

Conneaut School District – Mathematics Curriculum Map
 Precalculus **Grades** 10-12 **90 minutes/18 weeks**

Time-Line	CONTENT	STANDARDS	SKILLS	ASSESSMENT
3.5 wks	<p style="text-align: center;">UNIT NAME</p> <ul style="list-style-type: none"> Functions and Their Graphs 	M11.C.3.1.1 M11.C.3.1.2 M11.D.1.1.2 M11.D.2.1.3 M11.D.2.1.4 M11.D.3.2.1 M11.D.3.2.2 M11.D.3.2.3	A. Rectangular Coordinates B. Graphs of Equations C. Linear Equations in Two Variables D. Functions E. Analyzing Graphs of Functions F. Parent Functions G. Transformations of Functions H. Composite Functions I. Inverse Functions	<ul style="list-style-type: none"> Verbal Response Written and Oral Exams Homework Class Participation Teacher Observation Projects Labs Writing Oral Presentations Notebooks
3 wks	<p style="text-align: center;">UNIT NAME</p> <ul style="list-style-type: none"> Polynomial and Rational Functions 	M11.D.2.1.2 M11.D.2.1.5 M11.D.4.1.3	A. Quadratic Functions B. Polynomial Functions C. Polynomial Division D. Complex Numbers E. Zeros of Polynomial Functions F. Rational Functions G. Nonlinear Inequalities	<ul style="list-style-type: none"> Verbal Response Written and Oral Exams Homework Class Participation Teacher Observation Projects Labs Writing Oral Presentations Notebooks

2.5 wks	<p style="text-align: center;">UNIT NAME</p> <ul style="list-style-type: none"> Exponential and Logarithmic Functions 	M11.D.4.1.1 M11.D.4.1.2 M11.D.4.1.3	<ul style="list-style-type: none"> A. Exponential Functions B. Logarithmic Functions C. Properties of Logarithms D. Exponential and Logarithmic Equations E. Exponential and Logarithmic Models 	<ul style="list-style-type: none"> <input type="radio"/> Verbal Response <input type="radio"/> Written and Oral Exams <input type="radio"/> Homework <input type="radio"/> Class Participation <input type="radio"/> Teacher Observation <input type="radio"/> Projects <input type="radio"/> Labs <input type="radio"/> Writing <input type="radio"/> Oral Presentations <input type="radio"/> Notebooks
3 wks	<p style="text-align: center;">UNIT NAME</p> <ul style="list-style-type: none"> Trigonometry 	M11.A.1.1.2 M11.A.1.1.4 M11.B.2.1.1 M11.B.2.1.2 M11.B.2.3.1 M11.C.1.3.1 M11.C.1.4.1	<ul style="list-style-type: none"> A. Radian and Degree Measure B. Trigonometric Functions C. Right Triangle Trigonometry D. Trigonometric Functions of Any Angle E. Graphs of Sine and Cosine Functions F. Graphs of Other Trigonometric Functions G. Inverse Trigonometric Functions H. Applications and Models 	<ul style="list-style-type: none"> <input type="radio"/> Verbal Response <input type="radio"/> Written and Oral Exams <input type="radio"/> Homework <input type="radio"/> Class Participation <input type="radio"/> Teacher Observation <input type="radio"/> Projects <input type="radio"/> Labs <input type="radio"/> Writing <input type="radio"/> Oral Presentations <input type="radio"/> Notebooks

2 wks	<p style="text-align: center;">UNIT NAME</p> <ul style="list-style-type: none"> Analytical Trigonometry 	M11.A.1.1.2 M11.A.1.1.4 M11.B.2.1.1 M11.B.2.1.2 M11.B.2.3.1 M11.C.1.3.1 M11.C.1.4.1	A. Using Fundamental Identities B. Verifying Trigonometric Identities C. Solving Trigonometric Identities D. Sum and Difference Formulas E. Multiple-Angle and Product-to-Sum Formulas	<input type="radio"/> Verbal Response <input type="radio"/> Written and Oral Exams <input type="radio"/> Homework <input type="radio"/> Class Participation <input type="radio"/> Teacher Observation <input type="radio"/> Projects <input type="radio"/> Labs <input type="radio"/> Writing <input type="radio"/> Oral Presentations <input type="radio"/> Notebooks
3 wks	<p style="text-align: center;">UNIT NAME</p> <ul style="list-style-type: none"> Sequences, Series and Probability 	M11.A.2.1.1 M11.A.3.1.1 M11.E.3.1.1 M11.E.3.1.2 M11.E.3.2.1 M11.E.4.1.2	A. Sequences and Series B. Arithmetic Sequences and Partial Sums C. Geometric Sequences and Series D. Mathematical Induction E. Binomial Theorem F. Counting Principles G. Probability	<input type="radio"/> Verbal Response <input type="radio"/> Written and Oral Exams <input type="radio"/> Homework <input type="radio"/> Class Participation <input type="radio"/> Teacher Observation <input type="radio"/> Projects <input type="radio"/> Labs <input type="radio"/> Writing <input type="radio"/> Oral Presentations <input type="radio"/> Notebooks

