long beach unified school district

OFFICE OF CURRICULUM, INSTRUCTION AND PROFESSIONAL DEVELOPMENT

HIGH SCHOOL COURSE OUTLINE

Department	Mathematics	**Course Title**	Precalculus Honors		**Course Code**	3053	
Abbreviation	Precalc (H)	**Grade Level**	11 - 12	**Grad Requirement**		No	
Course Length	2 semesters	**Credits/Semester**	5	**Required**	No	**Elective**	X
Prerequisites	B or better in Intermediate Algebra 1-2 or Intermediate Algebra/Trig Accelerated						
Articulated with LBCC	No	**Articulated with CSULB**		No			
Meets UC a-g Requirement	Yes (c)	**Meets NCAA Requirement**		Yes			

COURSE DESCRIPTION:

This course combines the content standards of Trigonometry and Mathematical Analysis from the California Mathematics Framework. Emphasis is placed on the many trigonometric, geometric and algebraic techniques needed for the preparation of the study of Calculus. Topics include analytic geometry, circular and special functions, theory of equations, limits, with an introduction to the derivative and the integral. The course takes a functional point of view towards these topics and is designed to strengthen and enhance conceptual understanding and mathematical reasoning used when solving problems**.** The course also emphasizes the use of the graphing calculator as a tool to interpret results as well as a method of obtaining an answer. Students in Precalculus Honors are required to use a graphing calculator and a scientific calculator throughout the course. **The curriculum for the honors course differs from the regular course in the depth of the topics presented as well as the additional topics that are included. Little time is spent on reviewing previous courses.**

GOALS: (Student needs the course is intended to meet)

Content Goal: Students will understand the structure of the systems of real and complex numbers, understand the concept of functions and their unifying role in mathematics, acquire facility in applying algebraic and trigonometric concepts and skills, be able to analyze and graph a variety of functions, and will acquire the necessary skills used in calculus.

Literacy Goal: Students communicate precisely about quantities, logical relationships, and unknown values through the use of signs, symbols, models, graphs, and mathematical vocabulary. Regular opportunities are provided for students to communicate through oral and written explanations of math concepts.

Career Goal: Students learn to apply mathematics to everyday life. They will develop an interest in pursuing advance studies in mathematics in a wide array of mathematically related career choices.

CONTENT STANDARDS

Trigonometry

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 *n*th 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.

Mathematical Analysis

1.0 Students are familiar with, and can apply, polar coordinates and vectors in the plane. In particular, they can translate between polar and rectangular coordinates and can interpret polar coordinates and vectors graphically.

2.0 Students are adept at the arithmetic of complex numbers. They can use the trigonometric form of complex numbers and understand that a function of a complex variable can be viewed as a function of two real variables. They know the proof of DeMoivre' s theorem.

3.0 Students can give proofs of various formulas by using the technique of mathematical induction.

4.0 Students know the statement of, and can apply, the fundamental theorem of algebra.

5.0 Students are familiar with conic sections, both analytically and geometrically:

5.1 Students can take a quadratic equation in two variables; put it in standard form by completing the square and using rotations and translations, if necessary; determine what type of conic section the equation represents; and determine its geometric components (foci, asymptotes, and so forth).

5.2 Students can take a geometric description of a conic section - for example, the locus of points whose sum of its distances from (1, 0) and (-1, 0) is 6 - and derive a quadratic equation representing it.

6.0 Students find the roots and poles of a rational function and can graph the function and locate its asymptotes.

7.0 Students demonstrate an understanding of functions and equations defined parametrically and can graph them.

8.0 Students are familiar with the notion of the limit of a sequence and the limit of a function as the independent variable approaches a number or infinity. They determine whether certain sequences converge or diverge.

Probability and Statistics

1.0 Students know the definition of the notion of *independent events* and can use the rules for addition, multiplication, and complementation to solve for probabilities of particular events in finite sample spaces.

