

COURSE OF STUDY MATHEMATICS

Name of Course: Pre-Calculus

Length of Course: 180 Days

Course Number: 340

Type of Offering: Academic/Elective

Grade Level: 12

Credit Value: 1 credit

Prerequisite/s: Algebra 1, Geometry and Algebra 2

Minutes: 7200

COURSE DESCRIPTION:

Intermediate algebra, analytic geometry, and trigonometry are integrated with other precalculus topics to prepare the student for college mathematics. This course is intended for the student who has successfully completed two years of algebra and one year of plane geometry.

TEXBOOK/S (if applicable)

Title: Precalculus, 5th Edition

Publisher: McDougal Littell Company

Copyright: 2001

OTHER RESOURCES: Textbook Ancillary Materials

Teacher Generated Materials

Calculator Applications

Computer Software Applications

Internet-Based Applications

12/13/10

TUNKHANNOCK AREA SCHOOL DISTRICT

Course: Precalculus Mathematics

Grade Level: 11-12

Unit of Study: Prerequisites

Instructional Time: 800 minutes

<p>exponents and scientific notation).</p> <p>Standard: 2. 2.8.11.D Formulate expressions, equations, inequalities, systems of equations, systems of inequalities and matrices to model routine and non-routine problem situations.</p> <p>Anchor: M11.D.2.2.2 Factor algebraic expressions, including difference of squares and trinomials (trinomials limited to the form ax^2+bx+c where a is not equal to 0).</p> <p>Standard: 2.2.11A Develop and use computation concepts, operations and procedures with real numbers in problem-solving situations.</p> <p>Anchor: M11.D.2.2.2 Factor</p>	<p>Polynomials and Factoring</p> <p>Rational Expressions</p>			
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Course: Precalculus Mathematics

Grade Level: 11-12

Unit of Study: Prerequisites

Instructional Time: 800 minutes

<p>algebraic expressions, including difference of squares and trinomials (trinomials limited to the form ax^2+bx+c where a is not equal to 0).</p> <p>Standard: 2.8.11.N Solve linear, quadratic and exponential equations both symbolically and graphically.</p> <p>Anchor: M11.D.2.1.3 Write, solve and/or apply a linear equation (including problem situations).</p>	<p>Solving Equations</p>			
<p>Standard: 2.8.11.N Solve linear, quadratic and exponential equations both symbolically and graphically.</p> <p>Anchor: M11.D.2.1.1 Solve compound inequalities and/or graph their solution sets on a number line (may</p>	<p>Solving Inequalities</p>			

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Unit of Study: Prerequisites

Instructional Time: 800 minutes

<p>include absolute value inequalities).</p> <p>Standard: 2.10.11.B Identify, create and solve practical problems involving right triangles using the trigonometric functions and the Pythagorean Theorem.</p> <p>Anchor: M11.C.3.1.1 Calculate the distance and/or midpoint between 2 points on a number line or on a coordinate plane (formula provided on the reference sheet).</p>	<p>Graphical Representations of Data</p>			
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TUNKHANNOCK AREA SCHOOL DISTRICT

Course: Precalculus Mathematics

Grade Level: 11-12

Unit of Study: Functions and Their Graphs

Instructional Time: 800 minutes

Anchor & Academic Standard (Eligible Content)	Content	Teaching Method(s)	Materials & Resources	Assessment
<p>Standard: 2.8.11K Select, justify and apply an appropriate technique to graph a linear function in two variables, including slope-intercept, x- and y-intercepts, graphing by transformations and the use of a graphing calculator.</p> <p>Anchor: M11.D1-Demonstrate an understanding of patterns, relations & functions (2.8.11Q, 2.8.11A, 2.8.11O) M11.D2-Represent and/or analyze mathematical situations using numbers, symbols, words, tables and or graphs (2.8.8F, 2.8.11D,H, J, N, L, K)</p> <p>Standard: 2.8.11L Write the equation of a line when given the graph of the line, two points on the line, or the slope of the line and a point on the line.</p>	<p>Graphs of Equations</p> <p>Linear Equations in Two Variables</p>	<ul style="list-style-type: none"> -Lecture/Demonstration -Question/Answer -Brainstorming -Discussion -Journaling -Cooperative Learning -Exercises -Practice/Application 	<ul style="list-style-type: none"> -Textbook- Larson, Hostetler, <u>Precaculus</u>, fifth edition, Houghton Mifflin, 2001 -Teacher Generated Materials -Calculator Applications -Computer Applications -Internet-Based Applications 	<ul style="list-style-type: none"> -Homework -Tests -Quizzes -Projects -Teacher observation/student participation

