

# Mathematics

Key for "Province":

**Bold type – BC Big Ideas**

Regular type – BC content (K-9)

\* - BC curricular competency/content (HS)

K-9 Curricular Competencies used throughout all topics: reasoning and analyzing, understanding and solving, communicating and representing

Topics	Gr	North American Division	Province:
Numbers and Operations	12	None	
Operations and Algebraic Thinking	12	AI.2.1 Understand mathematical concepts (number sense, algebraic and geometric thinking, measurement, data analysis, and probability). MP.7	<p><b>(P12) Understanding the characteristics of families of functions allows us to model and understand relationships and to build connections between classes of functions.</b></p> <p><b>(C12) The concept of a limit is foundational to calculus: functions and graphs.</b></p> <p>*Estimate reasonably and demonstrate fluent, flexible, and strategic thinking about number.</p> <p>*Connect mathematical concepts with each other, other areas, and personal interests.</p>
		AI.2.2 Utilize the problem-solving process (explore, plan, solve, verify). MP.1, MP.2	<p><b>(P12) Understanding the characteristics of families of functions allows us to model and understand relationships and to build connections between classes of functions.</b></p> <p><b>(C12) The concept of a limit is foundational to calculus.</b></p> <p>*Solve problems with persistence and a positive disposition.</p> <p>*Apply flexible and strategic approaches to solve problems.</p>
		AI.2.3 Develop higher-order thinking skills (analyze, evaluate, reason, classify, predict, generalize, solve, decide, relate, interpret, simplify, model, synthesize).MP.2, MP.3, MP.4	<p><b>(P12) Understanding the characteristics of families of functions allows us to model and understand relationships and to build connections between classes of functions.</b></p> <p><b>(C12) Derivatives and integrals are inversely related.</b></p> <p>*Explore, analyze, and apply mathematical ideas using reason, technology, and other tools.</p> <p>*Model with mathematics in situational contexts.</p> <p>*Explain and justify mathematical ideas and decisions in many ways.</p> <p>*Apply flexible and strategic approaches to solve problems.</p> <p>*Develop thinking strategies to solve puzzles and play games.</p>
		AI.2.4 Attend to precision. MP.6	<p><b>(P12) Understanding the characteristics of families of functions allows us to model and understand relationships and to build connections between classes of functions: transformations</b></p> <p><b>(C12) The concept of a limit is foundational to calculus.</b></p> <p>*Estimate reasonably and demonstrate fluent, flexible, and strategic thinking about number.</p>
		AI.3.1 Use a variety of strategies in the problem-solving process (i.e. patterns, tables, diagrams). MP.7, MP.8	<p><b>(P12) Understanding the characteristics of families of functions allows us to model and understand relationships and to build connections between</b></p>

		<p><b>classes of functions: exponential, geometric, logarithms, polynomial, rational, and trigonometry.</b></p> <p><b>(C12) Derivatives and integrals are inversely related.</b></p> <p>*Apply flexible and strategic approaches to solve problems.</p>
	AI.3.2 Conduct research (locate, observe/gather, analyze, conclude).	<p><b>(P12) Understanding the characteristics of families of functions allows us to model and understand relationships and to build connections between classes of functions.</b></p> <p><b>(C12) Derivatives and integrals are inversely related.</b></p> <p>*Explore, analyze, and apply mathematical ideas using reason, technology, and other tools.</p>
	AI.3.3 Perform calculations with and without technology in life situations. MP.5	<p><b>(P12) Understanding the characteristics of families of functions allows us to model and understand relationships and to build connections between classes of functions.</b></p> <p><b>(C12) Derivatives and integrals are inversely related.</b></p> <p>*Explore, analyze, and apply mathematical ideas using reason, technology, and other tools.</p> <p>*Estimate reasonably and demonstrate fluent, flexible, and strategic thinking about number (this is part of the mental math section).</p> <p>*Model with mathematics in situational contexts (this is related to real-life scenarios).</p>
	AI.3.4 Read critically and communicate proficiently with mathematical vocabulary.	<p><b>(P12) Understanding the characteristics of families of functions allows us to model and understand relationships and to build connections between classes of functions.</b></p> <p><b>(C12) Derivatives and integrals are inversely related.</b></p> <p>*Use mathematical vocabulary and language to contribute to discussions in the classroom.</p> <p>*Develop, demonstrate, and apply conceptual understanding of mathematical ideas through play, story, inquiry, and problem solving (mostly for the story part).</p>
	CA.4 Be able to understand concepts of differentiation and integration.	<p><b>(C12) Differential calculus develops the concept of instantaneous rate of change.</b></p> <p>*The whole differentiation and integration sections.</p>
	CA.4.1 Understand limits of functions (i.e. definition, graphs, calculating, properties, behaviors, finite, infinite, one-sided).	<p><b>(C12) The concept of a limit is foundational to calculus.</b></p> <p>*Limits.</p> <p>*Left and right limits.</p> <p>*Limits to infinity.</p>
	CA.4.2 Identify continuity of functions (i.e. intuitively, definition in terms of limits, and graphically).	<p><b>(C12) The concept of a limit is foundational to calculus.</b></p> <p>*Continuity</p> <p>*Limits</p>
	CA.4.3 Demonstrate knowledge of the derivative (i.e. concept, definition, at a point, as a function, applications, linearization and second derivatives).	<p><b>(C12) Differential calculus develops the concept of instantaneous rate of change.</b></p> <p>*Differentiation: rate of change, rules, higher order &amp; implicit, applications.</p>