Vocabulary

- amplitude the value by which the graph of a trigonometric function such as sine or cosine is stretched; the amplitude is always a positive value.
- axis of symmetry the line passing through the vertex of a parabola about which the graph of the parabola is symmetric.
- cofunctions trigonometric function pairs which differ only in the presence or absence of the prefix "co," such as sine and cosine.
- common logarithm a logarithm of base 10; if a logarithm is written without an explicit base (like $\log 3x$), the base is understood to be 10.

complex numbers any number of the form $a + bi$, where a and b are real numbers and $i = \sqrt{-1}$. If $b = 0$, the *complex number* is also a *real number*. If, however, $a = 0$, the number is said to be *purely imaginary*.

composition of functions the act of plugging one function into another, usually written as $f(g(x))$ or $(f \circ g)(x)$.

coterminal angles angles in standard position that share the same terminal ray.

critical number a value for which an expression is either undefined or is equal to zero.

degree (of a polynomial) the greatest exponent within a polynomial.

Descartes' Rule of Signs a method used to determine the number of possible positive and negative real roots of a polynomial.

even functions functions such that $f(-x) = -f(x)$.

exponential function has form $f(x) = a^x$, for some real number a , as long as $a > 0$.

exponentiating the process of raising a constant to the power of both sides of the equation in order to cancel out a logarithm. The exponentiated form of $\log_c x = c$ is $x^{\log_c c} = c^c$.

factorial the product of a natural number, n , with all its preceding natural numbers, written " $n!$ ".

function a relation in which every input results in one and only one output.

identity elements numbers that, when applied in specific operations, do not alter the values you begin with.

inverse function the function, labeled $f^{-1}(x)$, which contains all the ordered pair of $f(x)$, with its coordinates reversed. In other words, if $f(x)$ contains (a,b) , then $f^{-1}(x)$ contains (b,a) .

irrational numbers any number that cannot be expressed as the quotient $\frac{a}{b}$, where a and b are integers and b is nonzero.

leading coefficient the coefficient in the term of a polynomial containing the variable raised to its highest power.

Leading Coefficient Test describes what direction (either up or down) the graph is heading at the far right and left edges of the coordinate axes.

logarithmic function function of form $f(x) = \log_c x$ (read "the log base c of x ").

natural exponential function the exponential function with Euler's number as its base: $f(x) = e^x$.

natural logarithm the logarithmic function of base e , written " $\ln x$ " and read either "natural log of x " or "L-N of x ."

odd functions functions such that $f(-x) = -f(x)$.

one-to-one a term used to describe a function for which every output has only one corresponding input. Only one-to-one functions have inverses.

optimal maximum or minimum values of a function.

partial sum sum of the terms of a series whose upper summation limit is finite.

Pascal's triangle the triangular arrangement of the coefficients of binomial expansions; the $(n + 1)$ th row of the triangle gives the coefficients for the expression $(a + b)^n$.

period the shortest length along the x-axis after which a periodic graph will repeat itself.

periodic describes a graph which will repeat itself infinitely after some fixed length of the x-axis, called the period.

principal the initial investment in a compound interest problem.

radian measurement of an angle in standard position that, when extended to a circle of radius r centered at the origin, will mark the endpoints of an arc whose length is also r .

