## **Honors Precalculus**

2310

2006-2007

Honors Precalculus		
Course Description:	Honors College Preparatory - Precalculus is designed to lay the foundation for the study of calculus at the 12 <sup>th</sup> grade level. There are immediate extensions of algebra II skills. Precalculus places a strong emphasis on trigonometry and addresses such topics as exponential and logarithmic functions, matrices, sequences, probability and analytic geometry.	
Grade Level:	11, Weighted Course 1.10	
Length of Course:	Frequency: 6 days per 6 day cycle Duration: 44 minutes Length: full year course Credits: 1	
Prerequisites:	Teacher recommendation and minimal course competition of Honors Geometry.	
Textbook:	PRECALCULUS, 7 <sup>TH</sup> EDITION	
Expected Level of Achievement	Students will be required to maintain a 70% or better. They will be required to come to class prepared to learn. 93-100% = A 85-92% = B 77-84% = C 70-76% = D Below $70\% = F$	

Northern York County School District Curriculum		
Course Name:	Honors Precalculus	
Content:	Real Numbers and Properties of Algebra	
Key Learning(s):	Many relationships in real world applications are related to previous knowledge and skills of algebra.	
Essential Question(s):	How are the skills and knowledge developed from previous courses married to the study of Precalculus?	
Grade Level:	11	

Number	Student Learning Experiences	Procedures for Assessment	Resources
2.1.11 A	The students will order real numbers, use inequalities and evaluate algebraic	Notebook	Textbook
2.2.11 A	expressions.		
2.2.11 F		Oral presentation	Black-line masters
2.4.11 E	The student will use properties of exponents, scientific notation and radicals.	and explanation	
2.5.11 A	The student will rationalize numerators and denominators in preparation for	of problem	Graphing Calculators
2.5.11 B	the study of limits in calculus.	solution	
2.5.11 C			Graph links and computer
2.8.11 D	The student will factor polynomials.	Written quizzes	word processing
2.8.11 E			
2.8.11 F	The student will determine domains of algebraic expressions and simplify	Written Test	Teacher generated handouts
2.8.11 H	rational expressions.		
2.8.11 J			Supplemental Texts
2.8.11 K	With the aid of previous skills, the student will solve linear, polynomial,		
2.8.11 L	radical and absolute value equations.		Transparencies
2.8.11 N			
2.8.11 Q	As an extension to equation work, the student will solve linear, polynomial,		Computer Lab
2.8.11 R	rational and absolute value inequalities.		
2.8.11 S			
2.8.11 T	The student will be exposed to algebraic techniques commonly used in		
	calculus.		

The student will plot points in the coordinate plane and find the distance between two points.		
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Northern York County School District Curriculum		
Course Name:	Honors Precalculus	
Content:	Polynomial and Rational Functions	
Key Learning(s):	To enhance skills necessary in dealing with these function types as well as investigate multiple real-life applications.	
Essential Question(s):	What skills are pertinent to analyzing polynomial functions? How are polynomial and rational functions utilized in application?	
Grade Level:	11	

Number	Student Learning Experiences	Procedures for Assessment	Resources
2.1.11 A	The student will learn to sketch the graphs of equations.	Notebook	Textbook
2.2.11 A			
2.2.11 C	The student will find and use the slopes of lines to write and graph linear	Oral presentation	Black-line masters
2.2.11 E	equations in two variables.	and explanation	
2.2.11 F		of problem	Graphing Calculators
2.3.11 D	The student will evaluate functions and find their domains and ranges.	solution	
2.4.11 E			Graph links and computer
2.5.11 A	The student will analyze graphs of functions for function characteristics	Written quizzes	word processing
2.5.11 B	including domain, range, relative maximum(s) and relative minimum(s).		
2.5.11 C		Written Test	Teacher generated handouts
2.5.11 D	The student will identify and graph shifts, reflections and non-rigid		
2.6.11 C	transformations of functions.	Linear Regression	Supplemental Texts
2.6.11 D		Lab – Modeling	
2.8.11 A	The student will find arithmetic combinations and compositions of functions.	real life data as a	Transparencies
2.8.11 B		linear regression	
2.8.11 E	The student will find inverses of functions graphically and algebraically.	utilizing a TI-84	Computer Lab
2.8.11 F		graphing utility	
2.8.11 H	The student will write and solve algebraic models for direct, inverse and joint	and computer	
2.8.11 K	variation.	interface	