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

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

STATE PERFORMANCE STANDARDS

The California State Board of Education has identified the following performance levels for the California Content Standards Test, High School Mathematics (Summative), taken by Precalculus students. This assessment covers Content Standards from Algebra I, Geometry, Algebra II and Probability and Statistics (not the standards listed above for this course.) Therefore, many standards on the Content Standards Test, High School Mathematics, are embedded in the LBUSD Precalculus course outline as noted by the CST code next to the standard. The objective of Long Beach Unified School District is to have all students achieve at or above the Proficient Performance Standard (Level).

	Far Below Basic	Below Basic	Basic	Proficient	Advanced Proficient
%	0% - 34%	35% - 56%	57% - 72%	73% - 87%	88% - 100%
# Correct	Less than 23	23 – 36	37 – 47	48 - 56	57 – 65

DISTRICT PERFORMANCE STANDARDS

The Long Beach Unified School District has common assessments and key assignments that are required for Precalculus. The Performance Standard Criteria is shown in the table below. The objective is to have all students achieve at or above the Proficient Level and receive a C or better in the course.

Mathematics Performance Standard Criteria

Assignments	Far Below Basic (FBB)	Below Basic (BB)	Basic (B)	Proficient (P)	Advanced Proficient (AP)
Key Assignments: practice exams for semester 1 and EOC exams	The student completes at least 50%; not all work is shown.	The student completes at least 60%; not all work is shown.	The student completes 70% - 79% showing all work.	The student completes 80% - 89% showing all work.	The student completes at least 90% showing all work.
Assessments	FBB	BB	B	P	AP
Semester 1 Exam and End-Of-Course Exam	0% - 34%	35% - 56%	57% - 72%	73% - 87%	88% - 100%

OUTLINE OF CONTENT AND RECOMMENDED TIME ALLOTMENT:

Content sequencing is only suggested and may be adjusted to suit school site curriculum plans and student needs. Symbols used in this document:

( ) Indicates California State Framework Content Standard

AI - Algebra I	G - Geometry	AII - Algebra II
T - Trigonometry	MA - Mathematical Analysis	PS - Probability & Statistics
LA – Linear Algebra	C - Calculus	

. # refers to the Chapter and Section in the text: Precalculus with Limits, A Graphing Approach, Fifth Edition; Larson, Hostetler and Edwards, 2008; Houghton Mifflin Publishing

CST Standard assessed on the California Standards Test, High School Mathematics

* Key standards - comprise a minimum of 70% of the California Standards Test

Equations and Inequalities

Topics	LBUSD Curriculum Objective	Adopted Textbook Correlation	Investigations and Enrichment (*Precalculus Ideas* Book)	Key Vocabulary	Time
Graphing linear data and linear equations	Graph data points and determine the line of best fit		**Stack of Cups:** Graph relationship of the number of cups to height of the stack and use to estimate. (Investigations: p. I.3)	General form Horizontal line Parallel lines Perpendicular lines Point-slope form Slope Slope-intercept form Vertical line	½ Week
	Determine the slope of a line (AI -7*) CST	1.1			
	Determine the midpoint of a segment (G -17)	B.1			
	Determine the distance between two points using the Distance Formula (G – 15) CST, (G - 17)	B.1			
	Determine the relationship of slopes for parallel and perpendicular lines (AI - 8) CST	1.1			
Solving linear equations and inequalities; writing equations of lines	Solve linear equations and inequalities by graphing and algebraic methods (AI – 5*, 6*) CST	B.2, B.3, B.4		Conditional equation Extraneous solution General form Graph of an inequality Graph of the equation Horizontal line Identity Linear equation in one variable	½ Week
	Slope-intercept, point-slope, and standard form of linear equations (AI -7*) CST	1.1		parallel lines perpendicular lines Point of intersection Point-slope form Satisfy Slope-intercept form Solutions Solve an inequality Vertical line *x-intercept & y-intercept*	
	Writing the equation of a line given various information (AI -7*) CST	1.1			