TUNKHANNOCK AREA SCHOOL DISTRICT

Course: Precalculus Mathematics

Grade Level: 11-12

Unit of Study: Functions and Their Graphs

Instructional Time: 800 minutes

<p>Anchor: M11.D.3 Analyze change in various contexts.</p> <p>Standard: 2.8.11O Determine the domain and range of a relation, given a graph or set of ordered pairs. 2.8.11R Create and interpret functional models.</p> <p>Anchor: M11.D.4 Describe or use models to represent quantitative relationships.</p> <p>Standard: 2.8.11S Analyze properties and relationships of functions (e.g., linear, polynomial, rational, trigonometric, exponential, logarithmic).</p> <p>Anchor: M11.D.4 Describe or use models to represent quantitative relationships.</p>	<p>Functions</p> <p>Analyzing Graphs of Functions</p>			
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Course: Precalculus Mathematics

Grade Level: 11-12

Unit of Study: Functions and Their Graphs

Instructional Time: 800 minutes

<p>Standard: 2.8.11A Analyze a given set of data for the existence of a pattern and represent the pattern algebraically and graphically. Anchor: M11.D.1 Demonstrate an understanding of patterns, relations and functions.</p>	<p>Combinations of Functions</p>			
<p>Standard: 2.8.11P Analyze a relation to determine whether a direct or inverse variation exists and represent it algebraically and graphically. Anchor: M11.D.3 Analyze change in various contexts.</p>	<p>Inverse Functions</p>			

TUNKHANNOCK AREA SCHOOL DISTRICT

Course: Precalculus Mathematics

Grade Level: 11-12

Unit of Study: Polynomial and Rational Functions

Instructional Time: 800 minutes

<p>polynomial, rational, trigonometric, exponential, logarithmic).</p> <p>Standard: 2.8.11 N Solve linear, quadratic and exponential equations both symbolically and graphically. 2.8.11 S Analyze properties and relationships of functions (e.g., linear, polynomial, rational, trigonometric, exponential, logarithmic).</p> <p>Anchor: M11.D.4.1 Interpret and/or use linear, quadratic and/or exponential functions and their equations, graphs or tables.</p>	<p>Polynomial and Synthetic Division</p>			
<p>Standard: 2.8.11 N Solve linear, quadratic and exponential equations both symbolically and graphically.</p> <p>Anchor:</p>	<p>Complex Numbers</p>			

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Grade Level: 11-12

Unit of Study: Polynomial and Rational Functions

Instructional Time: 800 minutes

<p>M11.D.4.1 Interpret and/or use linear, quadratic and/or exponential functions and their equations, graphs or tables.</p>				
<p>Standard: 2.8.11 N Solve linear, quadratic and exponential equations both symbolically and graphically. 2.8.11 S Analyze properties and relationships of functions (e.g., linear, polynomial, rational, trigonometric, exponential, logarithmic).</p>	<p>Zeros of Polynomial Functions</p>			
<p>Anchor: M11.D.4.1 Interpret and/or use linear, quadratic and/or exponential functions and their equations, graphs or tables.</p>				
<p>Standard: 2.8.11 S Analyze properties and relationships of functions (e.g., linear, polynomial, rational,</p>	<p>Rational Functions</p>			

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Course: Precalculus Mathematics

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Unit of Study: Polynomial and Rational Functions

Instructional Time: 800 minutes

trigonometric, exponential, logarithmic). Anchor: M11.D.4.1 Interpret and/or use linear, quadratic and/or exponential functions and their equations, graphs or tables.				
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TUNKHANNOCK AREA SCHOOL DISTRICT