2.8.11 L 2.8.11 M 2.8.11 N 2.8.11 Q 2.8.11 Q 2.8.11 R 2.8.11 S 2.8.11 T 2.9.11 I	The student will use least squares regression to find mathematical models both by algebraic methods and on a graphing utility.	
2.11.11 A 2.11.11 B		

Northern York County School District Curriculum		
Course Name:	Honors Precalculus	
Content:	Polynomial and Rational Functions	
Key Learning(s):	The regression process is extended to include quadratic models. In depth study of finding zeros of any Polynomial function is investigated.	
Essential Question(s):	What techniques are available for solving polynomial equations that do not fit a factoring pattern? How are rational functions solved? What techniques are available for solving nonlinear inequalities?	
Grade Level:	11	

Number	Student Learning Experiences	Procedures for Assessment	Resources
2.1.11 A	The student will sketch and analyze quadratic functions and models.	Notebook	Textbook
2.2.11 A			
2.2.11 F	The student will use long division and synthetic division to divide polynomials	Oral presentation	Black-line masters
2.5.11 A	by other polynomials.	and explanation	
2.5.11 B	The student will perform operations with complex numbers	of problem	Graphing Calculators
2.5.11 C	The student will perform operations with complex numbers.	solution	
2.3.11 D 2.8.11 A	The student will determine the numbers of rational and real zeros of		Graph links and computer
2.0.11 A 2.8.11 D	polynomial functions as well as use various techniques to find the zeros –	Written quizzes	word processing
2.8.11 D	whether rational, irrational or complex.	Writton Test	1 0
2.8.11 N		willien rest	Teacher generated handouts
2.8.11 O	The student will determine the domains of rational functions and find all	Zero Lab –	C
2.8.11 Q	asymptotes of rational functions – vertical, horizontal and/or oblique.	Finding zeros of	Supplemental Texts
2.8.11 R		complex	11
2.8.11 S	The student will compile the characteristics and sketch the graphs of rational	polynomial	Transparencies
2.8.11 T	functions.	equations -	
2.11.11 A		utilizing a TI-84	Computer Lab
2.11.11 B	The student will recognize and determine partial fraction decompositions of	graphing utility as	
	rational expressions with non-repeating denominator factors.	support	

Northern York County School District Curriculum			
Course Name:	Honors Precalculus		
Content:	Exponential and Logarithmic Functions		
Key Learning(s):	The exponential and logarithmic functions are inverses of each other. This realization solidifies properties of these functions and empowers students with the tools to solve both exponential and logarithmic equations.		
Essential Question(s):	What tools for equation solving does the inverse nature of logarithmic and exponential functions offer? How can these techniques be used to solve real life problems?		
Grade Level:	11		

Number	Student Learning Experiences	Procedures for Assessment	Resources
2.1.11 A	The student will recognize and evaluate exponential and logarithmic functions.	Notebook	Textbook
2.2.11 A			
2.2.11 F	The student will graph exponential and logarithmic functions by hand and with	Oral presentation	Black-line masters
2.4.11 E	graphing calculators.	and explanation	
2.5.11 A		of problem	Graphing Calculators
2.5.11 B	The student will rewrite logarithmic functions with a different base.	solution	
2.5.11 C			Graph links and computer
2.5.11 D	By using properties of logarithms, the student will evaluate, rewrite, expand or	Written quizzes	word processing
2.6.11 C	condense logarithmic expressions.		
2.6.11 D		Written Test	Teacher generated handouts
2.8.11 A	Using the characteristics of inverse functions, the student will solve		
2.8.11 D	exponential and logarithmic equations.		Supplemental Texts
2.8.11 H			
2.8.11 M	The student will use exponential growth models, exponential decay models,		Transparencies
2.8.11 N	Gaussian models, logistic growth models and logarithmic models to solve real		
2.8.11 O	life problems.		Computer Lab
2.8.11 Q			

