AVENTA LEARNING

Alignment Document
State of Indiana and Aventa Learning Trigonometry

Trigonometry
2005-2007 Benchmark Blueprint

Standards	Benchmarks	Unit Name	Course Topic Description
PC.1 Students use polynomial, rational, and algebraic functions to write functions and draw graphs to solve word problems, to find composite and inverse functions, and to analyze functions and graphs. They analyze and graph circles, ellipses, parabolas, and hyperbolas.	**PC.1.1** Recognize and graph various types of functions, including polynomial, rational, algebraic, and absolute value functions. Use paper and pencil methods and graphing calculators.	Linear Relations and Functions	Relations, Functions and Graphs
	PC.1.2 Find domain, range, intercepts, zeros, asymptotes, and points of discontinuity of functions. Use paper and pencil methods and graphing calculators.	Linear Relations and Functions	Relations, Functions and Graphs
	PC.1.3 Model and solve word problems using functions and equations.	Graphs and Functions	Polynomial and Rational Functions
	PC.1.4 Define, find, and check inverse functions.	Graphs and Functions	Inverse Functions, Continuity and Extrema
	PC.1.5 Describe the symmetry of the graph of a function.	Graphs and Functions	The Nature of Graphs
	PC.1.6 Decide if functions are even or odd.	Graphs and Functions	The Nature of Graphs
	PC.1.7 Apply transformations to functions.	Graphs and Functions	The Nature of Graphs
	PC.1.8 Understand curves defined parametrically and draw their graphs.		
	PC.1.9 Compare relative magnitudes of functions and their rates of change.	Trigonometric and Parametric Equations	Vectors and Parametric Equations
	PC.1.10 Write the equations of conic sections in standard form (completing the square and using translations as necessary), in order to find the		

	type of conic section and to find its geometric properties (foci, asymptotes, eccentricity, etc.).		
PC.2 Students solve word problems involving logarithmic and exponential functions. They draw and analyze graphs and find inverse functions.	**PC.2.1** Solve word problems involving applications of logarithmic and exponential functions.		
	PC.2.2 Find the domain, range, intercepts, and asymptotes of logarithmic and exponential functions.		
	PC.2.3 Draw and analyze graphs of logarithmic and exponential functions.		
	PC.2.4 Define, find, and check inverse functions of logarithmic and exponential functions.		
PC.3 Students define trigonometric functions using right triangles. They solve word problems and apply the laws of sines and cosines.	**PC.3.1** Solve word problems involving right and oblique triangles.	Trigonometric Functions	The Trigonometric Functions and Law of Sines and Cosines
	PC.3.2 Apply the laws of sines and cosines to solving problems.	Trigonometric Functions	The Trigonometric Functions and Law of Sines and Cosines
	PC.3.3 Find the area of a triangle given two sides and the angle between them.	Trigonometric Functions	The Trigonometric Functions and Law of Sines and Cosines
PC.4 Students define trigonometric functions using the unit circle and use degrees and radians. They draw and analyze graphs, find inverse functions, and solve word problems.	**PC.4.1** Define sine and cosine using the unit circle.	Trigonometric Functions	Graphs of the Trigonometric Functions
	PC.4.2 Convert between degree and radian measures.	Trigonometric Functions	Graphs of the Trigonometric Functions
	PC.4.3 Learn exact sine, cosine, and tangent values for 0, pi/2, pi/3, pi/4, pi/6, and multiples of pi. Use those values to find other trigonometric values.	Trigonometric Functions	Graphs of the Trigonometric Functions
	PC.4.4 Solve word problems involving applications of trigonometric functions.	Trigonometric Functions	The Trigonometric Functions and Inverse Trigonometric Functions
	PC.4.5 Define and graph trigonometric functions (i.e., sine, cosine, tangent, cosecant, secant, cotangent).	Trigonometric Functions	The Trigonometric Functions and Inverse Trigonometric Functions
	PC.4.6 Find domain, range, intercepts, periods, amplitudes, and asymptotes of trigonometric functions.	Trigonometric Functions	Graphs of the Trigonometric Functions
	PC.4.7 Draw and analyze graphs of translations	Trigonometric	Graphs of the Trigonometric