Course: Precalculus Mathematics

Grade Level: 11-12

Unit of Study: Trigonometry

Instructional Time: 800 minutes

Anchor & Academic Standard (Eligible Content)	Content	Teaching Method(s)	Materials & Resources	Assessment
<p>Standard: 2.3.11 A Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations. 2.3.11 B Measure and compare angles in degrees and radians.</p> <p>Standard: 2.10.11 A Use graphing calculators to display periodic and circular functions; describe properties of the graphs. 2.10.11 B Identify, create and solve practical problems involving right triangles using the trigonometric functions and the Pythagorean Theorem.</p> <p>Standard: 2.10.11 A Use graphing calculators to display periodic and circular</p>	<p>Radian and Degree Measure</p> <p>Trigonometric Functions: The Unit Circle</p> <p>Right Triangle Trigonometry</p>	<ul style="list-style-type: none"> -Lecture/Demonstration -Question/Answer -Brainstorming -Discussion -Journaling -Cooperative Learning -Exercises -Practice/Application 	<ul style="list-style-type: none"> -Textbook- Larson, Hostetler, <u>Precaculus</u>, fifth edition, Houghton Mifflin, 2001 -Teacher Generated Materials -Calculator Applications -Computer Applications -Internet-Based Applications 	<ul style="list-style-type: none"> -Homework -Tests -Quizzes -Projects -Teacher observation/student participation

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Course: Precalculus Mathematics

Grade Level: 11-12

Unit of Study: Trigonometry

Instructional Time: 800 minutes

<p>functions; describe properties of the graphs. 2.10.11 B Identify, create and solve practical problems involving right triangles using the trigonometric functions and the Pythagorean Theorem.</p> <p>Standard: 2.10.11 A Use graphing calculators to display periodic and circular functions; describe properties of the graphs. 2.10.11 B Identify, create and solve practical problems involving right triangles using the trigonometric functions and the Pythagorean Theorem.</p> <p>Standard: 2.10.11 A Use graphing calculators to display periodic and circular functions; describe properties of the graphs</p>	<p>Trigonometric Functions of Any Angle</p> <p>Graphs of Sine and Cosine Functions</p>			
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Course: Precalculus Mathematics

Grade Level: 11-12

Unit of Study: Trigonometry

Instructional Time: 800 minutes

<p>Standard: 2.10.11 A Use graphing calculators to display periodic and circular functions; describe properties of the graphs</p> <p>Standard: 2.10.11 A Use graphing calculators to display periodic and circular functions; describe properties of the graphs. 2.10.11 B Identify, create and solve practical problems involving right triangles using the trigonometric functions and the Pythagorean Theorem.</p>	<p>Graphs of Other Trigonometric Functions</p> <p>Inverse Trigonometric Functions</p>			
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Course: Precalculus Mathematics

Grade Level: 11-12

Unit of Study: Trigonometry

Instructional Time: 800 minutes

Standard: 2.10.11 A Use graphing calculators to display periodic and circular functions; describe properties of the graphs. 2.10.11 B Identify, create and solve practical problems involving right triangles using the trigonometric functions and the Pythagorean Theorem.	Applications and Models			
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TUNKHANNOCK AREA SCHOOL DISTRICT

Course: Precalculus Mathematics

Grade Level: 11-12

Unit of Study: Analytic Trigonometry

Instructional Time: 800 minutes

Anchor & Academic Standard (Eligible Content)	Content	Teaching Method(s)	Materials & Resources	Assessment
<p>Standard: 2.8.11 S Analyze properties and relationships of functions (e.g., linear, polynomial, rational, trigonometric, exponential, logarithmic). 2.8.11 T Analyze and categorize functions by their characteristics.</p> <p>Standard: 2.8.11 S Analyze properties and relationships of functions (e.g., linear, polynomial, rational, trigonometric, exponential, logarithmic). 2.4.11 A Use direct proofs, indirect proofs or proof by contradiction to validate conjectures.</p> <p>Standard: 2.8.11 S Analyze properties and relationships of functions (e.g., linear, polynomial, rational,</p>	<p>Using Fundamental Identities</p> <p>Verifying Trigonometric Identities</p> <p>Solving Trigonometric Identities</p>	<ul style="list-style-type: none"> -Lecture/Demonstration -Question/Answer -Brainstorming -Discussion -Journaling -Cooperative Learning -Exercises -Practice/Application 	<ul style="list-style-type: none"> -Textbook- Larson, Hostetler, <u>Precaculus</u>, fifth edition, Houghton Mifflin, 2001 -Teacher Generated Materials -Calculator Applications -Computer Applications -Internet-Based Applications 	<ul style="list-style-type: none"> -Homework -Tests -Quizzes -Projects -Teacher observation/student participation