2.8.11 R	The student will use a graphing utility to analyze data for the purpose of	
2.8.11 S	developing both exponential and logarithmic regressions.	
2.8.11 T		
2.11.11 A		
2.11.11 B		
2.11.11 C		

Northern York County School District Curriculum			
Course Name:	Honors Precalculus		
Content:	Trigonometry		
Key Learning(s):	The Unit Circle is the basis for understanding and applying the concepts of circular trigonometry. A foundation in the Unit Circle opens the study of trigonometry beyond right triangles.		
Essential Question(s):	What are the two major measuring units for angles and how do they relate? How can our foundation of right triangle trigonometry be expanded to include any angle? How is the periodic nature of the six trigonometric functions applied to real life applications?		
Grade Level:	11		

Number	Student Learning Experiences	Procedures for Assessment	Resources
2.1.11 A	The student will describe an angle and convert between radian and degree	Notebook	Textbook
2.2.11 A	measure.		
2.2.11 F		Oral presentation	Black-line masters
2.3.11 D	The student will identify a unit circle and its relationship to angle values of the	and explanation	
2.4.11 E	six trigonometric functions.	of problem	Graphing Calculators
2.5.11 A		solution	
2.5.11 B	The student will evaluate trigonometric functions of any angles.		Graph links and computer
2.5.11 C		Written quizzes	word processing
2.8.11 E	The student will use the fundamental trigonometric identities.		
2.8.11 Q		Written Test	Teacher generated handouts
2.8.11 R	The student will sketch the graphs of trigonometric functions and translations		
2.8.11 S	of graphs of sine and cosine functions.	Integration Lab –	Supplemental Texts
2.8.11 T		Wankel Rotary	
2.9.11 F	The student will use a graphing utility to analyze data fitting sine regression	Engine utilizing a	Transparencies
2.9.11 G	models.	TI-89 graphing	
2.9.11 I		utility and	Computer Lab
2.10.11 A	The student will evaluate and apply the six inverse trigonometric functions.	computer	
2.10.11 B		interface	

2.11.11 A	The student will evaluate the compositions of trigonometric functions and	
2.11.11 B	inverse trigonometric functions.	

Northern York County School District Curriculum			
Course Name:	Honors Precalculus		
Content:	Analytic Trigonometry		
Key Learning(s):	Fundamental trigonometric identities are used to verify more complex identities. These verifying techniques are part of the process in solving trigonometric equations.		
Essential Question(s):	How are derivatives and integrals determined and applied to transcendental functions?		
Grade Level:	11		

Number	Student Learning Experiences	Procedures for Assessment	Resources
2.1.11 A	The student will use fundamental trigonometric identities to evaluate	Notebook	Textbook
2.2.11 A	trigonometric functions and simplify trigonometric expressions.		
2.2.11 C		Oral presentation	Black-line masters
2.2.11 F	By using fundamental trigonometric identities, the student will verify	and explanation	
2.3.11 D	trigonometric identities.	of problem	Graphing Calculators
2.4.11 A		solution	
2.4.11 B	By using standard algebraic techniques and inverse trigonometric functions,		Graph links and computer
2.4.11 C	the student will solve trigonometric equations.	Written quizzes	word processing
2.4.11 E			
2.5.11 A	The student will use sum and difference formulas, multiple-angle formulas,	Written Test	Teacher generated handouts
2.5.11 B	power-reducing formulas, half-angle formulas and product-to-sum formulas to		
2.5.11 C	rewrite and evaluate trigonometric functions.	TI-84 graphing	Supplemental Texts
		utility	
			Transparencies
			Computer Lab

Northern York County School District Curriculum			
Course Name:	Honors Precalculus		
Content:	Topics in Trigonometry		
Key Learning(s):	This unit will investigate applications for the Law of Sines and Law of Cosines. Trigonometric form of complex numbers are investigated.		
Essential Question(s):	How are the Law of Sines and Law of Cosines utilized in applications? How can a trigonometric form of a complex number lead to determining all complex roots of an equation?		
Grade Level:	11		

