

East Penn School District
Secondary Curriculum

A Planned Course Statement
for
Math Analysis

Course # 316

Grade(s) 11-12

Department: Mathematics

Length of Period (mins.) 42 Total Clock Hours: 126

Periods per Cycle: 6 Length of Course (yrs.) 1

Type of Offering: required ✓ elective

Credit: 1

Adopted: 6/28/10

Developed by:

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Description of Course 312:

Course Title: Math Analysis

Description: This course is designed to introduce new topics in mathematics that utilize skills that were learned in previous math courses. Students will learn topics that develop higher level thinking skills. The course includes modular arithmetic, set theory, logic, number theory, logarithms, quadratic applications, probability, statistics, and mathematics of financial management.

Goals:

- To develop higher level analytical skills in problem solving applications.

Requirements:

- Must have at least a 74% in Algebra 2 or at least a 65% in Algebra III/ Trigonometry.

Text: Mathematical Ideas Expanded 11th Edition

Key to Levels of Achievement (Listed with each learning objective)

Awareness (A):	Students are introduced to concepts, forms, and patterns.
Learning (L):	Students are involved in a sequence of steps and practice activities that involved further development and allow evaluation of process.
Understanding (U):	Students demonstrate ability to apply acquired concepts and skills to individual assignments and projects on an independent level.
Reinforcement (R):	Students maintain and broaden understanding of concepts and skills to accomplish tasks at a greater level of sophistication.

Unit	Num	Objective	Level	Content	Evaluation	Standard
Problem Solving	1.1	Students will form conclusions using inductive and deductive reasoning. Students will complete patterns using arithmetic and geometric sequence formulas.	A	<ul style="list-style-type: none"> Form conclusions by recognizing patterns Use specific examples to form conclusions Use general examples to form conclusions Find specific terms in an arithmetic and geometric sequence. Find the sum of the first n numbers using arithmetic and geometric sequence formulas. 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	2.4.11.A 2.5.11.A 2.5.11.B 2.8.11.C
	1.2		L			
	1.3	Students will apply several methods to solve word problems.	U			
	1.4	Students will make conclusions from graphical data	R	<ul style="list-style-type: none"> Use the distance formula to calculate the distance between 2 points. Use the midpoint formula to determine the midpoint of two coordinates 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	2.5.11.A 2.5.11.B
Set Theory	2.1	Students will define terms that apply to set theory. Students will designate sets. Student will compare sets. Students will determine the cardinality of sets.	A	<ul style="list-style-type: none"> Define the following terms: finite sets, infinite sets, members, empty set, cardinality, universal set, set equality Compare sets Find the cardinality of sets. 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	Beyond Standards
			L			
	2.2	Students will define complement of a set, subset, proper subset, and counting subset. Students will create venn diagrams from given sets. Students will determine subset and proper subset relationships. Students will create tree diagrams to find subsets.	U	<ul style="list-style-type: none"> Define complement of a set, subset, proper subset, and counting subset Make venn diagrams from given sets Find subsets using tree diagrams 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	Beyond Standards