		CA.4.4 Demonstrate knowledge of the integral (i.e. concept, definition of anti-derivatives, techniques, fundamental theorems of calculus, and numerical approximations).	<b>(C12) Integral calculus develops the concept of determining a product involving a continuously changing quantity over an interval.</b> *Integration: approximations, fundamental theorem, methods, and application.
		CA.5 Be able to represent mathematical relationships and situations using calculus.	<b>(C12) The concept of a limit is foundational to calculus: functions and graphs.</b> *Represent mathematical ideas in concrete, pictorial, and symbolic forms.
		CA.5.1 Interpret applications of the derivative in various situations (i.e. optimization, velocity, speed, acceleration, increasing/decreasing, concave up/down and points of inflection).	<b>(C12) Differential calculus develops the concept of instantaneous rate of change.</b> *Applications of differentiation.
		CA.5.2 Solve a variety of situations (physical, biological, or economic) and represent their limits as definite integrals.	<b>(C12) Derivatives and integrals are inversely related.</b> *Methods of integration. *Limits.
		CA.5.3 Identify, graph, and interpret various derivatives and integrals in applied contexts.	<b>(C12) Derivatives and integrals are inversely related.</b> *Applications of differentiation. *Applications of integration.
		CA.5.4 Present solutions resulting from applications of derivatives and integrals in conjunction with substitution techniques in finding anti-derivatives.	<b>(C12) Derivatives and integrals are inversely related.</b> *Methods of integration.
		CA.6 Be able to apply appropriate techniques, tools, and formulas to interpret and solve problems,	<b>(P12) Understanding the characteristics of families of functions allows us to model and understand relationships and to build connections between classes of functions.</b> <b>(C12) Derivatives and integrals are inversely related.</b> *Solve problems with persistence and a positive disposition. *Apply flexible and strategic approaches to solve problems.
		CA.6.1 Compute the derivatives of functions using the sum, product, quotient, and chain rules.	<b>(C12) Derivatives and integrals are inversely related.</b> *Differentiation rules.
		CA.6.3 Demonstrate mathematical mastery of a graphing utility.	<b>(P12) Understanding the characteristics of families of functions allows us to model and understand relationships and to build connections between classes of functions.</b> <b>(C12) Derivatives and integrals are inversely related.</b> *Explore, analyze, and apply mathematical ideas using reason, technology, and other tools.
Measurement	12	CA.6.2 Use the integral in specific applications to give accumulated change, find the area of a region, the volume of a solid with known cross sections, the average value of a function, and the distance traveled by a particle along a line.	<b>(C12) Integral calculus develops the concept of determining a product involving a continuously changing quantity over an interval.</b> *Applications of integration
Geometry	12	None	
	12	CA.7 Be able to analyze results and draw appropriate conclusions.	<b>(P12) Understanding the characteristics of families of functions allows us to model and understand</b>

Data Analysis, Statistics, and Probability			<p><b>relationships and to build connections between classes of functions.</b></p> <p><b>(C12) Derivatives and integrals are inversely related.</b></p> <p>*Explain and justify mathematical ideas and decisions in many ways.</p>
		CA.7.1 Find and interpret information from graphs, charts, and numerical data.	<p><b>(P12) Understanding the characteristics of families of functions allows us to model and understand relationships and to build connections between classes of functions.</b></p> <p><b>(C12) Derivatives and integrals are inversely related.</b></p> <p>*Explore, analyze, and apply mathematical ideas using reason, technology, and other tools.</p>
		CA.7.2 Predict patterns and generalize trends.	<p><b>(P12) Understanding the characteristics of families of functions allows us to model and understand relationships and to build connections between classes of functions.</b></p> <p><b>(C12) Derivatives and integrals are inversely related.</b></p> <p>*Visualize to explore and illustrate mathematical concepts and relationships.</p>
		CA.7.3 Judge meaning, utility, and reasonableness of findings in a variety of situations, including those carried out by technology.	<p><b>(P12) Understanding the characteristics of families of functions allows us to model and understand relationships and to build connections between classes of functions.</b></p> <p><b>(C12) Derivatives and integrals are inversely related.</b></p> <p>*Apply flexible and strategic approaches to solve problems.</p> <p>*Explore, analyze, and apply mathematical ideas using reason, technology, and other tools.</p>
Christian Values	12	None	

Note: NAD Secondary Mathematics standards are classified by course rather than by grade. For the correlation above, course standards were assigned to grades as follows:

- Gr. 9 – Algebra I standards; Pre-Algebra standards
- Gr. 10 – Algebra II standards; Geometry standards
- Gr. 11 – Consumer Math standards; pre-Calculus standards
- Gr. 12 – Calculus standards

\*\*BC Note: Math 11 and 12 standards reflect two courses for each grade:

- Gr. 11 – Foundations of Math (F11), Pre-Calculus 11 (P11)
- Gr. 12 – Pre-Calculus 12 (P12), Calculus 12 (C12)