Solve quadratic equations and inequalities	Solving quadratic equations and inequalities by graphing and algebraic methods (AI -14*, 20*) CST, (AI - 21, 22)	B.3, B.4		Completing the square Conditional equation Critical numbers Cubic equation Extraneous solution Factoring Interval notation Quadratic equation Quadratic Formula	½ Week
	Solving quadratic equations and inequalities using Quadratic Formula (AI – 19), (AII – 8*) CST	B.3, B.4			
Solve absolute value equations and inequalities.	Solve absolute value equations and inequalities by graphing and algebraic methods (AII -1*) CST	1.2, B.4		Absolute value Conditional equation Critical numbers Piecewise graph	

Functions

Topics	LBUSD Curriculum Objective	Adopted Textbook Correlation	Investigations and Enrichment (*Precalculus Ideas* Book	Key Vocabulary	Time
Determine if a relation is a function, a 1-to-1 function or not a function; determine relative extrema, a composition of functions, an inverse, domain and range	Know definitions of relation, function and 1-to-1 function (AI -16)	1.2, 1.6	**Don t Fence Me In:** Application of finding maximum area of a garden (Investigations: p. I.7) **Match the Function Game:** Card game. Good review of function names, shapes, domains and ranges (Equations, Inequalities and functions: p. EF.4)	Composition of functions Constant on an interval Decreasing on an interval Dependent variable Domain Even function Function Function notation Graph of inverse function Horizontal Line Test Identity function Increasing on an interval Independent variable Inverse function Odd function One-to-one function Origin symmetry Range Relation Relative maximum Relative minimum Vertical Line Test x-axis symmetry y-axis symmetry Correlation coefficient Line of best fit Model Scatter plot	½ Week
	Determine domain and range of a relation or function (AI -17)	1.2			
	Determine relative maximum and minimum values of a relation or function (AII -10*) CST	1.3			
	Determine a composition of two functions (AII -24)	1.5			
	Determine the inverse of a function or relation if one exists (AII – 24)	1.6			
Use scatter plots to find models for data and choose a model that best fits a set of data.	Determine if a function has symmetry, is odd or even	1.3	**Functions Portfolio:** A student portfolio collection of the most common functions and their graphs. (Investigations: p. I.9)		
	Construct scatter plots of linear relations and interpret correlation	1.7			
	Find linear models for data (Line of best fit)	1.7, 2.8, 3.6			
Identify and interpret special functions and their graphs	Interpret Piecewise Functions	1.3	**Rational Functions:** An investigation of different Rational Functions. (Investigations: p. I.11)	Absolute value function Exponential function Logarithmic function Piecewise function Polynomial function Rational function Step function	½ Week
	Interpret Step Functions	1.3			
	Interpret Absolute Value Functions	1.2, 1.3			
	Interpret Exponential Functions (AII – 12*) CST	3.1			
	Interpret Logarithmic Functions (AII – 11.1*) CST	3.2			
	Interpret Polynomial Functions	2.1, 2.2			
	Interpret Rational Functions (MA - 6)	*2.6, 2.7*			

	Identify and perform transformations (translations, reflections, scale changes) to graphs of functions (AII - 9, G - 22)	1.4		Horizontal shift Nonrigid transformation Reflection Rigid transformation Scale change Shrink Stretch Translation Vertical shift	½Week
Determine the roots of a function	Determine the roots of a quadratic or polynomial function using a graph, synthetic division or factoring (AII – 4*, 8*, 10*) CST	2.1, 2.2, 2.3, 2.5		Asymptote Complex conjugate Continuous Descartes' Rule of Signs Imaginary number Intermediate Value Th. Leading Coefficient Test Linear function Multiplicity Polynomial function Quadratic function Rational function Repeated zeros Slant asymptote Synthetic division Upper & lower bounds	3½ Weeks
	Know and apply various theorems to find the solutions of a polynomial; such as, Fundamental Th. Of Alg., Rational Zeros Th., etc. (MA - 4)	2.3, 2.5			
	Determine if roots are real or complex (AII -8*) CST	2.3, 2.4			
	Locate roots of a function (AII – 8*, 10*) CST	2.3			
	Determine undefined values, asymptotes and real roots of a function (MA - 6)	2.6			
Use exponential and logarithmic functions to solve problems	Know and use properties of logarithms (AII -11.2) CST, (AII - 13,14)	3.3	**Just How Old is It?** An investigation of exponential decay of $_{C14}$ dating. (Investigations: p. I.13) **Exponential Models:** An investment problem requiring students to graph exponential curves and compare them. (Equations, Inequalities, and Functions: p. EF.16)	Base *e* change-of-base formula Common logarithmic function Continuous compounding Exponential decay Exponential function Exponential growth Logarithmic function Natural base Natural exponential function Natural logarithmic function	3 Weeks
	Convert logarithmic to exponential format and vice versa (AII -11.1*) CST	3.2, 3.4			
	Simplify exponential expressions and solve exponential equations (AII -11.1*) CST	3.1, 3.4			
	Solve problems using logarithms and exponents, including exponential growth or decay (AII -12*) CST	3.4, 3.5			
Determine the limit of a function	Determine the limit of a function at a value (MA - 8)	11.1, 11.2		Converge Diverge Indeterminate form Left & right side behavior Limit Limits at infinity One-sided limit Oscillating behavior Rationalizing technique	½ Week
	Determine the limit of a function at infinity (MA - 8)	11.4			

