East Penn School District Secondary Curriculum								
A Planned Course Statement for								
PRECALCULUS CP								
Course # 330 Grade(s)								
Department: Mathematics								
Length of Period (mins.) 42 Total Clock Hours: 126								
Periods per Cycle: <u>6</u> Length of Course (yrs.) <u>1</u>								
Type of Offering:requiredelective								
Credit: <u>1</u>								
Adopted: <u>6/28/10</u>								
Developed by:								
Charles Sonon Denise Teles Donna Wagner								

**Description of Course #330** 

## **Course Title: Precalculus CP**

**Description:** The course is designed primarily for those students with better than average backgrounds in mathematics who intend to continue study in the areas of science and mathematics. It involves a comprehensive study of real numbers, algebraic manipulations, logarithms, trigonometric and circular functions, graphing functions, and sequences and series.

**Goals:** To provide a comprehensive study of real numbers, algebraic manipulations, logarithms, trigonometric and circular functions, graphing functions and sequences and series.

**Requirements:** Scientific or graphing calculator, Geometry 330 (84% or better) and Algebra II (84% or better)

Text: <u>Precalculus</u>, Blitzer, Prentice Hall, 2010 4<sup>th</sup> Edition

## \*\*\* A graded project will be completed during each semester in this course.

## \*\*\* <u>Careers that utilize the mathematics taught in this course will be discussed</u> <u>during the first semester.</u>

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 which 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.

Course Objectives –				Page 1			
Unit	Num	Objective	Level	Content	Evaluation	Standard	
Algebra Review	1	Student will be able to order real numbers, use inequalities, and evaluate algebraic expressions	L	<ul> <li>Represent, classify, and order real numbers and use inequalities</li> <li>Find the absolute value of real numbers and find the distance between two real numbers</li> <li>Evaluate algebraic expressions</li> <li>Use basic rules and properties of algebra</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>	2.2.A2.C	
	2	Students will be able to add, subtract, multiply, and factor polynomials	L	<ul> <li>Use properties of exponents</li> <li>Use scientific notation to represent real numbers</li> <li>Use properties of radicals to simplify and combine radicals</li> <li>Rationalize denominators and numerators</li> <li>Use properties of rational exponents</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>	2.1.A2.D	
	3	Students will determine the domains of algebraic expressions and simplify rational expressions	L	<ul> <li>Write polynomials in standard form</li> <li>Simplify, add, subtract, multiply, and divide rational expressions</li> <li>Simplify complex fractions</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		
	4	Students will solve linear, quadratic, polynomial, radical, and absolute value equations and inequalities	R	<ul> <li>Identify different types of equations</li> <li>Solve linear equations in one variable</li> <li>Solve polynomial equations</li> <li>Solve equations involving radicals and absolute values</li> <li>Recognize solutions of linear inequalities</li> <li>Use properties of linear inequalities</li> <li>Solve inequalities using absolute values</li> <li>Solve polynomial and rational inequalities</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>	2.8.A2.B 2.8.A2.F	

Course Objectives –				Page 2			
Unit	Num	Objective	Level	Content	Evaluation	Standard	
	5	Students will plot points in the coordinate plane and find the distance between two points	U	<ul> <li>Plot points in the Cartesian plane</li> <li>Use distance formula and midpoint formula</li> <li>Use coordinate plane to model and solve real-life problems</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		
Functions and Their Graphs	6	Students will be able to sketch the graphs of equations	L	<ul> <li>Sketch graphs of equations</li> <li>Use intercepts and symmetry to sketch graphs of equations</li> <li>Find equations and sketch graphs of circles</li> <li>Use graphs of equations in real-life problems</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		
	7	Students will find and use the slopes of lines to write and graph linear equations in two variables	L	<ul> <li>Calculate slope and use slope to graph linear equations</li> <li>Write linear equations and identify parallel and perpendicular lines</li> <li>Use linear equations to model and solve real-life problems</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>	2.9.A2.A	
	8	Students will be able to evaluate functions and find their domain	U	<ul> <li>Decide whether relations between two variables are functions</li> <li>Use function notation and evaluate functions</li> <li>Find domain of functions</li> <li>Use functions to model and solve real-life problems</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>	2.8.A2.D	
	9	Students will be able to analyze graphs of functions	L	<ul> <li>Use Vertical Line Test and find the zeros of functions</li> <li>Determine intervals on which functions are increasing or decreasing</li> <li>Identify and graph linear and piecewise-defined functions</li> <li>Identify even and odd functions</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		
	10	Students will be able to identify and graph shifts, reflections, and nonrigid transformations of functions	L	<ul> <li>Recognize graphs of common functions</li> <li>Use transformations to sketch graphs of functions</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		