Rational Root Test a method used to determine all possible rational roots for a polynomial.

recursive sequence sequence whose terms are defined based on one or more preceding terms of the sequence.

reference angle an acute angle that helps calculate trigonometric function values of an oblique angle.

sequence ordered list of numbers a_1, a_2, a_3, \dots

series the sum of the terms of a sequence.

slant asymptote a linear asymptote that is neither vertical nor horizontal.

standard position describes an angle whose initial side lies on the positive x-axis and whose vertex lies on the origin of the coordinate plane.

synthetic division a shortcut alternative to long division, which uses only the coefficients of the divisor and dividend; it is only applicable if the divisor is linear.

test points points chosen based on the graph of an inequality to determine which regions of the graph (as defined by the inequality) make it true.

unit circle a circle, centered at the origin with radius 1, which is used to calculate the sine and cosine values of certain angles.

vertical line test if a vertical line can be drawn through a graph, intersecting it in two or more places, then the graph cannot be that of a function.

General Syllabus for:
PRECALCULUS ---- GRADES 11/12
CONNEAUT SCHOOL DISTRICT

Type of course: Mathematics

Prerequisites: Trigonometry

Text Information: *Precalculus with Limits* supplementals provided by teacher

Objectives:

- To help every student acquire the mathematical knowledge, skills and attitude to pursue a career of their choice;
- To give students the opportunity to use technology to increase their understanding and applications of mathematics;
- To enhance the student's performance with national and state established standards from mathematical curriculum;
- To integrate math across the curriculum.

Topics Covered:

Functions and Their Graphs (17 DAYS)

- A. Rectangular Coordinates
- B. Graphs of Equations
- C. Linear Equations in Two Variables
- D. Functions
- E. Analyzing Graphs of Functions
- F. Parent Functions
- G. Transformations of Functions
- H. Composite Functions
- I. Inverse Functions

Polynomial and Rational Functions (13 DAYS)

- A. Quadratic Functions
- B. Polynomial Functions
- C. Polynomial Division
- D. Complex Numbers
- E. Zeros of Polynomial Functions
- F. Rational Functions
- G. Nonlinear Inequalities

Exponential and Logarithmic Functions (11 DAYS)

- A. Exponential Functions
- B. Logarithmic Functions

- C. Properties of Logarithms
- D. Exponential and Logarithmic Equations
- E. Exponential and Logarithmic Models

Trigonometry (15 DAYS)

- A. Radian and Degree Measure
- B. Trigonometric Functions
- C. Right Triangle Trigonometry
- D. Trigonometric Functions of Any Angle
- E. Graphs of Sine and Cosine Functions
- F. Graphs of Other Trigonometric Functions
- G. Inverse Trigonometric Functions
- H. Applications and Models

Analytical Trigonometry (11 DAYS)

- A. Using Fundamental Identities
- B. Verifying Trigonometric Identities
- C. Solving Trigonometric Identities
- D. Sum and Difference Formulas
- E. Multiple-Angle and Product-to-Sum Formulas

Sequences, Series and Probability (14 DAYS)

- A. Sequences and Series
- B. Arithmetic Sequences and Partial Sums
- C. Geometric Sequences and Series
- D. Mathematical Induction
- E. Binomial Theorem
- F. Counting Principles
- G. Probability

Assessment:

- Verbal Response
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Parent/Student Resources:

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- coterminal angles** angles in standard position that share the same terminal ray.
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- degree (of a polynomial)** the greatest exponent within a polynomial.
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- exponential function** has form $f(x) = a^x$, for some real number a , as long as $a > 0$.
- exponentiating** the process of raising a constant to the power of both sides of the equation in order to cancel out a logarithm. The exponentiated form of $\log_a x = c$ is $a^{\log_a x} = a^c$.
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Conneaut School District – Mathematics Curriculum Map
Calculus (when teaching pre-Calculus) Grades 11th and 12th **90 Minutes/90 Days**