Trigonometric and Circular Functions

Topics	LBUSD Curriculum Objective	Adopted Textbook Correlation	Investigations and Enrichment (*Precalculus Ideas* Book	Key Vocabulary	Time
Use and apply trigonometric and circular functions	Use and apply definitions of trigonometric and circular functions (G-18*) CST, (T-2, 5, 6)	4.2, 4.3, 4.4	**Special Right Triangle Investigation:** Worksheet on fraction form, decimal form and exact values for 30º and 60º. (Trig & Circular: p.TC.3)	Amplitude Angle Angle of depression Angle of elevation Arc functions Arc length Central angle Complementary angles Cosecant Cosine Cotangent Coterminal Damping factor Degrees Initial side Inverse Trig functions Linear & angular speed Measure of an angle Negative angle Period Periodic function Phase shift Positive angle Radian Reference angle Secant Sine Special & quadrant angles Standard position Supplementary angles Tangent Terminal side Trigonometry Unit circle	4 Weeks
	Use and apply degree and radian measure (T-1)	4.1	**Trig Value Chart** Create a chart of the special and quadrant values of the trig functions. (Trig & Circular: p. TC.6)		
	Use and apply values of trig functions for special and quadrant angles (G - 20, T- 9)	4.3, 4.4			
	Create and interpret the graphs of the trig functions and their variations (T- 4, 5, 6)	4.5, 4.6			
	Use and apply Inverse Trigonometric Functions (T- 8)	4.7	**Biorhythm Chart** Investigation of Biorhythm Theory (Investigations: p. I.18)		

Use trig functions to solve real world problems	Solve right triangles (G- 19*) CST, (T- 12)	4.3	**Indirect Measure** Investigation of the use of trig relations to measure distance (Investigations: p. I.13) **Discus Throw** Determining distance of throwing a discus (Investigations: p. I.21)	Adjacent side Ambiguous Case Angle of depression Angle of elevation Bearings Cosecant Cosine Cotangent Heron's Area Formula Hypotenuse Law of Cosines Law of Sines Oblique triangle Opposite side Right triangle Secant Simple harmonic motion Sine Special angles Tangent	2 Weeks
	Use and apply the Law of Sines and the Law of Cosines (T- 13)	6.1, 6.2			
	Determine the area of a triangle using SSS and SAS formulas (T- 14)	6.1, 6.2			
	Use trigonometric principles to solve problems involving triangles (T - 19)	4.8, 6.1, 6.2			
Use and apply trig functional relationships to verify trig identities and solve trigonometric equations and inequalities	Verify trigonometric identities using algebraic and graphing methods, and using other trigonometric identities (G – 18*) CST, (T- 3)	5.1, 5.2	**Verify Identities** Working in groups, Students verify identity statements for different angles and compare. (Investigations: p.I .20)	Conditional equation Double-angle formulas Extraneous solution Fundamental Identities General solution Half-angle formulas Identity Power-reducing formulas Product-to-sum formulas Reduction formulas Sum & difference formulas Sum-to-product formulas	3 Weeks
	Use and apply formulas for sum and difference of angles, double and half angles, and multiple angles (T- 10, 11)	5.4, 5.5			
	Use trig identities to solve trigonometric equations	5.3			