Course Objectives –				Page 3			
Unit	Num	Objective	Level	Content	Evaluation	Standard	
	11	Students will be able to find arithmetic combinations and compositions of functions	L	<ul> <li>Add, subtract, multiply, and divide functions</li> <li>Find compositions and combinations of functions</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>	2.8.A2.E	
	12	Students will be able to find inverses of functions graphically and algebraically	L	<ul> <li>Find inverses functions informally</li> <li>Use Horizontal Line Test to determine if inverses exist</li> <li>Use graphs of functions to decide whether functions have inverses</li> <li>Find inverse functions algebraically</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		
	13	Students will be able to write algebraic models	U	Write mathematical models for direct variation, inverse variation, and joint variation	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		
Polynomial and Rational Functions	14	Students will be able to sketch and analyze graphs of functions	L	<ul> <li>Analyze graphs of quadratic functions</li> <li>Write quadratic functions in standard form and sketch their graphs</li> <li>Use quadratic functions to model and solve real-life problems</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		
	15	Students will be able to use long division and synthetic division to divide polynomials by other polynomials	L	<ul> <li>Use transformations to sketch the graphs of polynomial functions</li> <li>Use the Leading Coefficient Test to determine the end behavior of graphs of polynomial functions</li> <li>Use zeros of polynomial functions as sketching aids</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		
	16	Students will be able to perform operations with complex numbers	L	<ul> <li>Use long division to divide polynomials by other polynomials</li> <li>Use synthetic division to divide polynomials by other polynomials</li> <li>Use the remainder theorem and the factor theorem</li> <li>Use polynomial division to answer questions about real-life problems</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		

Course Objectives –				Page 4			
Unit	Num	Objective	Level	Content	Evaluation	Standard	
	17	Students will be able to determine the numbers of rational and real zeros of polynomial functions and then find the zeros	L	<ul> <li>Use the imaginary unit <i>i</i> to write complex numbers</li> <li>Add, subtract, multiply, and divide complex numbers</li> <li>Use the Quadratic formula to find complex solutions of quadratic equations</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>	2.1.A2.A	
	18	Students will be able to determine the domains of rational functions and find the asymptotes of rational functions	L	<ul> <li>Use the Fundamental Theorem of Algebra to determine the numbers of zeros of polynomial functions</li> <li>Find rational zeros of polynomial functions</li> <li>Find the conjugate pairs of complex zeros</li> <li>Find the zeros of polynomials by factoring and using Descartes' Rules of Signs</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		
	19	Students will be able to sketch the graphs of rational functions	L	<ul> <li>Find the domains of rational functions</li> <li>Find the horizontal and vertical graphs of rational functions</li> <li>Analyze and sketch graphs of rational functions</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		
Exponential and Logarithmic Functions	20	Students will be able to recognize and evaluate exponential and logarithmic functions	U	<ul> <li>Recognize and evaluate exponential functions with base <i>a</i></li> <li>Graph exponential functions</li> <li>Recognize and evaluate exponential functions with base <i>e</i></li> <li>Use exponential functions to model and solve real-life applications</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>	2.1.A2.F	
	21	Students will be able to graph exponential and logarithmic functions	U	<ul> <li>Recognize and evaluate logarithmic functions with base <i>a</i></li> <li>Graph logarithmic functions</li> <li>Recognize and evaluate natural logarithmic functions</li> <li>Use logarithmic functions to model and solve real-life applications</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		

Course Objectives –				Page 5			
Unit	Num	Objective	Level	Content	Evaluation	Standard	
	22	Students will be able to rewrite logarithmic functions with different bases	L	• Use the change of base formula to rewrite logarithmic functions with a different base	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		
	23	Students will be able to use properties of logarithms to evaluate, rewrite, expand, or condense logarithmic expressions	U	<ul> <li>Use properties of logarithms to evaluate or rewrite logarithmic expressions</li> <li>Use properties of logarithms to expand or condense logarithmic expressions</li> <li>Use logarithmic functions to model and solve real-life applications</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>	2.1.A2.F	
	24	Students will be able to solve exponential and logarithmic equations	U	<ul> <li>Solve the simple exponential and logarithmic equations</li> <li>Solve more complicated exponential and logarithmic equations</li> <li>Use exponential and logarithmic equations to model and solve real-life applications</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		
Trigonometry	25	Students will be able to describe an angle and convert between radian and degree measure.	U	<ul> <li>Describe angles</li> <li>Use radian and degree measure</li> <li>Use angles to model and solve real-life problems</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		
	26	Students will be able to identify a unit circle and its relationship to real numbers.	L	<ul> <li>Identify a unit circle and its relationship to real numbers.</li> <li>Evaluate trigonometric functions using the unit circle.</li> <li>Use the domain and period to evaluate sine and cosine functions.</li> <li>Use a calculator to evaluate Trigonometric functions.</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		

