Curriculum Year 7

Limits, sequences and series:
- Definition of a sequence, arithmetic and geometric sequences
- Definition of a series, the sigma notation, arithmetic and geometric series
- Convergent series and sums to infinity
- Applications of arithmetic and geometric sequences and series

Differential Calculus - Basics:
- Gradient of a secant and tangent line, difference and differential quotient
- Differentiation from first principles, derivative of a function
- Rules for differentiation: power rule, constant rule, constant multiple rule, sum and difference rule, product rule, quotient rule, chain rule
- Equations of tangent and normal lines to a curve
- Derivative of the exponential and logarithmic function
- Second and higher order derivatives

Differential Calculus – kinematics:
- Rates of change
- Definition of displacement, velocity, speed, acceleration and applications
- Modelling vertical motion and motion in a line

Differential Calculus – curve sketching:
- The derivative and graphing: critical numbers (points), increasing and decreasing functions, the first derivative test
- Stationary points: turning points and stationary points of inflection, the second derivative test
- Stationary and non-stationary points of inflection
- Absolute (global) extrema
- Graph sketching
- Graphing f(x), f´(x), f´´(x) if given <u>one</u> of the graphs

Differential calculus – modelling of a function and optimization problems:
- Obtaining the equation of a polynomial function from given properties of its derivatives
- Optimization problems, applications including profit, area, volume, distance, time

Differential calculus with trigonometric functions:
- Derivatives of trigonometric functions
- Curve sketching with trigonometric functions (see topics for 2nd exam – curve sketching)

Bivariate Analysis:
- Scatter diagrams and terminology
- Drawing the regression line (line of best fit) by eye using the mean point
- Understanding and interpreting the regression line
- Using the method of least squares regression and the GDC to draw the regression line and to measure the correlation
- Interpreting the Pearson product-moment correlation coefficient

Discrete random variables and their probability distribution:
- The concept of discrete random variables
- Expected value (expectation, mean) and variance of a discrete random variable
- Applications

Discrete probability distributions: binomial and hypergeometric distribution:
- Definition of a binomial distribution, expectation (mean) and variance of a binomial distribution
- Definition of a hypergeometric distribution
- Applications