



Alignment Document
State of Nebraska and Aventa Learning Calculus

Calculus
2005-2007 Benchmark Blueprint

Strand	Standards	Benchmarks	Unit Name	Course Topic Description
12.1 Numeration/Number Sense	12.1.1 Describe and compare the relationships between subsets of real numbers.	12.1.1.A Draw Venn diagrams including, but not limited to, natural, whole, integers, rational, irrational, and real numbers.		
		12.1.1.B Find intersection and union of two sets of numbers.		
		12.1.1.C Given a number, identify which subsets it belongs.		
		12.1.1.D Justify why a number does not belong to a specific set.		
	12.1.2 Express the equivalent forms of numbers using exponents, radicals, scientific notation, absolute values, fractions, decimals, and percents.	Limits and Their Properties	Linear Models and Rates of Change	
		Limits and Their Properties	Functions, Graphs of Functions, and Finding Models to Data	
Differentiation		Implicit Differentiation		
Applications of Differentiation		Derivative Tests, Limits, and Graphs		
Applications of Differentiation		Optimization, Newton's Method, and Differentials		
	Integration	Area, Riemann Sums, and Definite Integrals		



			<p>Integration</p> <p>Differential Equations</p> <p>Applications of Integration</p> <p>Applications of Integration</p>	<p>Integration by Substitution and Numerical Integration</p> <p>Separation of Variables and First Order Linear Differential Equations</p> <p>Volumes, Arc Lengths, and Surfaces</p> <p>Work, Moments, and Fluids</p>
<p>12.2 Computation/Estimation</p>	<p>12.2.1 Solve theoretical and applied problems using numbers in equivalent forms, radicals, exponents, scientific notation, absolute values, fractions, decimals, and percents, ratios and proportions, order of operations, and properties of real numbers.</p>		<p>Limits and Their Properties</p> <p>Limits and Their Properties</p> <p>Differentiation</p> <p>Applications of Differentiation</p> <p>Applications of Differentiation</p> <p>Integration</p> <p>Integration</p> <p>Differential Equations</p>	<p>Linear Models and Rates of Change</p> <p>Functions, Graphs of Functions, and Finding Models to Data</p> <p>Implicit Differentiation</p> <p>Derivative Tests, Limits, and Graphs</p> <p>Optimization, Newton's Method, and Differentials</p> <p>Area, Riemann Sums, and Definite Integrals</p> <p>Integration by Substitution and Numerical Integration</p> <p>Separation of Variables and First Order Linear Differential Equations</p>



			Applications of Integration	Volumes, Arc Lengths, and Surfaces
			Applications of Integration	Work, Moments, and Fluids
12.2.2 Justify solutions to mathematical problems.	12.2.2.A Write an explanation based on the context of the problem stating why the solution is reasonable.		Limits and Their Properties	Finding Limits Graphically, Numerically, and Analytically
			Applications of Differentiation	Derivative Tests, Limits, and Graphs
			Integration	Area, Riemann Sums, and Definite Integrals
			Integration	Integration by Substitution and Numerical Integration
			Applications of Integration	Work, Moments, and Fluids
12.2.3 Perform estimations and computations of real numbers mentally, with paper and pencil, and with technology.			Applications of Differentiation	Extrema and The Mean Value Theorem
			Applications of Differentiation	Derivative Tests, Limits, and Graphs
			Applications of Differentiation	Optimization, Newton's Method, and Differentials
			Integration	Antiderivatives and Indefinite Integration
			Integration	Area, Riemann Sums, and Definite Integrals
			Integration	The Fundamental Theorem of Calculus



			<p>Integration</p> <p>Logarithmic, Exponential, and Other Transcendental Functions</p> <p>Logarithmic, Exponential, and Other Transcendental Functions</p> <p>Logarithmic, Exponential, and Other Transcendental Functions</p> <p>Differential Equations</p> <p>Applications of Integration</p> <p>Applications of Integration</p> <p>Applications of Integration</p>	<p>Integration by Substitution and Numerical Integration</p> <p>The Natural Logarithmic Function</p> <p>Inverse Functions and Exponential Functions</p> <p>Inverse Trigonometric Functions</p> <p>Slope Fields, Euler's Method, and Growth and Decay</p> <p>Area of a Region Between Two Curves</p> <p>Volumes, Arc Lengths, and Surfaces</p> <p>Work, Moments, and Fluids</p>
12.3 Measurement	12.3.1 Select and use measuring units, tools, and/or technology and explain the degree of accuracy and precision of measurements.	12.3.1.A Explain the accuracy of the measurement.	<p>Applications of Differentiation</p> <p>Integration</p>	<p>Optimization, Newton's Method, and Differentials</p> <p>Area, Riemann Sums, and Definite Integrals</p>