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Course: Precalculus Mathematics

Grade Level: 11-12

Unit of Study: Analytic Trigonometry

Instructional Time: 800 minutes

<p>trigonometric, exponential, logarithmic). 2.8.11 T Analyze and categorize functions by their characteristics.</p> <p>Standard: 2.8.11 S Analyze properties and relationships of functions (e.g., linear, polynomial, rational, trigonometric, exponential, logarithmic). 2.8.11 T Analyze and categorize functions by their characteristics.</p> <p>Standard: 2.8.11 S Analyze properties and relationships of functions (e.g., linear, polynomial, rational, trigonometric, exponential, logarithmic). 2.8.11 T Analyze and categorize functions by their characteristics.</p>	<p>Sum and Difference Formulas</p> <p>Multiple-Angle and Product-to-Sum Formulas</p>			
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TUNKHANNOCK AREA SCHOOL DISTRICT

Course: Precalculus Mathematics

Grade Level: 11-12

Unit of Study: Additional Topics in Trigonometry

Instructional Time: 800 minutes

Anchor & Academic Standard (Eligible Content)	Content	Teaching Method(s)	Materials & Resources	Assessment
<p>Standard: 2.9.11 G Solve problems using analytic geometry.</p> <p>Standard: 2.9.11 G Solve problems using analytic geometry.</p> <p>Standard: 2.9.11 G Solve problems using analytic geometry.</p> <p>Standard: 2.9.11 G Solve problems using analytic geometry.</p> <p>Standard: 2.9.11 G Solve problems using analytic geometry.</p>	<p>Law of Sines</p> <p>Law of Cosines</p> <p>Vectors in the Plane</p> <p>Vectors and Dot Products</p> <p>Trigonometric Form of a Complex Number</p>	<p>-Lecture/Demonstration</p> <p>-Question/Answer</p> <p>-Brainstorming</p> <p>-Discussion</p> <p>-Journaling</p> <p>-Cooperative Learning</p> <p>-Exercises</p> <p>-Practice/Application</p>	<p>-Textbook- Larson, Hostetler, <u>Precaculus</u>, fifth edition, Houghton Mifflin, 2001</p> <p>-Teacher Generated Materials</p> <p>-Calculator Applications</p> <p>-Computer Applications</p> <p>-Internet-Based Applications</p>	<p>-Homework</p> <p>-Tests</p> <p>-Quizzes</p> <p>-Projects</p> <p>-Teacher observation/student participation</p>

TUNKHANNOCK AREA SCHOOL DISTRICT

Course: Precalculus Mathematics

Grade Level: 11-12

Unit of Study: Systems of Equations and Inequalities

Instructional Time: 800 minutes

Anchor & Academic Standard (Eligible Content)	Content	Teaching Method(s)	Materials & Resources	Assessment
<p>Standard: 2.8.11 H Select and use an appropriate strategy to solve systems of equations and inequalities using graphing calculators, symbol manipulators, spreadsheets and other software. Anchor: M11.D.2.1.4 Write and/or solve systems of equations using graphing, substitution and/or elimination (limit systems to 2 equations).</p> <p>Standard: 2.8.11 H Select and use an appropriate strategy to solve systems of equations and inequalities using graphing calculators, symbol manipulators, spreadsheets and other software. Anchor: M11.D.2.1.4 Write and/or solve systems of equations using graphing, substitution and/or elimination (limit</p>	<p>Solving Systems of Equations</p> <p>Two-Variable Linear Systems</p>	<ul style="list-style-type: none"> -Lecture/Demonstration -Question/Answer -Brainstorming -Discussion -Journaling -Cooperative Learning -Exercises -Practice/Application 	<ul style="list-style-type: none"> -Textbook- Larson, Hostetler, <u>Precaculus</u>, fifth edition, Houghton Mifflin, 2001 -Teacher Generated Materials -Calculator Applications -Computer Applications -Internet-Based Applications 	<ul style="list-style-type: none"> -Homework -Tests -Quizzes -Projects -Teacher observation/student participation

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Course: Precalculus Mathematics

