

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

Periods per Cycle: $\qquad$ 6

Length of Course (yrs.) 1
Type of Offering: $\qquad$ required $\qquad$ elective

Credit: $\quad 1$
Adopted: $\qquad$ 6/28/10

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## 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: Precalculus, Blitzer, Prentice Hall, $20104^{\text {th }}$ Edition
*** A graded project will be completed during each semester in this course.
*** Careers that utilize the mathematics taught in this course will be discussed during the first semester.

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 <br> which involved further development and allow evaluation of process. |
| Understanding (U): | Students demonstrate ability to apply acquired concepts and skills to <br> individual assignments and projects on an independent level. |
| Reinforcement (R): | Students maintain and broaden understanding of concepts and skills <br> to accomplish tasks at a greater level of sophistication. |

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| 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 | - Represent, classify, and order real numbers and use inequalities <br> - Find the absolute value of real numbers and find the distance between two real numbers <br> - Evaluate algebraic expressions <br> - Use basic rules and properties of algebra | - Teacher Observation <br> - Assignments <br> - Quizzes <br> - Tests <br> - Alternative Assessments | 2.2.A2.C |
|  | 2 | Students will be able to add, subtract, multiply, and factor polynomials | L | - Use properties of exponents <br> - Use scientific notation to represent real numbers <br> - Use properties of radicals to simplify and combine radicals <br> - Rationalize denominators and numerators <br> - Use properties of rational exponents | - Teacher Observation <br> - Assignments <br> - Quizzes <br> - Tests <br> - Alternative Assessments | 2.1.A2.D |
|  | 3 | Students will determine the domains of algebraic expressions and simplify rational expressions | L | - Write polynomials in standard form <br> - Simplify, add, subtract, multiply, and divide rational expressions <br> - Simplify complex fractions | - Teacher Observation <br> - Assignments <br> - Quizzes <br> - Tests <br> - Alternative Assessments |  |
|  | 4 | Students will solve linear, quadratic, polynomial, radical, and absolute value equations and inequalities | R | - Identify different types of equations <br> - Solve linear equations in one variable <br> - Solve polynomial equations <br> - Solve equations involving radicals and absolute values <br> - Recognize solutions of linear inequalities <br> - Use properties of linear inequalities to solve linear inequalities <br> - Solve inequalities using absolute values <br> - Solve polynomial and rational inequalities | - Teacher Observation <br> - Assignments <br> - Quizzes <br> - Tests <br> - Alternative Assessments | $\begin{aligned} & \text { 2.8.A2.B } \\ & \text { 2.8.A2.F } \end{aligned}$ |


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

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

Course Objectives -

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

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| 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 | - Teacher Observation <br> - Assignments <br> - Quizzes <br> - Tests <br> - Alternative Assessments |  |
|  | 23 | Students will be able to use properties of logarithms to evaluate, rewrite, expand, or condense logarithmic expressions | U | - Use properties of logarithms to evaluate or rewrite logarithmic expressions <br> - Use properties of logarithms to expand or condense logarithmic expressions <br> - Use logarithmic functions to model and solve real-life applications | - Teacher Observation <br> - Assignments <br> - Quizzes <br> - Tests <br> - Alternative Assessments | 2.1.A2.F |
|  | 24 | Students will be able to solve exponential and logarithmic equations | U | - Solve the simple exponential and logarithmic equations <br> - Solve more complicated exponential and logarithmic equations <br> - Use exponential and logarithmic equations to model and solve reallife applications | - Teacher Observation <br> - Assignments <br> - Quizzes <br> - Tests <br> - Alternative Assessments |  |
| Trigonometry | 25 | Students will be able to describe an angle and convert between radian and degree measure. | U | - Describe angles <br> - Use radian and degree measure <br> - Use angles to model and solve real-life problems | - Teacher Observation <br> - Assignments <br> - Quizzes <br> - Tests <br> - Alternative Assessments |  |
|  | 26 | Students will be able to identify a unit circle and its relationship to real numbers. | L | - Identify a unit circle and its relationship to real numbers. <br> - Evaluate trigonometric functions using the unit circle. <br> - Use the domain and period to evaluate sine and cosine functions. <br> - Use a calculator to evaluate Trigonometric functions. | - Teacher Observation <br> - Assignments <br> - Quizzes <br> - Tests <br> - Alternative Assessments |  |

Course Objectives -

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

Course Objectives -

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|  | 33 | Students will be able to verify trigonometric identities. | L | - Plan a strategy for verifying trigonometric identities. <br> - Verify trigonometric identities. | - Teacher Observation <br> - Assignments <br> - Quizzes <br> - Tests <br> - Alternative Assessment |  |
|  | 34 | Students will be able to use standard algebraic techniques and inverse trigonometric functions to solve trigonometric equations. | L | - Use standard algebraic techniques to solve trigonometric equations. <br> - Solve trigonometric equations of quadratic type. <br> - Solve trigonometric equations involving multiple angles. <br> - Use inverse trigonometric functions to solve trigonometric equations. | - Teacher Observation <br> - Assignments <br> - Quizzes <br> - Tests <br> - Alternative Assessments |  |
|  | 35 | Students will be able to use sum and difference formulas, multiple-angle formulas, powerreducing formulas, half-angle formulas, and product - to- sum formulas to rewrite and evaluate trigonometric functions. | L | - Use sum and difference formulas to evaluate trigonometric functions. <br> - Use sum and difference formulas to verify identities and solve trigonometric equations. <br> - Use multiple-angle formulas to rewrite and evaluate trigonometric functions. <br> - Use power-reducing formulas to rewrite and evaluate trigonometric functions. <br> - Use half-angle formulas to rewrite and evaluate trigonometric functions. <br> - Use product-to-sum formulas to rewrite and evaluate trigonometric functions. | - Teacher Observation <br> - Assignments <br> - Quizzes <br> - Tests <br> - Alternative Assessments |  |
|  | 36 | Students will be able to use the Law of Sines and the Law of Cosines to solve oblique triangles. | U | - Use the Law of Sines and Law of Cosines to solve oblique triangles. <br> - Use the Law of Sines and the Law of Cosines to model and solve real-life problems. | - Teacher Observation <br> - Assignments <br> - Quizzes <br> - Tests <br> - Alternative Assessments |  |

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| 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. | - Teacher Observation <br> - Assignments <br> - Quizzes <br> - Tests <br> - Alternative Assessments |  |
| Sequences | 38 | Students will be able to use sequence, factorial, and summation notation to write the terms and sum of a sequence. | U | - Use sequence notation to write the terms of a sequence. <br> - Use factorial notation. <br> - Use summation notation to write sums. <br> - Find the sum of an infinite series. <br> - Use sequence and series to model real-life problems. | - Teacher Observation <br> - Assignments <br> - Quizzes <br> - Tests <br> - Alternative Assessments |  |
|  | 39 | Students will be able to recognize, write, and manipulate arithmetic sequences and geometric sequences. | U | - Recognize and write arithmetic and geometric sequences. <br> - Find the nth partial sum of an arithmetic and geometric sequence. <br> - Find the infinite sum of a geometric sequence. <br> - Use arithmetic and geometric sequences to model and solve real-life problems. | - Teacher Observation <br> - Assignments <br> - Quizzes <br> - Tests <br> - Alternative Assessments |  |