Time-Line	CONTENT	STANDARDS	SKILLS	ASSESSMENT
1 wks	<p style="text-align: center;">UNIT NAME</p> <ul style="list-style-type: none"> Preparation for Calculus Chapter P 	M11D2.1 M11D3.1 M11D3.2 M11D4.1 M11E1.1	<ul style="list-style-type: none"> Sketch graph of equation Intercepts and slope of a graph Symmetry Points of intersections of two graphs. Rates of change Mathematical models 	<ul style="list-style-type: none"> Classroom participation Homework Quiz Test
3 wks	<p style="text-align: center;">UNIT NAME</p> <ul style="list-style-type: none"> Limits and their Properties Chapter 1 	M11A M11B M11C M11D	<ul style="list-style-type: none"> Define a Limit Calculating limits Evaluating limits Continuity Infinite Limits Slope of Tangent Line Difference Quotient Differentiation Rules Higher Order Derivatives Implicit Differentiation Related Rates 	<ul style="list-style-type: none"> Classroom participation Homework Quiz Test
6 wks	<p style="text-align: center;">UNIT NAME</p> <ul style="list-style-type: none"> Differentiation Chapter 2 	M11A M11B M11C M11D	<ul style="list-style-type: none"> Extrema on an Interval Rolle's Theorem Mean Value Theorem 1st and 2nd Derivative Tests Limits of Infinity Curve Sketching Optimization Newton's Method Differentials 	<ul style="list-style-type: none"> Classroom participation Homework Quiz Test
4 wks	<p style="text-align: center;">UNIT NAME</p> <ul style="list-style-type: none"> Application of Differentiation Chapter 3 	M11A M11B M11C M11D		<ul style="list-style-type: none"> Classroom participation Homework Quiz Test

Conneaut School District – Mathematics Curriculum Map
Calculus (when teaching pre-Calculus) Grades 11th and 12th

90 Minutes/90 Days

UNIT NAME			
<ul style="list-style-type: none"> Integration Chapter 4 	M11A M11B M11C M11D	<ul style="list-style-type: none"> Anti-Derivative Indefinite Integration Riemanns Sums Definite Ingegratals Fundamental Theorem of Calculus Integration by substitution Numerical Integration 	<ul style="list-style-type: none"> Classroom participation Homework Quiz Test
4 wks			

Calculus Glossary

antiderivative A function $F(x)$ is called an antiderivative of a function $f(x)$ if $F'(x) = f(x)$ for all x in the domain of f . In words, this means that an antiderivative of f is a function which has f for its derivative.

chain rule The chain rule tells how to find the derivative of composite functions. In symbols, the chain rule says

$$\frac{d}{dx}(f(g(x))) = f'(g(x)) \cdot g'(x)$$

In words, the chain rule says the derivative of a composite function is the derivative of the outside function, done to the inside function, times the derivative of the inside function.

change of variables A term sometimes used for the technique of integration by substitution.

concave downward A function is concave downward on an interval if $f''(x)$ is negative for every point on that interval.

concave upward A function is concave upward on an interval if $f''(x)$ is positive for every point on that interval.

continuous A function $f(x)$ is continuous at a point $x = c$ when $f(c)$ exists, $\lim_{x \rightarrow c} f(x)$ exists, and $\lim_{x \rightarrow c} f(x) = f(c)$. In words, this means the curve could be drawn without lifting the pencil. To say that a function is continuous on some interval means that it is continuous at each point in that interval.

critical point A critical point of a function is a point $(x, f(x))$ with x in the domain of the function and either $f'(x) = 0$ or $f'(x)$ undefined. Critical points are among the candidates to be maximum or minimum values of a function.

C

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definite integral The definite integral of $f(x)$ between $x = a$ and $x = b$, denoted

$$\int_a^b f(x) dx$$

gives the signed area between $f(x)$ and the x-axis from $x = a$ to $x = b$, with area above the x-axis counting positive and area below the x-axis counting negative.

derivative The derivative of a function $f(x)$ is a function that gives the slope of $f(x)$ at each value of x . The derivative is most often denoted $f'(x)$ or $\frac{d}{dx}$. The mathematical definition of the derivative is

$$\lim_{\Delta x \rightarrow 0} \frac{f(x + \Delta x) - f(x)}{\Delta x},$$

or in words the limit of the slopes of the secant lines through the point $(x, f(x))$ and a second point on the graph of $f(x)$ as that second point approaches the first. The derivative can be interpreted as the slope of a line tangent to the function, the instantaneous velocity of the function, or the instantaneous rate of change of the function.

differentiable A function is said to be differentiable at a point when the function's derivative exists at that point. A function will fail to be differentiable at places where the function is not continuous or where the function has corners.

Extreme Value Theorem A theorem stating that a function which is continuous on a closed interval $[a, b]$ must have a maximum and a minimum value on $[a, b]$.