Unit	Num	Objective	Level	Content	Evaluation	Standard
	2.3	Students will determine the union, intersection and difference of sets. Students will apply DeMorgan's Laws.	A L U R	<ul style="list-style-type: none"> Find the union, intersection, and difference of given sets Use given sets to show that DeMorgan's Laws work for set theory. 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	Beyond Standards
	2.4	Students will analyze surveys using set theory Students will apply the cardinal number formula	L U R	<ul style="list-style-type: none"> Create Venn diagrams from given data Formulate conclusions from Venn diagrams. Use the cardinal number formula to complete Venn diagrams 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	Beyond Standards
	2.5	Students will put sets in one-to-one correspondence with each other. Students will determine if a set is infinite.	A L	<ul style="list-style-type: none"> Put sets into one-to-one correspondence Identify infinite sets 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	Beyond Standards
Logic	3.1	Students will decide if a statement is compound Students will define negation, conjunction, disjunction Students will learn the symbols that pertain to logic Students will form negations Students translate logic symbols to words. Students will form negations of quantified statements	A L U	<ul style="list-style-type: none"> Identify compound statements Learn symbols Translate logical statements Write the negation of quantified statements 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	2.4.11.A
	3.2	Students will determine the truth value of conjunctions, disjunctions, compound statements, quantified mathematical statements Students will construct truth tables.	L U R	<ul style="list-style-type: none"> Find the truth value of given statements using rules of logic Complete truth tables 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	2.4.11.A
	3.3	The student will be able to write conditional statements. The students will be able to determine the truth value of conditional statements. The student will draw circuits to symbolize logical statements	A L U R	<ul style="list-style-type: none"> Write conditional statements Find the truth value of conditional statements Create circuits that relate to a given logical statement 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	2.4.11.A 2.4.11.B

Unit	Num	Objective	Level	Content	Evaluation	Standard
	3.4	The student will write the converse, inverse, and contrapositive of conditional statements. The student will write biconditional statements and determine their truth value.	A L	<ul style="list-style-type: none"> Write converse, inverse, and contrapositive of conditional statements. Write biconditional statements Find the truth value of conditional statements 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	2.4.11.A 2.4.11.B
	3.5	The student will determine the validity of a logical statement using Euler diagrams	A L U	<ul style="list-style-type: none"> Use Euler diagrams to find validity 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	Beyond Standards
	3.6	The student will construct truth tables to test the validity of a logical statement	A L U R	<ul style="list-style-type: none"> Construct truth tables to test validity 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	Beyond Standards
Modular Arithmetic	4.4	The student will use modular arithmetic to complete basic mathematical operations	A L U	<ul style="list-style-type: none"> Complete mathematical problems using modular arithmetic 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	Beyond Standards
Quadratic Applications	7.7	The student will use the zero property rule to solve quadratic equations The student will use the quadratic formula to solve quadratic equations The students will apply methods of solving quadratics to solve word problems	L U R	<ul style="list-style-type: none"> Review methods of solving quadratics Solve word problems using methods of solving quadratics 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	2.8.11.C 2.8.11D 2.8.11.E
Functions and systems of equations	8.4	The students will define a function The student will determine dependent and independent variables The student will determine the domain and range of a function The student will graph linear functions	A L	<ul style="list-style-type: none"> Define function Identify dependent and independent variables Find the domain and range of functions Graph linear functions Use graphing calculators to graph linear models 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	2.8.11.B 2.8.11.D 2.8.11.E 2.8.11.F

Unit	Num	Objective	Level	Content	Evaluation	Standard
	8.5	The student will graph quadratic functions The students will use methods of translation to graph quadratic equations	L U	<ul style="list-style-type: none"> Graph quadratic functions using shifts or translations Graph quadratic functions using methods of solving quadratics Graph quadratic functions using graphing calculators 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	2.8.11.D 2.8.11.F
	8.6	The student will complete exponential graphs. The student will solve logarithmic problems. The student will apply the compound interest formulas.	L U R	<ul style="list-style-type: none"> Graph exponential functions Solve logarithmic functions Solve problems using the compound interest formula and continuous compound interest formula 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	2.8.11.D
	8.7	The student will solve problems using systems of equations.		<ul style="list-style-type: none"> Use linear method to solve problems Use elimination method to solve problems Use substitution method to solve problems Use methods of solving linear systems to solve application problems 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	2.8.11.B 2.8.11.E 2.8.11.F
Probability	12.1	The student will calculate theoretical probability of an event. The student will determine the empirical probability of an event. The student will calculate the odds of an event. The student will define the Law of Large of Numbers The student will convert odds to probability and probability to odds.	A L	<ul style="list-style-type: none"> Find the empirical and theoretical probabilities of events Find the odds of an event occurring. Define the Law of Large Numbers. Convert odds to probability and probability to odds. 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	2.7.11.A 2.7.11.C 2.7.11.E
	12.2	The student will use the addition principles with or to determine the probability of an event.	A L U	<ul style="list-style-type: none"> Find the probability of a complement Define mutually exclusive events Calculate probability of events involving or. 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	2.7.11.A 2.7.11.E
	12.3	The student will use the addition principles with or to determine the probability of an event.	A L U	<ul style="list-style-type: none"> Define independent events Find the probability of an event using the multiplication rule 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests 	2.7.11.E