Number	Student Learning Experiences	Procedures for Assessment	Resources
2.1.11 A	The student will use the Law of Sines and Law of Cosines to solve oblique	Notebook	Textbook
2.2.11 A	triangles.		
2.2.11 F		Oral presentation	Black-line masters
2.3.11 D	The student will find the areas of oblique triangles using both a sine variation	and explanation	
2.4.11 E	area formula and Heron's Area formula.	of problem	Graphing Calculators
2.5.11 A		solution	
2.5.11 B	The student will use the Law of Sines and Law of Cosines to model real-life		Graph links and computer
2.5.11 C	applications.	Written quizzes	word processing
2.5.11 D			
2.8.11 A	The student will graph complex numbers in the complex plane.	Written Test	Teacher generated handouts
2.8.11 C			
2.8.11 Q	The student will convert complex numbers into trigonometric form, then	TI-84 graphing	Supplemental Texts
2.9.11 G	multiply and divide them.	utility	
2.9.11 I			Transparencies
2.10.11 A	The student will find powers and <i>n</i> th roots of complex numbers after		
2.10.11 B	converting them to trigonometric form.		Computer Lab

Northern York County School District Curriculum			
Course Name:	Honors Precalculus		
Content:	Systems of Equations and Inequalities		
Key Learning(s):	Solving linear, nonlinear, multivariable linear and inequality systems.		
Essential Question(s):	What techniques are available to solve systems? How can a graphing utility be used to help verify algebraic techniques?		
Grade Level:	11		

Number	Student Learning Experiences	Procedures for Assessment	Resources
2.1.11 A	The student will solve systems of equations by substitution, variable	Notebook	Textbook
2.2.11 A	elimination, Gaussian elimination and verify solutions using a graphing utility.		
2.2.11 F		Oral presentation	Black-line masters
2.3.11 D	The student will use systems of equations to model and solve real-life	and explanation	
2.4.11 E	problems.	of problem	Graphing Calculators
2.5.11 A		solution	
2.5.11 B	The student will recognize linear systems in row-echelon form and to use back		Graph links and computer
2.5.11 C	substitution to solve the systems.	Written quizzes	word processing
2.5.11 D			
2.6.11 C	The student will solve nonsquare systems of equations.	Written Test	Teacher generated handouts
2.6.11 D			
2.8.11 A	The student will use systems of linear equations in three or more variables to	TI-84 graphing	Supplemental Texts
2.8.11 B	model and solve application problems.	utility	
2.8.11 D			Transparencies
2.8.11 E	The student will sketch the graphs of inequalities in two variables and show		
2.8.11 F	solution regions of inequality systems.		Computer Lab
2.8.11 G			
2.8.11 H	The student will use systems of equations and inequalities to model and solve		
2.8.11 I	real-life application problems.		
2.8.11 J			

2.8.11 K 2.8.11 N	The student will classify solution types of linear systems with appropriate vocabulary – consistent, inconsistent, independent and dependent.	
2.8.11 Q		
2.8.11 R	The student will use linear programming to solve application problems	
	involving both given as well as common knowledge constraints.	

Northern York County School District Curriculum			
Course Name:	Honors Precalculus		
Content:	Matrices and Determinants		
Key Learning(s):	Investigate operations of matrices and how they are used to solve linear systems.		
Essential Question(s):	How is a matrix formed? What are the operations used with matrices? How are these operations similar and/or different from algebraic techniques? How can a graphing utility be used to make the iterations time efficient?		
Grade Level:	11		