First Derivative Test for Local Extrema A method used to determine whether a critical point of a function is a local maximum or local minimum. If a continuous function changes from increasing (first derivative positive) to decreasing (first derivative negative) at a point, then that point is a local maximum. If a function changes from decreasing (first derivative negative) to increasing (first derivative positive) at a point, then that point is a local minimum.

general antiderivative If $F(x)$ is an antiderivative of a function $f(x)$, then $F(x) + C$ is called the general antiderivative of $f(x)$.

general form The general form (sometimes also called standard form) for the equation of a line is $ax + by = c$, where a and b are not both zero.



higher order derivatives The second derivative, third derivative, and so forth for some function.

implicit differentiation A procedure for finding the derivative of a function which has not been given explicitly in the form " $f(x) = ;$ ".

indefinite integral The indefinite integral of $f(x)$ is another term for the general antiderivative of $f(x)$. The indefinite integral of $f(x)$ is represented in symbols as

$$\int f(x) dx$$

instantaneous rate of change One way of interpreting the derivative of a function is to understand it as the instantaneous rate of change of that function, the limit of the average rates of change between a fixed point and other points on the curve that get closer and closer to the fixed point.

instantaneous velocity One way of interpreting the derivative of a function $s(t)$ is to understand it as the velocity at a given moment t of an object whose position is given by the function $s(t)$.

integration by parts One of the most common techniques of integration, used to reduce complicated integrals into one of the basic integration forms.

intercept form The intercept form for the equation of a line is $x/a + y/b = ; 1$, where the line has its x-intercept (the place where the line crosses the x-axis) at the point $(a,0)$ and its y-intercept (the place where the line crosses the y-axis) at the point $(0,b)$.

limit A function $f(x)$ has the value L for its limit as x approaches c if as the value of x gets closer and closer to c , the value of $f(x)$ gets closer and closer to L .

Mean Value Theorem If a function $f(x)$ is continuous on a closed interval $[a,b]$ and differentiable on the open interval (a,b) , then there exists some c in the interval $[a,b]$ for which

$$f'(c) = \frac{f(b) - f(a)}{b - a}$$

normal line The normal line to a curve at a point is the line perpendicular to the tangent line at that point.

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Conneaut School District – Mathematics Curriculum Map
Calculus (when teaching pre-Calculus) Grades 11th and 12th **90 Minutes/90 Days**

point of inflection A point is called a point of inflection of a function if the function changes from concave upward to concave downward, or vice versa, at that point.

point-slope form The point-slope form for the equation of a line is $y - y_1 = m(x - x_1)$, where m stands for the slope of the line and (x_1, y_1) is a point on the line.

Riemann sum A Riemann sum is a sum of several terms, each of the form $f(x_i)\Delta x$, each representing the area below a function $f(x)$ on some interval if $f(x)$ is positive or the negative of that area if $f(x)$ is negative. The definite integral is mathematically defined to be the limit of such a Riemann sum as the number of terms approaches infinity.

Second Derivative Test for Local Extrema A method used to determine whether a critical point of a function is a local maximum or local minimum. If $f''(x) = 0$ and the second derivative is positive at this point, then the point is a local minimum. If $f''(x) = 0$ and the second derivative is negative at this point, then the point is a local maximum.

slope of the tangent line One way of interpreting the derivative of a function is to understand it as the slope of a line tangent to the function.

slope-intercept form The slope-intercept form for the equation of a line is $y = mx + b$, where m stands for the slope of the line and the line has its y -intercept (the place where the line crosses the y -axis) at the point $(0, b)$.

standard form The standard form (sometimes also called general form) for the equation of a line is $ax + by = c$, where a and b are not both zero.

substitution Integration by substitution is one of the most common techniques of integration, used to reduce complicated integrals into one of the basic integration forms.

tangent line The tangent line to a function is a straight line that just touches the function at a particular point and has the same slope as the function at that point.

trigonometric substitution A technique of integration where a substitution involving a trigonometric function is used to integrate a function involving a radical.

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Conneaut School District – Mathematics Curriculum Map

Calculus (when teaching pre-Calculus) Grades 11th and 12th

90 Minutes/90 Days

C

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General Syllabus for:

Calculus (when teaching pre-Calculus) ---- GRADES 11th and 12th

CONNEAUT SCHOOL DISTRICT

Type of course: Mathematics

Prerequisites: Pre-Calculus

Text Information: Calculus of A Single Variable: Eighth Edition (Houghton Mifflin: Larson, Hostetler, Edwards)

Objectives:

- To help every student acquire the mathematical knowledge, skills and attitude to pursue a career of their choice.
- To give students the opportunity to use technology to increase their understanding and applications of mathematics.
- To integrate math across the curriculum.