Unit	Num	Objective	Level	Content	Evaluation	Standard
				<ul style="list-style-type: none"> • Create tree diagrams to determine possible outcomes 	<ul style="list-style-type: none"> • Alternative assessments 	
	11.3	The student will explain the difference between permutation and combination The student will calculate combinations and permutations of given situations	A L U	<ul style="list-style-type: none"> • Define permutation and combinations • Solve problems involving permutations and combinations 	<ul style="list-style-type: none"> • Teacher observation • Assignments • Quizzes • Tests • Alternative assessments 	Beyond Standards
	12.4	The student will find the probability of an event using the binomial probability formula.	A L U	<ul style="list-style-type: none"> • Use the binomial probability formula to solve problems 	<ul style="list-style-type: none"> • Teacher observation • Assignments • Quizzes • Tests • Alternative assessments 	Beyond Standards
	12.5	The student will calculate the expected value of an event	A L U R	<ul style="list-style-type: none"> • Use the expected value formula to solve problems. 	<ul style="list-style-type: none"> • Teacher observation • Assignments • Quizzes • Tests • Alternative assessments 	Beyond Standards
Statistics	13.1	The students will define statistical terms. The student will construct statistical graphs. The student will interpret data from statistical graph.	A L	<ul style="list-style-type: none"> • Define population, sample, descriptive statistics, inferential statistics, quantitative data, qualitative data • Construct frequency distributions, histograms, frequency polygon, stem and leaf, circle graph, and line graph 	<ul style="list-style-type: none"> • Teacher observation • Assignments • Quizzes • Tests • Alternative assessments 	2.6.8.B
	13.2	The student will determine measures of central tendencies from a given set of data.	A L U	<ul style="list-style-type: none"> • Find mean, median, mode from given sets of data 	<ul style="list-style-type: none"> • Teacher observation • Assignments • Quizzes • Tests • Alternative assessments 	2.6.11.C
	13.3	The student will calculate measures of dispersion	A L U	<ul style="list-style-type: none"> • Find the range, standard deviation, coefficient of variation 	<ul style="list-style-type: none"> • Teacher observation • Assignments • Quizzes • Tests • Alternative assessments 	Beyond Standards
	13.4	The student will calculate measures of position. The student will create a box plot	A L U	<ul style="list-style-type: none"> • Find z-score, percentiles, deciles, quartiles • Create a box plot. 	<ul style="list-style-type: none"> • Teacher observation • Assignments • Quizzes • Tests • Alternative assessments 	2.6.11.C

Unit	Num	Objective	Level	Content	Evaluation	Standard
	13.5	The student will use the table of percents for each z-score to calculate the percent of data between any two variables	A L U	<ul style="list-style-type: none"> Apply the normal curve table Apply the empirical rule Find areas under the normal curve 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	Beyond Standards
	13.6	The student will be able to determine the correlation between two variables	A L U	<ul style="list-style-type: none"> Describe the relationship between two variables using correlation methods 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	2.6.11.C
Trigonometry	10.1	The student will convert between decimal degrees and degrees, minutes, seconds	A L U	<ul style="list-style-type: none"> Complete angle conversions 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	2.10.11.B
	10.4	The student will calculate unknown sides and angles of right triangles using trigonometric functions.	A L U	<ul style="list-style-type: none"> Solve for unknown sides Solve for unknown angles Find reference angles 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	2.10.11.A
	10.5	The student will apply their knowledge of trigonometric functions to solve problems	A L U R	<ul style="list-style-type: none"> Find angle of elevation Find angle of declination Find lengths when you know the angles of elevation or declination 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	2.10.11.A
Personal Financial Management	14.1	The student will calculate simple and compound interest	A L	<ul style="list-style-type: none"> Solve problems involving simple interest Solve problems involving compound interest 	<ul style="list-style-type: none"> Quiz Teacher observation Assignments Quizzes Tests Alternative assessments 	2.5.11.A
	14.1 Ext	The student will calculate values of annuities	L U R	<ul style="list-style-type: none"> Calculate annuity values 	<ul style="list-style-type: none"> Teacher observation Assignments Quizzes Tests Alternative assessments 	2.5.11.A

