



Calculus

2010

**SECONDARY MATHEMATICS STANDARDS
IN SEVENTH-DAY ADVENTIST SCHOOLS**

OFFICE OF EDUCATION | North American Division Seventh-day Adventist Church

Mathematics Standards—Calculus

COURSE FOCUS [Apply the following to each content standard.]

- CA.1 Identify SDA Christian principles and values in correlation with mathematics.
 - CA.1.1 Recognize God as Creator and Sustainer of an ordered universe.
 - CA.1.2 Value God’s inspired writings and created works as a revelation of His precision, accuracy, and exactness.
 - CA.1.3 Develop accountability as expressed in God’s word and laws.
 - CA.1.4 Employ Christian principles as a basis for learning and growth.
 - CA.1.5 Broaden intellectual abilities through the study of mathematics.
 - CA.1.6 Make biblically-based choices when dealing with mathematical data.
 - CA.1.7 Apply biblical principles of Christian morality, integrity, and ethical behavior to mathematical processes.

COURSE ABILITIES [Apply the following to each content standard.]

- CA.2 Develop abilities in mathematics.
 - CA.2.1 Understand mathematical concepts (number sense, algebraic and geometric thinking, measurement, data analysis, and probability).
 - CA.2.2 Utilize the problem-solving process (explore, plan, solve, verify).
 - CA.2.3 Develop higher thinking skills (analyze, evaluate, reason, classify, predict, generalize, solve, relate, interpret, simplify, model, synthesize).
- CA.3 Be able to apply math knowledge and skills to a variety of purposes.
 - CA.3.1 Use a variety of strategies in the problem-solving process (patterns, tables, diagrams, etc.).
 - CA.3.2 Conduct research (locate, observe/gather, analyze, conclude).
 - CA.3.3 Perform calculations with and without technology in life situations.
 - CA.3.4 Read critically and communicate proficiently with mathematical vocabulary.

COURSE CONTENT [understand, represent, apply, analyze]

- CA.4 Be able to understand concepts of differentiation and anti-differentiation.
 - CA.4.1 Understand limits of functions (definition, from graphs, calculating of, properties and behaviors, finite, infinite, one-sided).
 - CA.4.2 Identify continuity of functions (intuitively, definition in terms of limits, and graphically).
 - CA.4.3 Demonstrate knowledge of the derivative (concept, definition, at a point, as a function, applications, linearization and second derivatives).
 - CA.4.4 Demonstrate knowledge of the integral (concept, definition anti-derivatives, techniques, fundamental theorem of calculus, and numerical approximations).
- CA.5 Be able to represent mathematical relationships and situations using calculus.
 - CA.5.1 Interpret applications of the derivative in various situations (optimization, velocity, speed, acceleration, increasing/decreasing, concave up/down and points of inflection).
 - CA.5.2 Solve a variety of situations (physical, biological, or economic) by setting up a Riemann sum and representing its limit as a definite integral.
 - CA.5.3 Identify, graph, and interpret various derivatives and integrals in applied contexts.
 - CA.5.4 Present solutions resulting from applications of derivatives and integrals in conjunction with substitution techniques in finding anti-derivatives.
- CA.6 Be able to apply appropriate techniques, tools, and formulas to interpret and solve problems,
 - CA.6.1 Compute the derivatives of functions using the sum, product, quotient, and chain rules.
 - 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.
 - CA.6.3 Demonstrate mathematical proficiency using a graphing utility.
- CA.7 Be able to analyze results and draw appropriate conclusions.
 - CA.7.1 Find and interpret information from graphs, charts, and numerical data.
 - CA.7.2 Predict patterns and generalize trends.
 - CA.7.3 Judge meaning, utility, and reasonableness of findings in a variety of situations, including those carried out by technology.