

Head Start: Year 11 and 12 Mathematics

A two-week intensive course preparing students for senior high school mathematics.

Course Overview

Head Start: Year 11 and 12 Mathematics is one of our most popular and impactful courses. It was one of the very first courses we ever ran, and we have run it every year since. Designed for motivated students heading into or already in senior mathematics, it covers the higher-level courses across the ACT, NSW and IB curricula. By the end, students will have worked through almost all of the Year 11 and 12 content, giving them a genuine head start on what lies ahead or a clearer, more connected view of what they have already studied. The course was formerly known as *Advanced Mathematics*.

This is not a typical holiday course aimed at a quick grade boost. At school, topics are often taught in an order set by textbooks and timetables rather than by how the ideas connect. Head Start puts the content into a logical sequence: algebra builds into functions, functions into calculus, and probability into statistics. Each new concept arrives once students have the foundations to understand it, so they can see how the pieces of senior mathematics fit together.

Every student receives a detailed course book with clear explanations, practice questions and worksheets. It is a reference they can return to throughout Years 11 and 12 and beyond. Our aim is for students to finish the course better prepared, and with a new appreciation of mathematics as a connected, logical subject.

Course Delivery:

- Lecture-style classrooms
- Small group tutorials
- Workbooks and additional worksheets
- Examinations

Target students:

- Year 10 Students (Advanced)
- Year 11 Students
- Year 12 Students

Key Course Information

Length: 80 Hours total (10 days)
Dates: Monday 18th to Friday 29th January
Times: 9am to 5pm daily
Location: Wise Minds Belconnen
Positions: 20 students (First in best dressed)
Price: $1,600 for the entire course (Including GST)
Can be paid in two equal instalments

Relevant School Subjects

- ACT Mathematical Methods
- ACT Specialist Methods
- HSC Mathematics
- HSC Mathematics Extension 1
- HSC Mathematics Extension 2
- IB SL Mathematics
- IB HL Mathematics

Enrolment:

Please email the course director below expressing your interest and request to be enrolled in the course. Please note a deposit will be required to confirm your slot.

Course Director: Rhys@WiseMindsTutoring.com.au (Ph: 0489089919)
Course Convenor: Lachlan@WiseMindsTutoring.com.au (Ph: 0489071014)

Course Overview

1. Advanced Algebraic Techniques

1. Expanding Binomials
2. Expanding Trinomials
3. Difference of Two Squares
4. Perfect Squares
5. Solving Quadratics
6. Long Division of Polynomials
7. Solving Polynomials

2. Numbers and Surds

1. Rationalising the Denominator
2. Rationalising Binomial Denominators

3. Exponential and Logarithmic Functions

1. Logarithm, Logarithm Laws, and Index Laws
2. Logarithmic Functions
3. Exponential Functions
4. Application of Logarithmic and Exponential Functions

4. The Coordinate Plane and Polynomials

1. Lengths and Midpoints of Intervals
2. Gradients and Intervals
3. Points of Intersection of Lines and Curves
4. The General Solution to These Problems
5. Perpendicular Distance
6. Sum and Product of Roots (Quadratics)

5. Trigonometry

1. The Radian and Degree
2. Sine, Cosine, and Tangent
3. Cotangent, Secant, and Cosecant
4. Problems with Right-Angled Triangles
5. The Sine Rule
6. The Cosine Rule
7. Angles of Elevation, Depression, and Coordinates
8. 3-Dimensional Trigonometry
9. The Area of a Triangle (Trigonometry)
10. Graphing Trigonometric Equations
11. Trigonometric Identities
12. Basic Trigonometric Equations
13. More Complicated Trigonometric Equations

6. Probability and Statistics

1. Introduction to Probability Notation
2. Sample Spaces
3. Conditional Probability
4. Discrete Random Variables
5. Expected Value, Mean, Variance, and Standard Deviation
6. Bernoulli Sequences and the Binomial Probability Distribution
7. The Graph, Expectation, and Variance for Binomial Distributions
8. Finding the Sample Size of a Binomial Distribution
9. Continuous Random Variables
10. Measures of Spread
11. Properties of the Mean and Variance
12. The 68-95-99.7% Rule
13. Determining the Normal Probability
14. Sampling, Estimation, and Confidence Intervals

7. Sequences and Series

1. What is a Series?
2. Arithmetic Series
3. Summing Arithmetic Sequences
4. Geometric Series
5. Summing Geometric Sequences
6. The Infinite Sum of a Geometric Sequence
7. Applying Sequences and Series

8. Calculus: Functions and Review

1. What is a Function?
2. Function Notation
3. Polynomial Functions
4. Introduction to Limits
5. Review of the Gradient
6. Log Laws and Index Laws

9. Calculus: Introduction to Differentiation

1. Differentiation by First Principles
2. Application of First Principles
3. Rule for Polynomial Differentiation
4. Derivatives of Negative Indices
5. Derivative of Surd Functions
6. The Chain Rule
7. The Product Rule
8. The Quotient Rule
9. Differentiation of Exponentials
10. Differentiation of Logarithms
11. Differentiation of Trigonometric Functions

10. Calculus: Application of Differentiation

1. Identifying Turning Points
2. Finding x for a Given Gradient
3. Equation of the Tangent
4. Equation of the Normal
5. Second Derivative and Concavity/Inflection
6. Maxima and Minima
7. Curve Sketching

11. Calculus: Integration

1. The Rule for Integration
2. Definite Integrals
3. Indefinite Integrals
4. Areas with Integration
5. Areas of Compound Regions
6. Integration by Substitution
7. Integration by Parts
8. Rotation Around the x-y Axis
9. Integration of Trigonometric Functions
10. Integration of Other Functions

12. The Binomial Distribution and Further Probability

1. Probability and Sample Spaces
2. Venn Diagrams and Probability Notation
3. Permutations
4. Combinations
5. Binomial Probability