Course Objectives –				Page 6			
Unit	Num	Objective	Level	Content	Evaluation	Standard	
	27	Students will be able to evaluate trigonometric functions of any angle.	U	<ul> <li>Evaluate trigonometric functions of acute angles.</li> <li>Use the fundamental trigonometric identities.</li> <li>Use a calculator to evaluate trigonometric functions.</li> <li>Use trigonometric functions to model and solve real-life problems.</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		
	28	Students will be able to use fundamental trigonometric identities	L	<ul> <li>Evaluate trigonometric functions of any angle.</li> <li>Use reference angles to evaluate trigonometric functions.</li> <li>Evaluate trigonometric functions of real numbers.</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		
	29	Students will be able to sketch the graphs of trigonometric functions and translations of graphs of sine and cosine functions	L	<ul> <li>Use the amplitude and period to sketch the graphs of sine and cosine functions.</li> <li>Sketch translations of graphs of sine and cosine functions.</li> <li>Use sine and cosine functions to model real-life data.</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>	2.10.A2.B	
	30	Students will be able to evaluate the inverse trigonometric functions.	L	<ul> <li>Sketch the graphs of tangent and cotangent functions.</li> <li>Sketch the graphs of secant and cosecant functions.</li> <li>Sketch the graphs of damped trigonometric functions.</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>	2.10.A2.B	
	31	Evaluate the compositions of trigonometric functions and inverse trigonometric functions.	L	<ul> <li>Evaluate the inverse sine function and all the other inverse trigonometric functions.</li> <li>Evaluate the compositions of trigonometric functions.</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		
	32	Students will be able to use fundamental trigonometric identities to evaluate trigonometric functions and simplify trigonometric expressions.	L	<ul> <li>Recognize and write fundamental trigonometric identities.</li> <li>Use the fundamental trigonometric identities to evaluate trigonometric functions, simplify trigonometric expressions, and rewrite trigonometric expressions.</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		

Course Objectives –				Page 7			
Unit	Num	Objective	Level	Content	Evaluation	Standard	
	33	Students will be able to verify trigonometric identities.	L	<ul> <li>Plan a strategy for verifying trigonometric identities.</li> <li>Verify trigonometric identities.</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessment</li> </ul>		
	34	Students will be able to use standard algebraic techniques and inverse trigonometric functions to solve trigonometric equations.	L	<ul> <li>Use standard algebraic techniques to solve trigonometric equations.</li> <li>Solve trigonometric equations of quadratic type.</li> <li>Solve trigonometric equations involving multiple angles.</li> <li>Use inverse trigonometric functions to solve trigonometric equations.</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		
	35	Students will be able to use sum and difference formulas, multiple-angle formulas, power- reducing formulas, half-angle formulas, and product - to- sum formulas to rewrite and evaluate trigonometric functions.	L	<ul> <li>Use sum and difference formulas to evaluate trigonometric functions.</li> <li>Use sum and difference formulas to verify identities and solve trigonometric equations.</li> <li>Use multiple-angle formulas to rewrite and evaluate trigonometric functions.</li> <li>Use power-reducing formulas to rewrite and evaluate trigonometric functions.</li> <li>Use half-angle formulas to rewrite and evaluate trigonometric functions.</li> <li>Use half-angle formulas to rewrite and evaluate trigonometric functions.</li> <li>Use product-to-sum formulas to rewrite and evaluate trigonometric functions.</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		
	36	Students will be able to use the Law of Sines and the Law of Cosines to solve oblique triangles.	U	<ul> <li>Use the Law of Sines and Law of Cosines to solve oblique triangles.</li> <li>Use the Law of Sines and the Law of Cosines to model and solve real-life problems.</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>		

<b>Course Objectives –</b>				Page 8		
Unit	Num	Objective	Level	Content	Evaluation	Standard
	37	Students will be able to find areas of oblique triangles.	L	• Use Law of Sines and Heron's area Formula to find area of triangles.	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>	
Sequences	38	Students will be able to use sequence, factorial, and summation notation to write the terms and sum of a sequence.	U	<ul> <li>Use sequence notation to write the terms of a sequence.</li> <li>Use factorial notation.</li> <li>Use summation notation to write sums.</li> <li>Find the sum of an infinite series.</li> <li>Use sequence and series to model real-life problems.</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>	
	39	Students will be able to recognize, write, and manipulate arithmetic sequences and geometric sequences.	U	<ul> <li>Recognize and write arithmetic and geometric sequences.</li> <li>Find the nth partial sum of an arithmetic and geometric sequence.</li> <li>Find the infinite sum of a geometric sequence.</li> <li>Use arithmetic and geometric sequences to model and solve real-life problems.</li> </ul>	<ul> <li>Teacher Observation</li> <li>Assignments</li> <li>Quizzes</li> <li>Tests</li> <li>Alternative Assessments</li> </ul>	