Grade Level: 11-12

Unit of Study: Systems of Equations and Inequalities

Instructional Time: 800 minutes

<p>systems to 2 equations).</p> <p>Standard: 2.8.11 H Select and use an appropriate strategy to solve systems of equations and inequalities using graphing calculators, symbol manipulators, spreadsheets and other software.</p> <p>Standard: 2.8.11 H Select and use an appropriate strategy to solve systems of equations and inequalities using graphing calculators, symbol manipulators, spreadsheets and other software.</p> <p>Standard: 2.8.11 H Select and use an appropriate strategy to solve systems of equations and inequalities using graphing calculators, symbol manipulators, spreadsheets and other software.</p>	<p>Multivariable Linear Systems</p> <p>Systems of Inequalities</p> <p>Linear Programming</p>			
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TUNKHANNOCK AREA SCHOOL DISTRICT

Course: Precalculus Mathematics

Grade Level: 11-12

Unit of Study: Matrices and Determinants

Instructional Time: 800 minutes

Anchor & Academic Standard (Eligible Content)	Content	Teaching Method(s)	Materials & Resources	Assessment
<p>Standard: 2.8.11 I Use matrices to organize and manipulate data, including matrix addition, subtraction, multiplication and scalar multiplication.</p> <p>2.8.11 H Select and use an appropriate strategy to solve systems of equations and inequalities using graphing calculators, symbol manipulators, spreadsheets and other software.</p>	Matrices and Systems of Equations	<ul style="list-style-type: none"> -Lecture/Demonstration -Question/Answer -Brainstorming -Discussion -Journaling -Cooperative Learning -Exercises -Practice/Application 	<ul style="list-style-type: none"> -Textbook- Larson, Hostetler, <u>Precaculus</u>, fifth edition, Houghton Mifflin, 2001 -Teacher Generated Materials -Calculator Applications -Computer Applications -Internet-Based Applications 	<ul style="list-style-type: none"> -Homework -Tests -Quizzes -Projects -Teacher observation/student participation
<p>Standard: 2.8.11 I Use matrices to organize and manipulate data, including matrix addition, subtraction, multiplication and scalar multiplication.</p>	Operations with Matrices			
<p>Standard: 2.8.11 I Use matrices to organize and manipulate data, including matrix addition, subtraction,</p>	The Inverse of a Square Matrix			

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Course: Precalculus Mathematics

Grade Level: 11-12

Unit of Study: Matrices and Determinants

Instructional Time: 800 minutes

<p>multiplication and scalar multiplication.</p> <p>Standard: 2.8.11 I Use matrices to organize and manipulate data, including matrix addition, subtraction, multiplication and scalar multiplication.</p> <p>Standard: 2.8.11 D Formulate expressions, equations, inequalities, systems of equations, systems of inequalities and matrices to model routine and non-routine problem situations. 2.8.11 I Use matrices to organize and manipulate data, including matrix addition, subtraction, multiplication and scalar multiplication.</p>	<p>The Determinant of a Square Matrix</p> <p>Applications of Matrices and Determinants</p>			
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TUNKHANNOCK AREA SCHOOL DISTRICT

Course: Precalculus Mathematics

Grade Level: 11-12

Unit of Study: Matrices and Determinants

Instructional Time: 800 minutes

Anchor & Academic Standard (Eligible Content)	Content	Teaching Method(s)	Materials & Resources	Assessment
<p>Standard: 2.8.11 E Use equations to represent curves (e.g., lines, circles, ellipses, parabolas, hyperbolas). 2.8.11 J Demonstrate the connection between algebraic equations and inequalities and the geometry of relations in the coordinate plane.</p>	<p>Lines</p>	<ul style="list-style-type: none"> -Lecture/Demonstration -Question/Answer -Brainstorming -Discussion -Journaling -Cooperative Learning -Exercises -Practice/Application 	<ul style="list-style-type: none"> -Textbook- Larson, Hostetler, <u>Precaculus</u>, fifth edition, Houghton Mifflin, 2001 -Teacher Generated Materials -Calculator Applications -Computer Applications -Internet-Based Applications 	<ul style="list-style-type: none"> -Homework -Tests -Quizzes -Projects -Teacher observation/student participation
<p>Standard: 2.8.11 E Use equations to represent curves (e.g., lines, circles, ellipses, parabolas, hyperbolas). 2.8.11 J Demonstrate the connection between algebraic equations and inequalities and the geometry of relations in the coordinate plane.</p>	<p>Introduction to Conics: Parabolas</p>			
<p>Standard: 2.8.11 E Use equations to represent curves (e.g., lines, circles, ellipses, parabolas,</p>	<p>Ellipses</p>			