Use trigonometric function to interpret vectors and complex numbers	Use and apply vectors and vector combinations to real world problems Determine the dot product and vector components (MA – 1, LA – 7, 12)	6.3, 6.4		Absolute value of a complex number Argument Component form DeMoivre's Theorem Directed line segment Direction angle Dot product Horizontal & vertical components ***i*** & ***j*** vectors Initial point Linear combination Magnitude Modulus *nth* root of a complex number Orthogonal Parallelogram law resultant Standard position Terminal point Trigonometric form of a complex number Unit vector Vector Zero vector	2 Weeks
	Use and apply the trigonometric representation of complex numbers Use and apply DeMoivre s Rules for complex numbers (MA - 2, T - 17, 18)	6.5			

Coordinate Systems

Topics	LBUSD Curriculum Objective	Adopted Textbook Correlation	Investigations and Enrichment (*Precalculus Ideas*	Key Vocabulary	Time
Use and apply a Polar Coordinate System to describe special functions	Use and apply Polar Coordinates on a Polar System (MA - 1)	9.6	**Polar Graphing** A portfolio presentation of an investigation of polar functions (Investigations: p.I.35)	Cardioid Dimpled limaçon Directed angle Directed distance Lemniscate Limaçon Polar axis Polar coordinate system Polar coordinates Pole Rose curve Spiral Symmetry with respect to the polar axis the pole the line $\theta = \frac{\pi}{2}$	2 Weeks
	Determine the relationship of Polar and Rectangular Coordinate Systems (T- 1 5, MA - 1)	9.6			
	Represent equations given in rectangular form in terms of polar coordinates (T - 16)	9.6			
	Identify and create graphs of special polar functions	9.7			
Use and apply a system of equations on a rectangular coordinate system	Graph curves represented by sets of parametric equations (MA – 7)	9.5		Eliminate parameter Parameter Parametric equations Plane curve	
	Rewrite set of parametric equations as single rectangular equations by eliminating the parameter. (MA – 7)	9.5			
	Solve a system of equations by graphing, algebraic methods or using matrices (AII – 2*) CST	7.1, 7.2, 7.3	**Two Ships** An investigation of two ships headed on a course toward a collision. (Investigations: p. I.24) **Solving Systems of Equations** Working in groups students demonstrate their ability to solve systems by various methods. (Investigations: p.I.29)	Back-substitution Elimination method Equivalent systems Gaussian elimination Graphing Method Inconsistent system Nonsquare system of equations Ordered triple Row-Echelon form Solve system of equations Substituton Method Three-dimensional coordinate system	2 Weeks
	Solve a system of inequalities by graphing or algebraic methods (AII – 2*) CST	F.1		Constraints Feasible solution Graph of an inequality Linear programming Objective function Solution of an Inequality system	
	Solve Linear Programming problems	F.2			

Graph and interpret the quadratic functions of two variables	Use and apply the definitions of locus for parabolas, circles, hyperbolas and ellipses (MA - 5.2)	9.1, 9.2, 9.3	**Conic Sections** A portfolio presentation of an investigation of the conic sections (Investigations: p. I.31)	Asymptotes Axis of symmetry Branches Center of circle Circle Conic section (conic) Conjugate axis Degenerate conic Directrix Discriminant Eccentricity Ellipse Focal chord Focus (foci) General form of conic equation Hyperbola Invariant under rotation Latus rectum Major axis Minor axis Parabola Radius Reflective Property Rotation of axes Standard form Transverse axis Vertex (vertices) *xy* - system *x'y'* - system	3 Weeks
	Create and interpret the graphs of the conic sections (AII – 16) CST, (MA - 5.1)	9.1, 9.2, 9.3			
	Interpret translations of the graphs of the conic sections (AII -17, MA - 5.1)	9.1, 9.2, 9.3, 9.4	**Conic Sections by Paper Folding** Construction technique used to find the translated equation of a conic. (Investigations: p.I.34)		