Topics Covered:

Chapter P: Preparation for Calculus (5 Days)

- Graphs and Models
- Linear Models and Rates of Change
- Fitting Models to Data

Limits and Their Properties (15 Days)

- A Preview of Calculus
- Finding Limits Graphically and Numerically
- Evaluating Limits Analytically
- Continuity and One-Sided Limits
- Infinite Limits

Differentiation (30 Days)

- The Derivative and the Tangent Line Problem
- Basic Differentiation Rules and Rates of Change
- Product and Quotient Rules and Higher-Order Derivatives
- The Chain Rule
- Implicit Differentiation

Applications of Differentiation (20 Days)

- Extrema on an Interval
- Rolle's Theorem and the Mean Value Theorem
- Increasing and Decreasing Functions and the First Derivative Test
- Concavity and the Second Derivative Test
- Limits at Infinity
- Curve Sketching
- Optimization Problems

- Newton's Method
- Differentials

Integration (20 Days)

- Antiderivatives and Indefinite Integration
- Area
- Riemann Sums and Definite Integrals
- The Fundamental Theorem of Calculus
- Integration by Substitution
- Numerical Integration

Assessment:

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Calculus when Not Teaching pre-Calculus Grade 12

Time-Line	CONTENT	STANDARDS	SKILLS	ASSESSMENT
3 wks	<p>UNIT NAME</p> <ul style="list-style-type: none"> • Functions and Their Graphs 	<p>M11.C.3.1.1 M11.C.3.1.2 M11.D.1.1.2 M11.D.2.1.3 M11.D.2.1.4 M11.D.3.2.1 M11.D.3.2.2 M11.D.3.2.3</p>	<ul style="list-style-type: none"> • Parent Functions • Transformations of Functions • Composite Functions • Inverse Functions 	<ul style="list-style-type: none"> • Classroom participation • Homework • Quiz • Test
6 wks	<p>UNIT NAME</p> <ul style="list-style-type: none"> • Polynomial and Rational Functions 	<p>M11.D.2.1.2 M11.D.2.1.5 M11.D.4.1.3</p>	<ul style="list-style-type: none"> • Quadratic Functions • Polynomial Functions • Polynomial Division • Complex Numbers • Zeros of Polynomial Functions • Rational Functions • Nonlinear Inequalities 	<ul style="list-style-type: none"> • Classroom participation • Homework • Quiz • Test
4 wks	<p>UNIT NAME</p> <ul style="list-style-type: none"> • Sequences, Series and Probability 	<p>M11.A.2.1.1 M11.A.3.1.1 M11.E.3.1.1 M11.E.3.1.2 M11.E.3.2.1 M11.E.4.1.2</p>	<ul style="list-style-type: none"> • Sequences and Series • Arithmetic Sequences and Partial Sums • Geometric Sequences and Series • Mathematical Induction • Binomial Theorem • Counting Principles • Probability 	<ul style="list-style-type: none"> • Classroom participation • Homework • Quiz • Test

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4 wks	<p>UNIT NAME</p> <ul style="list-style-type: none"> Limits and their Properties Chapter 1 	M11A M11B M11C M11D	<ul style="list-style-type: none"> Define a Limit Calculating limits Evaluating limits Continuity Infinite Limits 	<ul style="list-style-type: none"> Classroom participation Homework Quiz Test
7 wks	<p>UNIT NAME</p> <ul style="list-style-type: none"> Differentiation Chapter 2 	M11A M11B M11C M11D	<ul style="list-style-type: none"> Slope of Tangent Line Difference Quotient Differentiation Rules Higher Order Derivatives Implicit Differentiation Related Rates 	<ul style="list-style-type: none"> Classroom participation Homework Quiz Test
6 wks	<p>UNIT NAME</p> <ul style="list-style-type: none"> Application of Differentiation Chapter 3 	M11A M11B M11C M11D	<ul style="list-style-type: none"> Extrema on an Interval Rolle's Theorem Mean Value Theorem 1st and 2nd Derivative Tests Limits of Infinity Curve Sketching Optimization Newton's Method Differentials 	<ul style="list-style-type: none"> Classroom participation Homework Quiz Test
5 wks	<p>UNIT NAME</p> <ul style="list-style-type: none"> Integration Chapter 4 	M11A M11B M11C M11D	<ul style="list-style-type: none"> Anti-Derivative Indefinite Integration Riemanns Sums Definite Ingegratals Fundamental Theorem of Calculus Integration by substitution Numerical Integration 	<ul style="list-style-type: none"> Classroom participation Homework Quiz Test

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synthetic division a shortcut alternative to long division, which uses only the coefficients of the divisor and dividend; it is only applicable if the divisor is linear.

