MATHEMATICS

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COMPONENT	OBJECTIVES	COMPETENCY
I Functions	1. Find domains, ranges, and specific values in functional notation. 2. Given two functions, perform the algebra of functions including compositions of functions. 3. Determine if a given function is: a. symmetric (with respect to the axis/or the origin) b. periodic c. monotonic d. bounded e. continuous 4. Identify and graph polynomial and rational functions and determine asymptotes and intercepts 5. Define and use parametric forms of functions and convert from parametric to Cartesian form. 6. Given a set of parametric equations, sketch the graph. 7. Given a function, determine the inverse and state whether or not the inverse is a function.	A. Demonstrate an understanding of the theory of functions using graphs, models, graphing calculators, computers, projects and cooperative learning groups.
II Trigonometric and Circular Functions	1. Evaluate circular and trigonometric expressions involving any of the six functions and their inverses. 2. Given the equation for a circular or trigonometric function, identify and/or sketch its graph and the graph of its inverse relation and state domain and range of the original function and its associated inverse function. 3. Identify its equation, when given a graph of any of the six circular functions. 4. State the period, amplitude, phase shift, and vertical shift of a circular function and then graph the function.	A. Demonstrate an understanding of the connection between circular and trigonometric functions and their inverses by evaluating, graphing, and applying these functions using calculators, computers, models, projects, and cooperative learning groups.

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	5. Compare and contrast circular and trigonometric functions.	
	6. Prove and demonstrate knowledge of trigonometric identities including the sum and difference formulas, double angle formulas, and half-angle formulas for sine, cosine, and tangent.	
	7. Solve problems involving right or oblique triangles.	
	8. Solve problems by applying the Law of Sines and/or Law of Cosines.	
	9. Find area of oblique triangles	
	10. Estimate the solution to a problem involving right or an oblique triangle.	
	11. In the SSA case, determine whether 0,1, or 2 triangles exist and determine the triangles if they exist.	
	12. Use circular functions to model and describe real-world phenomena.	
	13. Find general solutions for trigonometric equations.	
	14. Find particular solutions for a trigonometric equation within a given domain.	
	15. Solve equations involving inverses of circular/trigonometric functions.	

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III Coordinate Systems	1. Graph points in the polar coordinate system. 2. Convert between polar coordinates and Cartesian coordinates. 3. Convert equations in Cartesian form to polar form 4. Express complex numbers in polar or trigonometric form 5. Graph polar equations and identify specific types (roses, limaccons, cardioids, spirals, and conics). 6. Discuss the symmetry of polar graphs and shifts of polar graphs when changing equations involving sine and cosine. 7. Use De Moivre's theorem to find powers and roots of complex numbers. 8. Demonstrate an understanding of the connections between trigonometric functions, polar coordinates, and complex numbers.	A. Demonstrate an understanding of graphs in the polar coordinate system and their relation to the cartesian coordinate system using graphing calculators, models, computers, projects, and cooperative learning.
IV Vectors	1. Find a vector in standard position equal to a given vector. 2. Determine magnitude and direction of vectors. 3. Identify perpendicular and parallel vectors. 4. Determine the measure of the angle between two vectors. 5. Resolve a vector into component vectors. 6. Add, subtract, and multiply a vector by a scalar. 7. Find the dot product of two vectors. 8. Use vectors to solve real world problems.	A. Demonstrate the ability to solve problems using vectors by incorporating the use of models, computers, graphing calculators, projects and cooperative learning groups.

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V Exponential and Logarithmic Functions	1. Evaluate expressions involving rational exponents. 2. Sketch the graphs of exponential functions and logarithmic functions of different bases. 3. Compare graphs domain and ranges of each, and discuss axis of symmetry. 4. Solve equations involving exponential functions and logarithmic functions. 5. Solve real-world problems involving exponential functions and logarithmic functions. 6. Demonstrate an understanding of the properties of logarithms. 7. Simplify expressions using the relationships between logarithms and exponents. 8. Express the number e and the expression e^x as an infinite series.	A. Demonstrate an understanding of the relationship between exponential and logarithmic functions and their application to problem situations using models, graphing calculators, computers, projects, and cooperative learning groups.
VI Conic Sections	1. Given the description of a locus, determine the equation of the locus. 2. Given the equation of a line, determine slope, y-intercept, and the graph it. 3. Given the equation of a circle, determine center and radius, then graph it. 4. Given the equation of a parabola, determine vector, focus, and direction, then graph it. 5. Given the equation of a ellipse in standard form, determine the center, foci, and vertices, then graph it. 6. Given the equation of a hyperbola in standard form, determine foci, vertices, and asymptotes, then graph it.	A. Demonstrate an understanding of conic section and loci using models, graphing calculators, competency manipulatives, project and cooperative learning groups.

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	7. Determine new equations resulting from translation or rotation of axes. 8. Identify the graph of any second degree equation. 9. Express a quadratic equation in general form $A x^2 + Bxy + C y^2 + Dx + E y + F = 0$ and use 10. $B - 4 AC$ to distinguish conics. 11. Recognize degenerate and imaginary cases.	
VII Mathematical Induction and Sequence and Series	1. Given an expression or rule for the nth term, find any term of the sequence. 2. Given a sequence, find a formula for the nth term in the sequence. 3. Find the nth term of a binomial expansion. 4. Find the sum of an arithmetic series. 5. Find the sum of a finite or infinite geometric series, if it exists. 6. Define convergent and divergent sequences and series and determine limits, if they exist. 7. Determine whether a sequence is increasing or decreasing. 8. Find the least upper bound and greatest lower bound of a sequence, if they exist. 9. Express a series in sigma notation. 10. Use mathematical induction to prove series formulas. 11. Use mathematical induction to prove inequality formulas.	A. Demonstrate an understanding of mathematical induction and sequence and series using graphing calculators, computers, models, projects, and cooperative learning groups.

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VIII Limits	1. Geometrically illustrate functions for which x increases without bound and finds limits if they exist. 2. Find, when possible, for any neighborhood a number L, a neighborhood of a point a such that f (x) is in the neighborhood of L when x is in the neighborhood of a. 3. Calculate limits of functions using theorems about limits. 4. Geometrically illustrate functions which are continuous at a point and/or continuous on an interval. 5. Given a rational function f (x) find the limit, if it exists, at a point of discontinuity. 6. Using the definition of a derived function of f(x) find the derived function. 7. Determine the equations of tangents to graphs of curves given the slope formula.	A. Demonstrate an understanding of the concepts of limits and its applications.
IX Matrix Algebra	1. Apply determinants to solve systems of equations. 2. Invert a square matrix	A. Demonstrate the ability to solve problems using concepts of matrix algebra through the use of graphing calculators, computers, models, projects and cooperative learning groups.