Sequences and Series, and Probability and Statistics

Topics	LBUSD Curriculum Objective	Adopted Textbook Correlation	Investigations and Enrichment (*Precalculus Ideas* Book	Key Vocabulary	Time
Use and apply Arithmetic or Geometric Sequences or Series	Find the general term and the sums of arithmetic series and of both finite and infinite geometric series. (AII – 22) CST	8.1, 8.2, 8.3	**Cuts of String:** "Hands on" activity developing a better understanding of sequences and series. (Sequences, Series, Probability and Limits: p. SP.3)	Arithmetic sequence Binomial coefficients Binomial Theorem Common difference Common ratio Converging sequence Diverging sequence Explicit formula Factorial Finite sequence Geometric sequence Geometric series Index Infinite sequence infinite series *Nth* term Partial sum Pascal's triangle Recursive formula Sequence Series Sigma notation Summation notation Term Upper & lower limit of summation	3 Weeks
	Determine limit of a sequence and if the sequence diverges or converges (MA - 8)	11.4			
	Derive the summation formulas for arithmetic series and for both finite and infinite geometric series. (AII - 23*) CST	8.1, 8.2, 8.3			
	Use and apply Sigma notation (AII – 23*) CST	8.1, 8.2, 8.3			
	Use and apply the Principle of Mathematical Induction to find the sums of powers of integers and finite differences of sequences (AII – 21, MA – 3)	8.4			
	Use and apply Pascal s triangle to Binomial Expansion Theorem (AII – 20)	8.5			
Use the laws of Probability	Computation of combinations and permutations using the fundamental counting principles (AII – 18*) CST	8.6		Certain event Combinations Complement of an event Conditional Probability Distinguishable permutations Event Experiment Fundamental Counting Principle Impossible event Independent Events Mutually exclusive events Outcomes Permutation Probability Sample space	1 Week
	Use combinations and permutations to compute probabilities (AII – 18*) CST	8.7			
	Know the definition of independent events and use the rules for addition, multiplication and complementation to solve for probabilities of events in finite sample spaces (PS – 1) CST, (PS - 3)	8.7			
	Know the definition of conditional probability and use it to solve for probabilities in finite sample spaces (PS - 2) CST	8.7			

Calculate Measures of Central Tendency and organize data by various means	Know the definitions of Mean, Median and Mode and can calculate all three (PS – 6)	B.5		Average Bar graph Bimodal Box-and-whiskers plot Frequency Distribution Frequency Range Histogram Line plot Lower quartile Mean, median, mode Measures of central tendency Quartiles Range Scatter plot Standard deviation Upper Quartile Variance	1 Week
	Display data in tables, bar graphs, frequency distributions, histograms, box-and-whiskers, scatterplots, stem-and-leaf graphs (PS – 8)	B.5			
Use Variance and Standard Deviation	Compute and interpret t the variance of a distribution of data (PS - 7) CST	C.1			
	Compute and interpret the standard deviation of a distribution of data (PS - 7) CST	C.1			

Limits and Introduction to Calculus

Topics	LBUSD Curriculum Objective	Adopted Textbook Correlation	Investigations and Enrichment (*Precalculus Ideas* Book	Key Vocabulary	Time
Determine Limits of a function	Geometric Interpretation of a Limit (MA - 8)	11.1		Converge Diverge Indeterminate form Left & right side behavior Limit Limits at infinity One-sided limit Oscillating behavior Rationalizing technique Area of plane region Calculus Derivative Difference quotient Plane region Secant line Tangent line	3 Weeks
	Evaluating a limit of a function as the independent variable approaches a number or infinity (MA - 8)	11.2, 11.4			
Find derivatives of functions	Use tangent lines to approximate the slope of a graph at a point. (C – 1,4)	11.3			
	Use the definition of the limit of the slope of secant lines to find derivatives (C – 1,4)	11.3			
Find the area of plane regions bounded by a function, the x- axis and two vertical lines	Find limits of summations (AII – 21, MA – 3)	8.4			
	Use rectangles to approximate area of plane region	11.5			
	Use limits of summation to find area of lane region	11.5			

