

TMUA Preparation Programme

24-Session Intensive | 36 Hours | Private 1:1 Online Coaching

A structured, high-intensity programme designed to develop the mathematical depth, reasoning ability, problem-solving judgement and examination performance required for a strong TMUA result.

Student Journey

DIAGNOSE → BUILD → DEVELOP → REASON → OPTIMISE → PERFORM

PHASE I — DIAGNOSE & BUILD

Session 1 — Initial Diagnostic & Programme Calibration

A comprehensive diagnostic covering:

- Algebra and equations
- Inequalities and bounds
- Functions and graphs
- Coordinate geometry
- Trigonometry
- Sequences and series
- Probability and combinatorics
- Differentiation and integration
- Mathematical reasoning
- Unfamiliar problem solving
- Accuracy and execution
- Speed and decision-making

The session establishes the student's starting profile and identifies the highest-priority areas for the programme.

Session 2 — Algebraic Structure & Advanced Manipulation

- Structural algebra
- Factorisation and identities
- Substitution
- Symmetry in algebraic expressions
- Transforming expressions
- Relationships between quantities
- Recognising hidden algebraic structure
- Efficient manipulation without unnecessary calculation

Practice: Progressive TMUA-level problems, moving from recognition to non-routine application.

Session 3 — Equations, Roots & Parameters

- Quadratic and higher-order equations
- Relationships between roots
- Simultaneous equations
- Parameter-dependent equations
- Number of solutions
- Symmetry and substitution
- Working backwards
- Using answer choices strategically

Practice: Difficult unfamiliar equations where identifying the structure is more important than performing routine algebra.

Session 4 — Inequalities, Bounds & Extremes

- Quadratic inequalities
- Rational inequalities
- Modulus
- Bounds
- Maximum and minimum values
- Comparing quantities
- Sign analysis
- Estimation and approximation
- Avoiding unnecessary exact calculation

Practice: Challenging TMUA problems requiring efficient reasoning and controlled manipulation.

Session 5 — Functions & Graphical Structure

- Functions and notation
- Composite functions
- Inverse functions
- Transformations
- Intersections
- Number of solutions
- Symmetry
- Graphical interpretation
- Algebraic versus graphical approaches

Practice: Non-routine function and graph problems with emphasis on recognising the shortest reliable route.

Session 6 — Coordinate Geometry & Geometric Reasoning

- Lines and gradients
- Intersections
- Distances and midpoints
- Coordinate transformations
- Geometric relationships
- Areas
- Symmetry
- Translating between diagrams, equations and inequalities

Practice: Integrated coordinate and geometric problems rather than routine formula application.

PHASE II — DEVELOP ADVANCED MATHEMATICAL PROBLEM SOLVING

Session 7 — Trigonometry & Structural Relationships

- Trigonometric identities
- Trigonometric equations
- Exact values
- Relationships between angles
- Graphical interpretation
- Geometric applications
- Substitution and transformation
- Recognising hidden trigonometric structure

Practice: Difficult TMUA-style trigonometric problems requiring multiple representations.

Session 8 — Sequences, Series & Recurrence

- Arithmetic and geometric sequences
- Series
- Recurrence relations
- General terms
- Index relationships
- Pattern recognition
- Telescoping structures
- Bounds
- Recursive reasoning

Practice: Unfamiliar sequence and recurrence problems with emphasis on discovering structure rather than applying a memorised formula.

Session 9 — Combinatorics & Systematic Counting

- Permutations and combinations
- Systematic counting
- Case analysis
- Complementary counting
- Symmetry
- Avoiding double counting
- Counting by structure
- Efficient enumeration

Practice: Difficult counting problems where the main challenge is choosing the correct counting framework.

Session 10 — Probability & Expected Value

- Conditional probability
- Independence
- Complementary probability
- Tree and case-based reasoning
- Expected value
- Probability through counting
- Symmetry
- Identifying misleading assumptions

Practice: Non-routine probability problems combining multiple ideas and requiring precise interpretation.

Session 11 — Differentiation, Optimisation & Rates

- Differentiation
- Stationary points
- Increasing and decreasing functions
- Maximum and minimum problems
- Rates of change
- Tangents
- Qualitative calculus
- Algebraic and graphical optimisation

Practice: TMUA-level optimisation problems where the calculus itself is not necessarily the difficult part—the modelling and method selection are.

Session 12 — Integration, Area & Calculus Applications

- Integration
- Area under curves
- Areas between curves
- Bounds
- Reverse reasoning
- Calculus combined with algebra
- Graphical interpretation
- Choosing efficient calculus methods

Practice: Difficult mixed calculus problems, including unfamiliar applications.

Session 13 — Integrated Mathematics & Cross-Topic Problems

The student begins solving problems where the topic is deliberately less obvious.

