Public Schools of North Carolina
State Board of Education | Department of Public Instruction

2019 – 2003 Standards Crosswalk Precalculus

This document is designed to help North Carolina educators teach the NC Standard Course of Study for Mathematics. NCDPI staff are continually improving these tools to better serve teachers.

This document is a general comparison of the current 2003 Precalculus Standard Course of Study and the new 2009 Precalculus Standard Course of Study. It provides initial insight into sameness and difference between these two sets of standards. This document is not intended to answer all questions about the nuances of the new standards versus the old – in fact, we imagine you will develop questions as you do a close reading of the new standards. Please send the K-12 Math Section of the NC DPI any thoughts, feedback, questions and ideas about additional resources that would be helpful as you start preparing to teach the standards. You can email Beverly Vance at beverly.vance@dpi.nc.gov with additional questions and comments.

2019 Precalculus Standards	2003 Precalculus Standards	Comments/Notes
Strand		
Standard	**Competency Goal**	
Objective	Objective	
Number and Quantity		
PC.N.1 Apply properties of complex numbers and the complex number system.	**ACT Content**	
PC.N.1.1 Execute the sum and difference algorithms to combine complex numbers.	**ACT Content**	
PC.N.1.2 Execute the multiplication algorithm with complex numbers.	**ACT Content**	
PC.N.2 Apply properties and operations with matrices.	**ACT Content**	
PC.N.2.1 Execute the sum and difference algorithms to combine matrices of appropriate dimensions.	**ACT Content**	
PC.N.2.2 Execute associative and distributive properties to matrices.	**ACT Content**	
PC.N.2.3 Execute commutative property to add matrices.	**ACT Content**	
PC.N.2.4 Execute properties of matrices to multiply a matrix by a scalar.	**ACT Content**	
PC.N.2.5 Execute the multiplication algorithm with matrices.	**ACT Content**	
PC.N.3 Understand properties and operations with vectors.	**Competency Goal 1: The learner will describe figures in the coordinate plane and algebraically.**	
PC.N.3.1 Represent a vector indicating magnitude and direction.	**1.03** Operate with vectors in two dimensions to model and solve problems.	
PC.N.3.2 Execute sum and difference algorithms to combine vectors.	**1.03** Operate with vectors in two dimensions to model and solve problems.	

2019 Precalculus Standards	2003 Precalculus Standards	Comments/Notes
Strand		
Standard	**Competency Goal**	
Objective	Objective	
Algebra		
PC.A.1 Apply properties of solving inequalities that include rational and polynomial expressions in one variable.	**Competency Goal 2: The learner will use relations and functions to solve problems.**	
PC.A.1.1 Implement algebraic (sign analysis) methods to solve rational and polynomial inequalities.	**2.01** Use functions (polynomial, power, rational, exponential, logarithmic, logistic, piecewise-defined, and greatest integer) to model and solve problems; justify results. **a)** Solve using graphs and algebraic properties.	
PC.A.1.2 Implement graphical methods to solve rational and polynomial inequalities.	**2.01** Use functions (polynomial, power, rational, exponential, logarithmic, logistic, piecewise-defined, and greatest integer) to model and solve problems; justify results. **a)** Solve using graphs and algebraic properties.	
PC.A.2 Apply properties of solving equations involving exponential, logarithmic, and trigonometric functions.	**Competency Goal 2: The learner will use relations and functions to solve problems.**	
PC.A.2.1 Use properties of logarithms to rewrite expressions.	**2.01** Use functions (polynomial, power, rational, exponential, logarithmic, logistic, piecewise-defined, and greatest integer) to model and solve problems; justify results. **a)** Solve using graphs and algebraic properties.	
PC.A.2.2 Implement properties of exponentials and logarithms to solve equations.	**2.01** Use functions (polynomial, power, rational, exponential, logarithmic, logistic, piecewise-defined, and greatest integer) to model and solve problems; justify results. **a)** Solve using graphs and algebraic properties.	
PC.A.2.3 Implement properties of trigonometric functions to solve equations including • inverse trigonometric functions, • double angle formulas, and	**2.02** Use trigonometric and inverse trigonometric functions to model and solve problems; justify results. **a)** Solve using graphs and algebraic properties.	

• Pythagorean identities.		
PC.A.2.4 Implement algebraic techniques to rewrite parametric equations in cartesian form by eliminating the parameter.	**2.06** Use parametric equations to model and solve problems.	