APPLICATION OF COURSE CONTENT

Career Connection:

Related Major Skills & Characteristics - Problem Solving , Organizational Skills, Numerical Computation, Ability to Analyze & Interpret Data, Critical Thinking, Computer Literacy, Logical Thinking, Team Skills Efficient, Systemizing Skills, Advanced Quantitative Skills, Testing Skills

Related Career Titles – Students who major in mathematics will be prepared for any of the following careers. *Accountant *Contract Administrator *Information Scientist *Actuary *Cost Estimator/Analyst *Inventory Control Specialist *Aerospace Engineer *Cryptographer/Cryptologist *Investment Banker *Air Traffic Controller *Data Control Administrator *ISO 2000 Specialist *Applications Programmer *Data Processing Manager *Market Research Analyst *Applied Science Technologist *Database Manager *Mathematician *Artificial Intelligence Programmer *Demographer *Media Buyer *Astronomer *Econometrician *Meteorologist *Banking/Credit/ Investment Mgr *Economist *Mortgage Researcher *Biometrician/ Biostatistician *EDP Auditor *Network Programmer *Commodity Manager *Employee Relations Specialist *Numerical Analyst *Compensation/Benefits Administrator *Engineer *Operations Research Analyst *Computer Consultant *Engineering Lab Technician *Physicist *Computer Engineer *Environmental Technologist *Pollution Meteorologist *Computer Facilities Mgr *Estate Planner *Production Manager *Computer Installation *External Auditor *Production Support Specialist *Computer Marketing/Sales Rep *Financial Auditor *Psychometrician *Computer Programmer *Financial Consultant *Public Health Statistician *Computer Scientist *Financial Manager *Purchasing/Contract Agent *Computer-Aided Design Tech. *Hydro Geologist *Quality Assurance Analyst *Consumer Loan/Credit Officer *Hydrologist *Rate Analyst *Cartographer *Software Engineer *Teacher: Science/Math/Computers *Research Analyst *Software Support Specialist *Technical Support Rep. *Risk & Insurance Specialist *Statistician *Technical Writer *Risk Analyst *Systems Analyst *Transportation Planner *Robotics Programmer *Systems Engineer *Treasury Management Specialist *Satellite Communications Specialist *Systems Programmer *Underwriter *Software Development Specialist *Urban Planner *Value Engineer *Weight Analyst

Service Learning – Students who are Advanced Proficient on the Content Standards Tests or those who are earning an A in the course, can participate in after school tutoring programs to assist other students in learning mathematics. All hours can be credited towards the Service Learning requirement.

METHODS: A variety of instructional strategies will be utilized to accommodate all learning styles including, but not limited to:

Lesson Design & Delivery: Teachers will incorporate these components of lesson design during direct instruction and inquiry activities. The order of components is flexible, depending on the teacher's vision for the individual lesson. For instance, the objective and purpose, while present in the teacher's lesson plan, are not made known to the students at the beginning of an inquiry lesson.

Essential **E**lements of **E**ffective **I**nstruction Model for Lesson Design Using Task Analysis	Anticipatory Set Objective Standard Reference Purpose Input Modeling Check for Understanding Guided Practice Closure Independent Practice

Some components may occur once in a lesson, but others will recur many times. Checking for understanding occurs continually; input, modeling, guided practice and closure may occur several times.

There may even be more than one anticipatory set when more than one content piece is introduced.

Active Participation: Teachers will incorporate the principles of active participation and specific strategies to ensure consistent, simultaneous involvement of the minds of all learners in the classroom. Teachers should include both covert and overt active participation strategies, incorporating cooperative learning structures and brain research. Some of the possible active participation strategies include:

COVERT	OVERT (Oral)	OVERT (Written)	OVERT (Gestures)
• Recall	• Pair/Share	• Restate in Journals / Notes	• Hand Signals
• Imagine	• Idea Wave	• Response Boards	• Model with Manipulatives
• Observe	• Choral Response	• Graphic Organizers	• Stand up/ Sit down
• Consider	• Give One, Get One	• Folded Paper	• Point to Examples
	• "Foggiest" point	• Ticket Out of Class	
	• Socratic Seminar		
	• Cooperative Discussion Groups (i.e.Talking Chips, Gambit Chips)		