	of trigonometric functions, including period, amplitude, and phase shift.	Functions	Functions
	PC.4.8 Define and graph inverse trigonometric functions.	Trigonometric Functions	The Trigonometric Functions and Inverse Trigonometric Functions
	PC.4.9 Find values of trigonometric and inverse trigonometric functions.	Trigonometric Functions	The Trigonometric Functions and Inverse Trigonometric Functions
	PC.4.10 Know that the tangent of the angle that a line makes with the x-axis is equal to the slope of the line.	Trigonometric Functions	The Trigonometric Functions and Inverse Trigonometric Functions
	PC.4.11 Make connections between right triangle ratios, trigonometric functions, and circular functions.	Trigonometric Functions	Graphs of the Trigonometric Functions
PC.5 Students prove trigonometric identities, solve trigonometric equations, and solve word problems.	**PC.5.1** Know the basic trigonometric identity $\cos^2 x + \sin^2 x = 1$ and prove that it is equivalent to the Pythagorean Theorem.	Trigonometric and Parametric Equations	Trigonometric Identities and Equations
	PC.5.2 Use basic trigonometric identities to verify other identities and simplify expressions.	Trigonometric and Parametric Equations	Trigonometric Identities and Equations
	PC.5.3 Understand and use the addition formulas for sines, cosines, and tangents.	Trigonometric and Parametric Equations	Trigonometric Identities and Equations
	PC.5.4 Understand and use the half-angle and double-angle formulas for sines, cosines, and tangents.	Trigonometric and Parametric Equations	Trigonometric Identities and Equations
	PC.5.5 Solve trigonometric equations.	Trigonometric and Parametric Equations	Trigonometric Identities and Equations
	PC.5.6 Solve word problems involving applications of trigonometric equations.	Trigonometric and Parametric Equations	Trigonometric Identities and Equations
PC.6 Students define polar coordinates and complex numbers and understand their connection with trigonometric functions.	**PC.6.1** Define polar coordinates and relate polar coordinates to Cartesian coordinates.		
	PC.6.2 Represent equations given in rectangular coordinates in terms of polar coordinates.		
	PC.6.3 Graph equations in the polar coordinate plane.		
	PC.6.4 Define complex numbers, convert complex numbers to trigonometric form, and		

	multiply complex numbers in trigonometric form.		
	PC.6.5 State, prove, and use De Moivre's Theorem.		
PC.7 Students define and use arithmetic and geometric sequences and series, understand the concept of a limit, and solve word problems.	**PC.7.1** Understand and use summation notation.		
	PC.7.2 Find sums of infinite geometric series.		
	PC.7.3 Prove and use the sum formulas for arithmetic series and for finite and infinite geometric series.		
	PC.7.4 Use recursion to describe a sequence.		
	PC.7.5 Understand and use the concept of limit of a sequence or function as the independent variable approaches infinity or a number. Decide whether simple sequences converge or diverge.		
	PC.7.6 Solve word problems involving applications of sequences and series.		
PC.8 Students model data with linear and nonlinear functions.	**PC.8.1** Find linear models using the median fit and least squares regression methods. Decide which model gives a better fit.	Linear Relations and Functions	Linear Relations, Scatter Plots and Linear Equalities
	PC.8.2 Calculate and interpret the correlation coefficient. Use the correlation coefficient and residuals to evaluate a "best-fit" line.	Linear Relations and Functions	Linear Relations, Scatter Plots and Linear Equalities
	PC.8.3 Find a quadratic, exponential, logarithmic, power, or sinusoidal function to model a data set and explain the parameters of the model.	Trigonometric Functions	The Trigonometric Functions and Inverse Trigonometric Functions
PC.9 Mathematical Reasoning and Problem Solving	**PC.9.1** Use a variety of problem-solving strategies, such as drawing a diagram, guess-and-check, solving a simpler problem, examining simpler problems, and working backwards.	Trigonometric Functions	The Trigonometric Functions and Law of Sines and Cosines
	PC.9.2 Decide whether a solution is reasonable in the context of the original situation.	Trigonometric Functions	The Trigonometric Functions and Law of Sines and Cosines
	PC.9.3 Decide if a given algebraic statement is		

	true always, sometimes, or never (statements involving rational or radical expressions, trigonometric, logarithmic or exponential functions).		
	PC.9.4 Use the properties of number systems and order of operations to justify the steps of simplifying functions and solving equations.	Linear Relations and Functions	Relations, Functions and Graphs
	PC.9.5 Understand that the logic of equation solving begins with the assumption that the variable is a number that satisfies the equation, and that the steps taken when solving equations create new equations that have, in most cases, the same solution set as the original. Understand that similar logic applies to solving systems of equations simultaneously.	Linear Relations and Functions	Linear Relations, Scatter Plots and Linear Equalities
	PC.9.6 Define and use the mathematical induction method of proof.		