2019 Precalculus Standards	2003 Precalculus Standards	
Strand		**Comments/Notes**
Standard	**Competency Goal**	
Objective	Objective	
Functions		
PC.F.1 Understand key features of sine, cosine, tangent, cotangent, secant and cosecant functions.	**Competency Goal 2: The learner will use relations and functions to solve problems.**	
PC.F.1.1 Interpret algebraic and graphical representations to determine key features of transformed sine and cosine functions. *Key features include: amplitude, domain, midline, phase shift, frequency, period, intervals where the function is increasing, decreasing, positive or negative, relative maximums and minimums.*	**2.02** Use trigonometric and inverse trigonometric functions to model and solve problems; justify results. **b)** Create and identify transformations with respect to period, amplitude, and vertical and horizontal shifts.	
PC.F.1.2 Interpret algebraic and graphical representations to determine key features of tangent, cotangent, secant, and cosecant. *Key features include: domain, frequency, period, intervals where the function is increasing, decreasing, positive or negative, relative maximums and minimums, and asymptotes.*	**2.02** Use trigonometric and inverse trigonometric functions to model and solve problems; justify results. **b)** Create and identify transformations with respect to period, amplitude, and vertical and horizontal shifts.	
PC.F.1.3 Integrate information to build trigonometric functions with specified amplitude, frequency, period, phase shift, or midline with or without context.	**2.02** Use trigonometric and inverse trigonometric functions to model and solve problems; justify results. **b)** Create and identify transformations with respect to period, amplitude, and vertical and horizontal shifts.	

PC.F.1.4 Implement graphical and algebraic methods to solve trigonometric equations and inequalities in context with support from technology.	**2.02** Use trigonometric and inverse trigonometric functions to model and solve problems; justify results. **a)** Solve using graphs and algebraic properties.	
PC.F.2 Apply properties of a unit circle with center (0,0) to determine the values of sine, cosine, tangent, cotangent, secant, and cosecant.	**Competency Goal 1:** The learner will describe figures in the coordinate plane and algebraically.	
PC.F.2.1 Use a unit circle to find values of sine, cosine, and tangent for angles in terms of reference angles.		**New Content**
PC.F.2.2 Explain the relationship between the symmetry of a unit circle and the periodicity of trigonometric functions.		**New Content**
PC.F.3 Apply properties of trigonometry to solve problems involving all types of triangles.	**Competency Goal 2: The learner will use relations and functions to solve problems.**	
PC.F.3.1 Implement a strategy to generate all solutions to an equation that involves inverse trigonometric functions.	**2.02** Use trigonometric and inverse trigonometric functions to model and solve problems; justify results. **a)** Solve using graphs and algebraic properties.	
PC.F.3.2 Implement the Law of Sines and the Law of Cosines to solve problems.	**2.02** Use trigonometric and inverse trigonometric functions to model and solve problems; justify results. **c)** Develop and use the law of sines and the law of cosines.	
PC.F.3.3 Implement the Pythagorean identity to find sin(θ), cos(θ), or tan(θ) given sin(θ), cos(θ), or tan(θ) and the quadrant of the angle.		**New Content**
PC.F.4 Understand the relationship of algebraic and graphical representations of exponential, logarithmic, rational, power functions, and conic sections to their key features.	**Competency Goal 2: The learner will use relations and functions to solve problems.**	
PC.F.4.1 Interpret algebraic and graphical representations to determine key features of exponential functions. *Key features include: domain, range, intercepts, intervals where the function is increasing, decreasing, positive or negative, concavity, end behavior, limits, and asymptotes*	**2.01** Use functions (polynomial, power, rational, exponential, logarithmic, logistic, piecewise-defined, and greatest integer) to model and solve problems; justify results. **b)** Interpret the constants, coefficients, and bases in the context of the problem.	

	2.03 For sets of data, create and use calculator-generated models of linear, polynomial, exponential, trigonometric, power, logistic, and logarithmic functions. **a)** Interpret the constants, coefficients, and bases in the context of the data. **2.08** Explore the limit of a function graphically, numerically, and algebraically.	
PC.F.4.2 Integrate information to build exponential functions to model phenomena involving growth or decay.	**2.03** For sets of data, create and use calculator-generated models of linear, polynomial, exponential, trigonometric, power, logistic, and logarithmic functions. **a)** Interpret the constants, coefficients, and bases in the context of the data. **b)** Check models for goodness-of-fit; use the most appropriate model to draw conclusions or make predictions.	
PC.F.4.3 Interpret algebraic and graphical representations to determine key features of logarithmic functions. *Key features include: domain, range, intercepts, intervals where the function is increasing, decreasing, positive or negative, concavity, end behavior, continuity, limits, and asymptotes.*	**2.01** Use functions (polynomial, power, rational, exponential, logarithmic, logistic, piecewise-defined, and greatest integer) to model and solve problems; justify results. **b)** Interpret the constants, coefficients, and bases in the context of the problem. **2.03** For sets of data, create and use calculator-generated models of linear, polynomial, exponential, trigonometric, power, logistic, and logarithmic functions. **a)** Interpret the constants, coefficients, and bases in the context of the data. **2.08** Explore the limit of a function graphically, numerically, and algebraically.	
PC.F.4.4 Implement graphical and algebraic methods to solve exponential and logarithmic equations in context with support from technology.	**2.01** Use functions (polynomial, power, rational, exponential, logarithmic, logistic, piecewise-defined, and greatest integer) to model and solve problems; justify results. **a)** Solve using graphs and algebraic properties.	
PC.F.4.5 Interpret algebraic and graphical representations to determine key features of rational functions. *Key features include: domain, range, intercepts, intervals where the function is increasing, decreasing, positive or negative,*	**2.01** Use functions (polynomial, power, rational, exponential, logarithmic, logistic, piecewise-defined, and greatest integer) to model and solve problems; justify results. **b)** Interpret the constants, coefficients, and bases in the context of the problem.	