			Integration	Integration by Substitution and Numerical Integration
			Applications of Integration	Work, Moments, and Fluids
		12.3.1.B Explain the precision of the measurement tool.		
	12.3.2 Convert between metric and standard units of measurement, given conversion factors.	12.3.2.A Change yards to meters.		
		12.3.2.B Change miles/hours to meters/second.		
12.4 Geometry/Spatial Concepts	12.4.1 Calculate perimeter and area of two-dimensional shapes and surface area and volume of three-dimensional shapes.		Limits and Their Properties	Finding Limits Graphically, Numerically, and Analytically
			Differentiation	Implicit Differentiation
			Applications of Differentiation	Optimization, Newton's Method, and Differentials
			Integration	Area, Riemann Sums, and Definite Integrals
			Integration	The Fundamental Theorem of Calculus
			Integration	Integration by Substitution and Numerical Integration
			Logarithmic, Exponential, and Other Transcendental Functions	The Natural Logarithmic Function
			Applications of Integration	Area of a Region Between Two Curves

			Applications of Integration	Volumes, Arc Lengths, and Surfaces
			Applications of Integration	Work, Moments, and Fluids
	12.4.2 Create geometric models to describe the physical world.	12.4.2.A Create perspective drawing. 12.4.2.B Create scale models.		
	12.4.3 Evaluate characteristics and properties of two- and three-dimensional geometric shapes.	12.4.3.A Classify and compare attributes of two- and three-dimensional shapes.		
		12.4.3.B Classify shapes in terms of congruence and similarity and apply these relationships.		
		12.4.3.C Determine the effects of changing dimensions on perimeter, area, and volume.		
		12.4.3.D Investigate and deduce geometric properties using transformations such as translations, rotations, and reflections.		
	12.4.4 Apply coordinate geometry to locate and describe objects algebraically.	12.4.4.A Graph a geometric shape and determine the slope of the sides.		
		12.4.4.B Identify the missing vertices of a polygon.		
	12.4.5 Apply right triangle trigonometry to find length and angle measures.		Differentiation Applications of Differentiation	Implicit Differentiation Optimization, Newton's Method, and Differentials
	12.4.6 Apply geometric properties to solve problems.	12.4.6.A Find missing angles and lengths of geometric shapes using geometric properties. (Properties may include, but are not limited to, similarity, parallel and line-transversal).		
	12.4.7 Apply deductive reasoning to arrive at a conclusion.	12.4.7.A Justify steps when solving an algebraic equation using properties of real numbers.	Limits and Their Properties	Linear Models and Rates of Change

			Applications of Differentiation	Derivative Tests, Limits, and Graphs
			Applications of Differentiation	Optimization, Newton's Method, and Differentials
			Applications of Integration	Area of a Region Between Two Curves
		12.4.7.B Use logic statements, paragraph proof, two-column proof, or algebraic proof to arrive at a conclusion.		
12.5 Data Analysis, Probability, and Statistical Concepts	12.5.1 Select a sampling technique to gather data, analyze the resulting data, and make inferences.	12.5.1.A Justify the chosen sampling techniques.		
		12.5.1.B Use technology to analyze the data.	Limits and Their Properties	Functions, Graphs of Functions, and Finding Models to Data
	12.5.2 Write equations and make predictions from sets of data.	12.5.2.A Display data in a scatter plot, describe its shape, and estimate how close the data comes to fitting an equation.	Limits and Their Properties	Linear Models and Rates of Change
		12.5.2.B Relate the slope of a regression line to the rate of change for the data set.	Limits and Their Properties	Functions, Graphs of Functions, and Finding Models to Data
		12.5.2.C Determine what the y-intercept or beginning value indicates about the data.	Limits and Their Properties	Linear Models and Rates of Change
		12.5.2.D Determine the validity of predictions made from regression equations.	Limits and Their Properties	Functions, Graphs of Functions, and Finding Models to Data
		12.5.3 Apply theoretical probability to represent problems and make decisions.	12.5.3.A Explain the likelihood of the next event based on theoretical probabilities.	
	12.5.4 Evaluate how transformations on data affect the	12.5.4.A Describe how adding the same amount to each score changes the mean,		