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Grade Level: 11-12

Unit of Study: Matrices and Determinants

Instructional Time: 800 minutes

<p>hyperbolas). 2.8.11 J Demonstrate the connection between algebraic equations and inequalities and the geometry of relations in the coordinate plane.</p>				
<p>Standard: 2.8.11 E Use equations to represent curves (e.g., lines, circles, ellipses, parabolas, hyperbolas).</p>	<p>Hyperbolas</p>			
<p>2.8.11 J Demonstrate the connection between algebraic equations and inequalities and the geometry of relations in the coordinate plane.</p>	<p>Rotation of Conics</p>			
<p>Standard: 2.8.11 J Demonstrate the connection between algebraic equations and inequalities and the geometry of relations in the coordinate plane.</p> <p>Standard: 2.8.11 S Analyze properties</p>	<p>Parametric Equations</p>			

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Grade Level: 11-12

Unit of Study: Matrices and Determinants

Instructional Time: 800 minutes

<p>and relationships of functions (e.g., linear, polynomial, rational, trigonometric, exponential, logarithmic).</p> <p>2.8.11 T Analyze and categorize functions by their characteristics.</p> <p>Standard: 2.8.11 J Demonstrate the connection between algebraic equations and inequalities and the geometry of relations</p> <p>2.8.11 Q Represent functional relationships in tables, charts and graphs.</p> <p>Standard: 2.8.11 Q Represent functional relationships in tables, charts and graphs</p> <p>Standard: 2.8.11 Q Represent functional relationships in tables, charts and graphs</p>	<p>Polar Coordinates</p> <p>Graphs of Polar Equations</p> <p>Polar Equations of Conics</p>			
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TUNKHANNOCK AREA SCHOOL DISTRICT

Course: Precalculus Mathematics

Grade Level: 11-12

Unit of Study: Sequences, Series, and Probability

Instructional Time: 800 minutes

Anchor & Academic Standard (Eligible Content)	Content	Teaching Method(s)	Materials & Resources	Assessment
<p>Standards: 2.11.11.D Determine sums of finite sequences of numbers and infinite geometric series.</p> <p>Standards: 2.11.11.D Determine sums of finite sequences of numbers and infinite geometric series.</p> <p>Standards: 2.11.11.D Determine sums of finite sequences of numbers and infinite geometric series.</p> <p>Standards: 2.11.11.D Determine sums of finite sequences of numbers and infinite geometric series.</p> <p>Standards: 2.8.11 T. Analyze and categorize functions by their characteristics.</p>	<p>Sequences and Series</p> <p>Arithmetic Sequences and Partial Sums</p> <p>Geometric Sequences and Series</p> <p>Mathematical Induction</p> <p>The Binomial Theorem</p>	<ul style="list-style-type: none"> -Lecture/Demonstration -Question/Answer -Brainstorming -Discussion -Journaling -Cooperative Learning -Exercises -Practice/Application 	<ul style="list-style-type: none"> -Textbook- Larson, Hostetler, <u>Precaculus</u>, fifth edition, Houghton Mifflin, 2001 -Teacher Generated Materials -Calculator Applications -Computer Applications -Internet-Based Applications 	<ul style="list-style-type: none"> -Homework -Tests -Quizzes -Projects -Teacher observation/student participation

TUNKHANNOCK AREA SCHOOL DISTRICT

Course: Precalculus Mathematics

Grade Level: 11-12

Unit of Study: Sequences, Series, and Probability

Instructional Time: 800 minutes

<p>Standards: 2.7.11 A Compare odds and probability. 2.7.11 B Apply probability and statistics to perform an experiment involving a sample and generalize its results to the entire population. 2.7.11 C. Draw and justify a conclusion regarding the validity of a probability or statistical argument</p>	<p>Counting Principles</p>			
<p>Standards: 2.7.11 A Compare odds and probability. 2.7.11 B Apply probability and statistics to perform an experiment involving a sample and generalize its results to the entire population. 2.7.11 C. Draw and justify a conclusion regarding the validity of a probability or statistical argument</p>	<p>Probability</p>			