

## Mathematics Methods (ATAR)

**Students who have not met the minimum standard of numeracy through the Online Literacy and Numeracy Assessment (OLNA) are not eligible for this course**

**Pre-requisite:** a 'B' grade or better in Year 10A Mathematics is highly recommended

This course focuses on the use of calculus and statistical analysis. The study of calculus provides a basis for understanding rates of change in the physical world, and includes the use of functions, their derivatives and integrals, in modelling physical processes. The study of statistics develops students' ability to describe and analyse phenomena that involve uncertainty and variation.

Mathematics Methods provides a foundation for further studies in disciplines in which mathematics and statistics have important roles. It is also advantageous for further studies in the health and social sciences.

In summary, this course is designed for students whose future pathways may involve mathematics and statistics and their applications in a range of disciplines at the tertiary level.

# Mathematics

## Courses

### Course Structure

#### Year 11

##### Unit 1

- This unit begins with a review of the basic algebraic concepts and techniques required for a successful introduction to the study of calculus.
- The basic trigonometric functions are then introduced. Simple relationships between variable quantities are reviewed, and these are used to introduce the key concepts of a function and its graph.
- The study of inferential statistics begins in this unit with a review of the fundamentals of probability and the introduction of the concepts of counting, conditional probability and independence.
- Access to technology to support the computational and graphical aspects of these topics is assumed.

##### Unit 2

- The algebra section of this unit focuses on exponentials. Their graphs are examined and their applications in a wide range of settings are explored.
- Arithmetic and geometric sequences are introduced and their applications are studied.
- Rates and average rates of change are introduced, and this is followed by the key concept of the derivative as an 'instantaneous rate of change'. These concepts are reinforced numerically, by calculating difference quotients both geometrically as slopes of chords and tangents, and algebraically.
- Calculus is developed to study the derivatives of polynomial functions, with simple application of the derivative to curve sketching, the calculation of slopes and equations of tangents, the determination of instantaneous velocities and the solution of optimisation problems. The unit concludes with a brief consideration of anti-differentiation.

# Mathematics

## Courses

### Unit 3

- The study of calculus continues with the derivatives of exponential and trigonometric functions and their applications, together with some differentiation techniques and applications to optimisation problems and graph sketching.
- It concludes with integration, both as a process that reverses differentiation and as a way of calculating areas.
- The fundamental theorem of calculus as a link between differentiation and integration is emphasised.
- In statistics, discrete random variables are introduced, together with their uses in modelling random processes involving chance and variation. This supports the development of a framework for statistical inference.

### Unit 4

- The calculus in this unit deals with derivatives of logarithmic functions.
- In probability and statistics, continuous random variables and their applications are introduced and the normal distribution is used in a variety of contexts.
- The study of statistical inference in this unit is the culmination of earlier work on probability and random variables. Statistical inference is one of the most important parts of statistics, in which the goal is to estimate an unknown parameter associated with a population using a sample of data drawn from that population.
- In the Mathematics Methods ATAR course, statistical inference is restricted to estimating proportions in two-outcome populations.