daily homework from the textbook -Quiz after each chapter (subtopic) -Mini-labs (modeling activities) after each chapter (subtopic)
	Summative Assessments (<i>unit final evaluation</i>): -Test with IB questions at the end of unit -Full lab (modeling activity) at end of unit with full lab write-up

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Unit 4	Length of Unit 12 class periods			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Topic #2p1: Polynomial Functions Subtopics: -Linear functions -Arithmetic Sequences -Power functions -Modelling	• Relation: function, domain, range, direct variation, inverse function • Sequence: term, series, arithmetic sequence, common difference • Modelling: extrapolation, interpolation, simple interest • Polynomials: vertex, quadratic formula, axis of symmetry, quadratic, cubic	See above for verbiage. • Algebra: Seeing Structure in Expressions #1(a)-3 • Algebra: Arithmetic with Polynomials and Rational Expressions #1 • Algebra: Creating Equations #1,2 • Algebra: Reasoning with Equations and Inequalities #4-7,10-11	Any assignment in this unit will include a range of difficulties of exercises, ranging from a simple application of the computations in the topic to the application of underpinning concepts in different contexts. For example, in a unit on quadratic modelling, students would have some exercises using a GDC to compute parameters of a quadratic model, the exercises where students choose whether a linear or quadratic model would be more appropriate, and finally some exercises where students must write about the suitability of their models and comment on the domain for which their model ought to be considered useable and valid. This style of exercise, where questions increase in complexity and application is commonly used in IB Examinations and mimics the building of knowledge and understanding as we work through problems in the world. Modeling tasks: (1) Modeling situations with linear functions and arithmetic sequences; (2) Modeling situations with quadratic and power functions.	-Mathematics: Applications and Interpretations Standard Level (Oxford) Chapters 5, 9
Differentiation	Support -- for students who are struggling with the content	Content: Unit 4 Process: Intervention units, flexible grouping, organizers, videos, and instructional support beyond class time Product: Proficiency in Unit 4 content		
	Extension – for high	Content: Unit 4 Process: Robust and differentiated problem solving and solutions to real world/modeling problems		

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	achieving students.	Product: Above expectations on Unit 4 content
Evaluation	Formative Assessments (<i>ongoing & mid-lesson</i>): -Daily questioning -Daily homework from the textbook -Quiz after each chapter (subtopic) -Mini-labs (modeling activities) after each chapter (subtopic)	
	Summative Assessments (<i>unit final evaluation</i>): -Test with IB questions at the end of unit -Full lab (modeling activity) at end of unit with full lab write-up	

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Unit 5	Length of Unit 10 class periods			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Topic #2p2: Exponential, Logarithmic, and Trigonometric Functions Subtopics: -Exponential functions -Geometric sequences -Logarithmic functions -Trigonometric functions -Modelling	- Geometric sequence: series, common ratio - Modelling: compound interest, present value, future value, compounding period, inflation, inflation adjustment, annuity - Exponential function: logarithms - Sinusoidal functions: period, principal axis, amplitude	See above for verbiage. - Algebra: Seeing Structure in Expressions #1(b)-4 - Algebra: Creating Equations #1,2	Any assignment in this unit will include a range of difficulties of exercises, ranging from a simple application of the computations in the topic to the application of underpinning concepts in different contexts. For example, in a unit on exponential functions students will model a compound interest problem with an exponential model. They will calculate future values, present values, and interest rates giving different information. They will use logarithms to solve for the number of years for a certain situation to occur. Modeling tasks: (1) Modeling ball rebound height with geometric sequences; (2) Modeling a bouncing weight on a spring with a trigonometric function	-Mathematics: Applications and Interpretations Standard Level (Oxford) Chapters 10, 11
Differentiation	Support -- for students who are struggling with the content	Content: Unit 5 Process: Intervention units, flexible grouping, organizers, videos, and instructional support beyond class time Product: Proficiency in Unit 5 content		
	Extension – for high achieving students.	Content: Unit 5 Process: Robust and differentiated problem solving and solutions to real world/modeling problems Product: Above expectations on Unit 5 content		
Evaluation	Formative Assessments (ongoing & mid-lesson): -Daily questioning -Daily homework from the textbook -Quiz after each chapter (subtopic) -Mini-labs (modeling activities) after each chapter (subtopic)			

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	Summative Assessments (<i>unit final evaluation</i>): -Test with IB questions at the end of unit -Full lab (modeling activity) at end of unit with full lab write-up		

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Unit 6	Length of Unit 8 class periods			
	Key Vocabulary	Standards (referenced)	Model Tasks	Tools / Texts
Topic #5: Calculus Subtopics: -Differential calculus -Integration	- Limit - Rate of Change: average, instantaneous, derivative - Tangent, normal - Optimization: stationary point, (local) maximum, (local) minimum, constraint - Integration: antiderivative, indefinite integral, constant of integration, power rule	See above for verbiage. Calculus: #1,4,7,9,11,13-15,17	Any assignment in this unit will include a range of difficulties of exercises, ranging from a simple application of the computations in the topic to the application of underpinning concepts in different contexts. For example, an assignment in the topic of the trapezoid rule might begin with one or two basic problems checking a student's understanding of the mechanics of the trapezoid rule, then go into an application of the trapezoid rule in computing the surface area of a lake from a map, then connect back to student's prior knowledge of the area under a curve to compare an approximated value to a theoretical value. Modeling tasks: (1) Calculate instantaneous rate of change of an object using calculus; (2) Calculate distance traveled and such using integration	-Mathematics: Applications and Interpretations Standard Level (Oxford) Chapters 12, 13
Differentiation	Support -- for students who are struggling with the content	Content: Unit 6 Process: Intervention units, flexible grouping, organizers, videos, and instructional support beyond class time Product: Proficiency in Unit 6 content		
	Extension – for high achieving students.	Content: Unit 6 Process: Robust and differentiated problem solving and solutions to real world/modeling problems Product: Above expectations on Unit 6 content		

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Evaluation	Formative Assessments (<i>ongoing & mid-lesson</i>): -Daily questioning -Daily homework from the textbook -Quiz after each chapter (subtopic) -Mini-labs (modeling activities) after each chapter (subtopic)
	Summative Assessments (<i>unit final evaluation</i>): -Test with IB questions at the end of unit -Full lab (modeling activity) at end of unit with full lab write-up