Number	Student Learning Experiences	Procedures for Assessment	Resources
2.1.11 A	The student will write matrices and identify their orders.	Notebook	Textbook
2.2.11 A			
2.2.11 F	The student will perform elementary row operations on matrices.	Oral presentation	Black-line masters
2.3.11 D		and explanation	
2.4.11 E	The student will use Gaussian elimination and Gaus-Jordan elimination	of problem	Graphing Calculators
2.5.11 A	methods to solve multivariable linear systems of equations.	solution	
2.5.11 B			Graph links and computer
2.5.11 C	The student will add and subtract matrices, multiply matrices by scalars and	Written quizzes	word processing
2.5.11 D	multiply two matrices.		
2.6.11 C		Written Test	Teacher generated handouts
2.6.11 D	The student will find inverses of matrices and use inverse matrices to solve		
2.8.11 A	matrix equations modeling systems of linear equations.	TI-84 graphing	Supplemental Texts
2.8.11 B		utility	
2.8.11 D	The student will find minors, cofactors and determinants of square matrices.		Transparencies
2.8.11 E			
2.8.11 F	The student will use Cramer's rule to solve systems of two and three variable		Computer Lab
2.8.11 G	linear systems of equations.		
2.8.11 H			
2.8.11 I	The student will use determinants to find the areas of triangles.		

2.8.11 J		
2.8.11 K	The student will use a determinant to verify collinear points an find an	
2.8.11 N	equation of the line passing through two points.	
2.8.11 Q		
2.8.11 R	The student will use matrices to encode and decode messages.	

Northern York County School District Curriculum				
Course Name:	Honors Precalculus			
Content:	Sequences, Series and Probability			
Key Learning(s):	Investigate applications for sequences and series. Evaluate various types of probability.			
Essential Question(s):	<b>Essential Question(s):</b> What are some fundamental types of sequences? How are these sequences used in modeling real-life problems? What are basic probability types? How are these various probability techniques applied?			
Grade Level:	11			

Number	Student Learning Experiences	Procedures for Assessment	Resources
2.1.11 A 2.2.11 A	The student will use sequence, factorial and summation notation to write the terms and/or sum of a sequence.	Notebook	Textbook
2.2.11 F 2.5.11 B	The student will recognize, write and manipulate both arithmetic and	Oral presentation	Black-line masters
2.5.11 C 2.7.11 A	geometric sequences.	of problem solution	Graphing Calculators
2.7.11 C 2.7.11 E 2.8.11 A	The student will use mathematical induction to prove a statement involving a positive integer $n$ .	Written quizzes	Graph links and computer word processing
2.8.11 C 2.11.11 D	The student will use the Binomial Theorem and Pascal's Triangle to calculate binomial coefficients and perform binomial expansions.	Written Test	Teacher generated handouts
	The student will solve counting problems using the Fundamental Counting	TI-84 graphing utility	Supplemental Texts
	Principle, permutations and combinations.		Transparencies
	The student will find the probabilities of events and their complements.		Computer Lab

Northern York County School District Curriculum			
Course Name:	Honors Precalculus		
Content:	Topics in Analytic Geometry		
Key Learning(s):	An analytic geometry investigation of lines and conic sections.		
Essential Question(s):	How does analytic geometry change our understanding of lines? What are the conic sections? How can we differentiate the formulas for these conics?		
Grade Level:	11		

Number	Student Learning Experiences	Procedures for Assessment	Resources
2.1.11 A	The student will find the inclination of a line, the angle between two lines and	Notebook	Textbook
2.2.11 A	the distance between a point and a line.		
2.2.11 F		Oral presentation	Black-line masters
2.5.11 A	The student will write the standard form of the equation of a parabola, an	and explanation	
2.5.11 B	ellipse and a hyperbola.	of problem	Graphing Calculators
2.5.11 C		solution	
2.5.11 D	The student will recognize a conic as an intersection of a plane and a cone.		Graph links and computer
2.8.11 E		Written quizzes	word processing
2.8.11 J	The student will find the eccentricity of an ellipse.	_	
2.8.11 Q		Written Test	Teacher generated handouts
2.8.11 S	The student will use the properties of parabolas, ellipses and hyperbolas to		_
2.8.11 T	model and solve real-life applications.	TI-84 graphing	Supplemental Texts
2.9.11 G		utility	
2.9.11 I			Transparencies
2.9.11 J			-
			Computer Lab