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test points points chosen based on the graph of an inequality to determine which regions of the graph (as defined by the inequality) make it true.



Calculus When Not Teaching pre-Calculus Grade 12

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General Syllabus for:

Calculus When Not Teaching pre-Calculus ---- GRADE 12

CONNEAUT SCHOOL DISTRICT

Type of course: Mathematics

Prerequisites: Trigonometry

Text Information: *Pre-Calculus with Limits* Supplementals (Houghton Mifflin: Larson, Hostetler)

Calculus of A Single Variable: Eighth Edition (Houghton Mifflin: Larson, Hostetler, Edwards)

Objectives:

- To help every student acquire the mathematical knowledge, skills and attitude to pursue a career of their choice.
- To give students the opportunity to use technology to increase their understanding and applications of mathematics.
- To integrate math across the curriculum.

Topics Covered:

Functions and Their Graphs (15 DAYS)

- Parent Functions
- Transformations of Functions
- Composite Functions
- Inverse Functions

Polynomial and Rational Functions (30 DAYS)

- Quadratic Functions
- Polynomial Functions
- Polynomial Division
- Complex Numbers
- Zeros of Polynomial Functions
- Rational Functions
- Nonlinear Inequalities

Sequences, Series and Probability (21 DAYS)

- Sequences and Series
- Arithmetic Sequences and Partial Sums
- Geometric Sequences and Series
- Mathematical Induction
- Binomial Theorem
- Counting Principles
- Probability

Limits and Their Properties (20 Days)

- A Preview of Calculus
- Finding Limits Graphically and Numerically
- Evaluating Limits Analytically
- Continuity and One-Sided Limits
- Infinite Limits

Differentiation (35 Days)

- The Derivative and the Tangent Line Problem
- Basic Differentiation Rules and Rates of Change
- Product and Quotient Rules and Higher-Order Derivatives
- The Chain Rule
- Implicit Differentiation

Applications of Differentiation (30 Days)

- Extrema on an Interval
- Rolle's Theorem and the Mean Value Theorem
- Increasing and Decreasing Functions and the First Derivative Test
- Concavity and the Second Derivative Test
- Limits at Infinity
- Curve Sketching
- Optimization Problems
- Newton's Method
- Differentials

Integration (25 Days)

- Antiderivatives and Indefinite Integration
- Area
- Riemann Sums and Definite Integrals
- The Fundamental Theorem of Calculus
- Integration by Substitution
- Numerical Integration

Assessment:

- Verbal Response
- Written and Oral Exam
- Homework
- Class Participation
- Teacher Observation
- Projects
- Labs
- Writing
- Oral Presentations
- Notebooks

Parent/Student Resources:

- Edline
- Online Resources

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series the sum of the terms of a sequence.

slope of the tangent line One way of interpreting the derivative of a function is to understand it as the slope of a line tangent to the function.

slope-intercept form The slope-intercept form for the equation of a line is $y = mx + b$, where m stands for the slope of the line and the line has its y -intercept (the place where the line crosses the y -axis) at the point $(0, b)$.

standard form The standard form (sometimes also called general form) for the equation of a line is $ax + by = c$, where a and b are not both zero.

substitution Integration by substitution is one of the most common techniques of integration, used to reduce complicated integrals into one of the basic integration forms.

synthetic division a shortcut alternative to long division, which uses only the coefficients of the divisor and dividend; it is only applicable if the divisor is linear.

tangent line The tangent line to a function is a straight line that just touches the function at a particular point and has the same slope as the function at that point.

test points points chosen based on the graph of an inequality to determine which regions of the graph (as defined by the inequality) make it true.

trigonometric substitution A technique of integration where a substitution involving a trigonometric function is used to integrate a function involving a radical.