concavity, end behavior, continuity, limits, and asymptotes.	**2.08** Explore the limit of a function graphically, numerically, and algebraically.	
PC.F.4.6 Implement graphical and algebraic methods to solve optimization problems given rational and polynomial functions in context with support from technology.	**2.01** Use functions (polynomial, power, rational, exponential, logarithmic, logistic, piecewise-defined, and greatest integer) to model and solve problems; justify results. **a)** Solve using graphs and algebraic properties.	
PC.F.4.7 Construct graphs of transformations of power, exponential, and logarithmic functions showing key features.	**2.03** For sets of data, create and use calculator-generated models of linear, polynomial, exponential, trigonometric, power, logistic, and logarithmic functions. **b)** Check models for goodness-of-fit; use the most appropriate model to draw conclusions or make predictions.	
PC.F.4.8 Identify the conic section (ellipse, hyperbola, parabola) from its algebraic representation in standard form.	**1.02** Use the quadratic relations (parabola, circle, ellipse, hyperbola) to model and solve problems; justify results. **a)** Solve using tables, graphs, and algebraic properties.	
PC.F.4.9 Interpret algebraic and graphical representations to determine key features of conic sections (ellipse: center, length of the major and minor axes; hyperbola: vertices, transverse axis; parabola: vertex, axis of symmetry).	**1.02** Use the quadratic relations (parabola, circle, ellipse, hyperbola) to model and solve problems; justify results. **b)** Interpret the constants and coefficients in the context of the problem.	
PC.F.5 Apply properties of function composition to build new functions from existing functions.	**Competency Goal 2: The learner will use relations and functions to solve problems.**	
PC.F.5.1 Implement algebraic procedures to compose functions.	**2.04** Use the composition and inverse of functions to model and solve problems.	
PC.F.5.2 Execute a procedure to determine the value of a composite function at a given value using algebraic, graphical, and tabular representations.	**2.04** Use the composition and inverse of functions to model and solve problems.	
PC.F.5.3 Implement algebraic methods to find the domain of a composite function.	**2.04** Use the composition and inverse of functions to model and solve problems.	
PC.F.5.4 Organize information to build models involving function composition.	**2.04** Use the composition and inverse of functions to model and solve problems.	
PC.F.5.5 Deconstruct a composite function into two functions.	**2.04** Use the composition and inverse of functions to model and solve problems.	

PC.F.5.6 Implement algebraic and graphical methods to find an inverse function of an existing function, restricting domains if necessary.	**2.04** Use the composition and inverse of functions to model and solve problems.	
PC.F.5.7 Use composition to determine if one function is the inverse of another function.	**2.04** Use the composition and inverse of functions to model and solve problems.	
PC.F.6 Apply mathematical reasoning to build recursive functions and solve problems.	**Competency Goal 2: The learner will use relations and functions to solve problems.**	
PC.F.6.1 Use algebraic representations to build recursive functions.	**2.07** Use recursively-defined functions to model and solve problems.	
PC.F.6.2 Construct a recursive function for a sequence represented numerically.	**2.07** Use recursively-defined functions to model and solve problems.	
PC.F.7 Apply mathematical reasoning to build parametric functions and solve problems.	**Competency Goal 2: The learner will use relations and functions to solve problems.**	
PC.F.7.1 Implement algebraic methods to represent a situation using parametric equations.	**2.06** Use parametric equations to model and solve problems.	
PC.F.7.2 Implement technology to solve contextual problems involving parametric equations.	**2.06** Use parametric equations to model and solve problems.	

	2003 Precalculus	
Removed 2003 Content		**Comments/Notes**
Standard	**Competency Goal**	
Objective	**Objective**	
	Competency Goal 1: The learner will describe figures in the coordinate plane and algebraically.	
	1.01 Transform relations in two dimensions; describe the results algebraically and geometrically.	**Removed Content**
	Competency Goal 2: The learner will use relations and functions to solve problems.	
	2.05 Use polar equations to model and solve problems. a) Solve using graphs and algebraic properties. b) Interpret the constants and coefficients in the context of the problem.	**Removed Content**