2018 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-order thinking skills (analyze, evaluate, reason, classify, predict, generalize, solve, relate, interpret, simplify, model, synthesize).

**CA.3 Be able to apply mathematical knowledge and skills to a variety of purposes.**

CA.3.1 Use a variety of strategies in the problem-solving process (i.e. patterns, tables, diagrams).

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 a mathematical vocabulary.

**Course Content (Understand, represent, apply, analyze.)**

**CA.4 Be able to understand concepts of differentiation and integration.**

CA.4.1 Understand limits of functions (i.e. definition, graphs, calculating, properties, behaviors, finite, infinite, one-sided).

CA.4.2 Identify continuity of functions (i.e. intuitively, definition in terms of limits, and graphically).

CA.4.3 Demonstrate knowledge of the derivative (i.e. concept, definition, at a point, as a function, applications, linearization and second derivatives).

CA.4.4 Demonstrate knowledge of the integral (i.e. concept, definition of anti-derivatives, techniques, fundamental theorems 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 (i.e. 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) and represent their limits as definite integrals.

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 mastery of 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.