Literacy and Differentiation Strategies

Learning styles and learning challenges of your students may be addressed by implementing combinations of the following:

Reading Strategies in Mathematics	*SDAIE Strategies for English Learners*	***Differentiation for Advanced Learners***
▪ Learning Logs ▪ Pre-teaching ▪ Vocabulary ▪ Pre-reading ▪ Text Structures ▪ Trail Markers ▪ Reciprocal Teaching ▪ Functional Text ▪ Anticipation Guide	▪ Tapping/Building Prior Knowledge (Graphic Organizers, Schema) ▪ Grouping Strategies ▪ Multiple Intelligences ▪ Adapt the Text ▪ Interactive Learning (Manipulatives, Visuals) ▪ Acquisition Levels ▪ Language Sensitivity ▪ Lower the Affective Filter (including Processing Time) ▪ Home/School Connection (including Cultural Aspects)	▪ Curriculum Compacting ▪ Tiered Assignments ▪ Flexible Grouping ▪ Acceleration ▪ Depth and Complexity ▪ Independent Study

MATERIALS USED IN TEACHING THE COURSE: In addition to the basic text (*mandatory information – Title, Author, Copyright Date and Publisher*), a variety of instructional tools will be used to meet the needs of all students

Basic Text:

Precalculus with Limits, A Graphing Approach, Fifth Edition; Larson, Hostetler and Edwards, 2008; Houghton Mifflin Publishing

Related Career Resources

- There are many web sites that will help with career selection such as Eguidance.com, BRIDGES.com, and icouldbe.org. The software package COIN JR also has career information. Video tapes such as the Futures with Jamie Escalante - School to Career shows how math is used in various careers (FASE productions 800-404-FASE). Other videos are Career Futures. Call the Career/Tech Ed Office (562-989-7872 x 291) for more information on careers.

EVALUATION: Student achievement in this course will be measured using multiple assessment tools including but not limited to chapter tests, cumulative tests (quarter tests, semester 1 test, and End-Of-Course Exam), quizzes, homework, classwork, notebooks, and projects.

Textbook	Diagnose	Monitor	Evaluate
District Developed Assessments	**Practice Exam 1 and 2**	**Standards Based Assessments Open-Ended Math**	**First Semester Exam End-of-Course Exam**
Houghton Mifflin	Chapter Test as Pretest	Chapter Project Synthesis & review exercises Chapter Summary	Chapter Test Cumulative Test

Scoring Guide for Written Response/Projects

Score	Description
4	The student response thoroughly accomplishes the task. • Shows thorough understanding and use of the central mathematical ideas(s) • Includes appropriate and accurate mathematical computations • Presents mathematical knowledge and ideas clearly and skillfully, using combinations of mathematical symbols and/or visual means as supporting evidence
3	The student response substantially accomplishes the task. • Shows an essential grasp of the central mathematical idea(s) • Includes appropriate and generally correct mathematical computations • Presents mathematical knowledge and ideas clearly with supporting evidence
2	The student response partially accomplishes the task. • Shows a limited grasp of the central mathematical ideas(s) • May include incomplete and/or misdirected mathematical computations • Presents mathematical knowledge and ideas in an unclear manner or without supporting evidence
1	The student response makes little or no progress toward accomplishing the task. • Shows little or no grasp of the central mathematical idea(s) • Includes mathematical computations that are incorrect or inappropriate • Presents mathematical knowledge and ideas in a barely (if at all) comprehensible manner

Grading Policy: A common grading policy ensures consistency between schools and classrooms across the district.

Suggested Percent of Grade

Classwork/Homework (10%)	15% - 20%
Notes/Projects	5%
Chapter Tests	35% - 40%
Quizzes	25% - 30%
Cumulative Tests/End-Of-Course Exam	10% - 15%

Standard Grading Scale

A = 90% - 100%
B = 80% - 89%
C = 70% - 79%
D = 60% - 69%
F = Below 60

Submitted by: Becky Afghani
School/Office: Math Office
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