Unit	Num	Objective	Level	Content	Evaluation	Standard
	14.2	The student will explain benefits of paying off loans early. The student will calculate future loan payments.	A L U R	<ul style="list-style-type: none"> • Calculate future payments • Compare payment methods 	<ul style="list-style-type: none"> • Teacher observation • Assignments • Quizzes • Tests • Alternative assessments 	Beyond Standards
	14.3	The student will calculate the APR on a loan The student will calculate early payoff amounts	A L U R	<ul style="list-style-type: none"> • Calculate payoff amounts • Calculate APR 	<ul style="list-style-type: none"> • Teacher observation • Assignments • Quizzes • Tests • Alternative assessments 	Beyond Standards
Graph Theory (Optional)	15.1	The student will complete graphs and subgraphs	A L U	<ul style="list-style-type: none"> • Explain graphs, walks, paths, circuits, and complete graphs • Use the sum of the degrees theorem • Discuss isomorphic graphs 	<ul style="list-style-type: none"> • Teacher observation • Assignments • Quizzes • Tests • Alternative assessments 	2.5.11.B
	15.2	The student will recognize Euler circuits	A L U	<ul style="list-style-type: none"> • Use Euler’s Theorem 	<ul style="list-style-type: none"> • Teacher observation • Assignments • Quizzes • Tests • Alternative assessments 	Beyond Standards
	15.3	The student will complete algorithms using Hamiltonian Circuits	A L U	<ul style="list-style-type: none"> • Use Hamiltonian Circuits 	<ul style="list-style-type: none"> • Teacher observation • Assignments • Quizzes • Tests • Alternative assessments 	Beyond Standards
Voting and Apportionment (Optional)	16.1	The student will define each method of voting.	A L	<ul style="list-style-type: none"> • Define Plurality, Pairwise comparison, Borda, and Hare methods. 	<ul style="list-style-type: none"> • Teacher observation • Assignments • Quizzes • Tests • Alternative assessments 	Beyond Standards
	16.2	The student will explain the impossibilities of voting	A L U	<ul style="list-style-type: none"> • Discuss Majority, Condorcet, Monotonicity, and Ireevelent Alternative Criteria • Discuss Arrow’s Impossibility Theorem 	<ul style="list-style-type: none"> • Teacher observation • Assignments • Quizzes • Tests • Alternative assessments 	Beyond Standards
	16.3	The student will explain the possibilities of Apportionment	A L U	<ul style="list-style-type: none"> • Discuss the Hamilton, Adams, Jefferson, and Webster methods. • 	<ul style="list-style-type: none"> • Teacher observation • Assignments • Quizzes • Tests • Alternative assessments 	Beyond Standards

Unit	Num	Objective	Level	Content	Evaluation	Standard
	16.4	The student will explain the impossibilities of apportionment	A L U	<ul style="list-style-type: none">Discuss the Quota method, Alabama Paradox, Population Paradox, Newstates Paradox, and the Balinski and Young Impossibility Theorem	<ul style="list-style-type: none">Teacher observationAssignmentsQuizzesTestsAlternative assessments	Beyond Standards