	measures of central tendency and variability.	median, mode, range, outliers, interquartile points, maximum, and minimum.		
		12.5.4.B Describe how dropping an outlier changes the other measures.		
	12.5.5 Interpret data represented by the normal distribution and formulate conclusions.	12.5.5.A Sketch a normal or bell curve, label one and two standard deviations from the mean and fill in approximate percents associated with the deviations.		
		12.5.5.B Determine factors that will produce a curve that is not normal.		
		12.5.5.C Describe how sample size is related to a normal curve.		
		12.5.5.D Determine position or rank relative to others in a normally distributed group given the standard deviation and mean.		
	12.5.6 Calculate probabilities of independent events.	12.5.6.A Calculate probabilities using the fundamental counting principle and permutations.		
12.6 Algebraic Concepts	12.6.1 Graph and interpret algebraic relations and inequalities.	12.6.1.A Describe a graph by identifying intercepts, slopes, maximum, minimum, increasing, decreasing, parallel, and perpendicular.	Limits and Their Properties Limits and Their Properties Differentiation Differentiation Differentiation Differential Equations Applications of	Linear Models and Rates of Change Functions, Graphs of Functions, and Finding Models to Data The Derivative Differentiation Implicit Differentiation Slope Fields, Euler's Method, and Growth and Decay Extrema and The Mean Value

			Differentiation Applications of Differentiation Applications of Differentiation	Theorem Derivative Tests, Limits, and Graphs Optimization, Newton's Method, and Differentials
		12.6.1.B Use families of curves to describe the effect of changing coefficients of an equation.		
12.6.2 Solve problems involving equations and inequalities.	12.6.2.A Use appropriate methods to solve linear and quadratic equations.		Limits and Their Properties Applications of Differentiation Applications of Differentiation Applications of Differentiation	Linear Models and Rates of Change Optimization, Newton's Method, and Differentials Extrema and The Mean Value Theorem Derivative Tests, Limits, and Graphs
12.6.3 Solve problems involving systems of two equations, and systems of two or more inequalities.	12.6.3.A Solve systems by graphing, substitution, elimination, or matrices.		Limits and Their Properties	Linear Models and Rates of Change
12.6.4 Solve problems using patterns and functions.	12.6.4.A Apply direct and indirect variations.			
	12.6.4.B Recognize the properties of families of functions.			
	12.6.4.C Recognize patterns of exponential growth and decay and their significance to real-life situations.		Differential Equations	Slope Fields, Euler's Method, and Growth and Decay
	12.6.4.D Represent a problem in multiple formats (words, tables, graphs, and symbols).		Limits and Their Properties Limits and Their	Linear Models and Rates of Change Functions, Graphs of Functions,



			Properties	and Finding Models to Data
			Limits and Their Properties	Finding Limits Graphically, Numerically and Analytically
			Differentiation	The Derivative
			Differentiation	Implicit Differentiation
			Applications of Differentiation	Extrema and the Mean Value Theorem
			Applications of Differentiation	Derivative Tests, Limits and Graphs
			Applications of Differentiation	Optimization, Newton's Method and Differentials
			Integration	Antiderivatives and Indefinite Integration
			Integration	Area, Riemann Sums, and Definite Integrals
			Integration	The Fundamental Theorem of Calculus
			Integration	Integration by Substitution and Numerical Integration
			Logarithmic, Exponential, and Other Transcendental Functions	The Natural Logarithmic Function
			Logarithmic,	Inverse Functions and



			Exponential, and Other Transcendental Functions	Exponential Functions
			Logarithmic, Exponential, and Other Transcendental Functions	Inverse Trigonometric Functions
			Differential Equations	Slope Fields, Euler's Method, and Growth and Decay
			Applications of Integration	Area of a Region Between Two Curves
			Applications of Integration	Volumes, Arc Lengths, and Surfaces
			Applications of Integration	Work, Moments, and Fluids