Focus areas include:

- Identifying the mathematical structure
- Switching between algebraic, graphical and geometric representations
- Combining multiple topics
- Selecting an efficient method
- Working backwards
- Using special cases
- Bounding and estimation
- Comparing quantities without full calculation

Practice: High-difficulty mixed TMUA problems designed to test mathematical judgement rather than topic recognition.

Session 14 — Advanced Problem-Solving Workshop

A dedicated workshop on **how strong TMUA candidates think**.

Methods include:

- Strategic substitution
- Working backwards
- Answer-choice exploitation
- Elimination
- Estimation
- Special cases
- Symmetry
- Invariance
- Bounding
- Comparing expressions
- Testing extreme cases
- Recognising when a conventional method is inefficient

Practice: Difficult unfamiliar problems selected specifically to force method selection and strategic thinking.

PHASE III — MATHEMATICAL REASONING

Session 15 — Statements, Implication & Logical Structure

- Mathematical statements
- Implication
- Converse
- Contrapositive
- Equivalence
- Necessary conditions
- Sufficient conditions
- Logical relationships

Practice: TMUA-style reasoning questions requiring precise interpretation rather than calculation.

Session 16 — Quantifiers, Negation & Counterexamples

- Universal statements
- Existential statements
- Negation
- Quantifiers

- Counterexamples
- Boundary cases
- Testing conjectures
- Determining whether a statement must be true

Practice: Increasingly subtle reasoning problems involving mathematical claims and their logical consequences.

Session 17 — Proof & Mathematical Argument

- Direct proof
- Proof by contradiction
- Contrapositive reasoning
- Assumptions
- Necessary logical steps
- Valid and invalid arguments
- Identifying gaps
- Constructing concise mathematical arguments

Practice: Problems requiring the student to evaluate and construct mathematical reasoning.

Session 18 — Integrated Mathematical Reasoning

Advanced reasoning problems combining:

- Algebra
- Number relationships
- Functions
- Sequences
- Probability
- Geometry
- Calculus
- Logic

Focus:

What exactly is being claimed?

What must be true?

What is sufficient?

What would disprove it?

What structure can be exploited?

PHASE IV — TMUA PERFORMANCE & ADVANCED APPLICATION

Session 19 — Difficult Mixed TMUA Problem Solving

A high-difficulty problem-solving session using unfamiliar questions across the full mathematical syllabus.

Focus:

- Rapid structural recognition
- Method selection
- Efficient execution
- Answer-choice analysis
- Avoiding routine-method traps
- Switching approaches when necessary
- Explaining why a method works

The objective is to move from “**I can solve this**” to “**I know how to solve this efficiently.**”

Session 20 — Advanced Problem-Solving & Decision Making

Focused coaching on examination judgement:

- Which questions to attack immediately
- Which questions require more thought
- When to abandon an approach
- When to return to a question
- How to use answer choices
- How to estimate difficulty
- How to control time without sacrificing accuracy
- How to recognise time sinks

Practice: Difficult mixed sets under controlled time pressure, followed by detailed coaching.

Session 21 — Official Paper 1 Coaching

Not a passive full-paper sitting.

Selected difficult questions from an official Paper 1 are worked through as **expert coaching**:

1. Student attempts independently.
2. Tutor diagnoses the initial approach.
3. Student explains their reasoning.

4. Tutor challenges inefficient or incomplete thinking.
5. Alternative methods are explored.
6. Answer-choice strategies are discussed.
7. Student re-solves key questions using the improved method.

A complete Paper 1 is assigned independently as preparation/performance data.

Session 22 — Official Paper 2 Coaching

Focused on the mathematical reasoning demands of Paper 2.

Coaching includes:

- Precise interpretation
- Logical structure
- Hidden assumptions
- Efficient reasoning
- Counterexamples
- Necessary versus sufficient conditions
- Answer-choice exploitation
- Difficult unfamiliar structures
- Time-efficient reasoning

Selected difficult official Paper 2 questions are coached intensively rather than spending the session watching the student complete a full paper.

A complete Paper 2 is completed independently outside the session and used for performance analysis.

Session 23 — Advanced Mixed Problem-Solving Coaching

A personalised high-difficulty session based on the student's accumulated performance.

Focus areas are selected from:

- Recurring errors
- Weak mathematical structures
- Slow question types
- Inefficient methods
- Reasoning weaknesses
- Difficult topics
- Questions repeatedly abandoned
- Accuracy under pressure

The session is deliberately adaptive rather than following a fixed topic list.

Session 24 — Final Performance Coaching

Final consolidation before the January TMUA.

Focus:

- Remaining mathematical weaknesses
- Recurring errors
- High-value methods
- Timing strategy
- Question selection
- Accuracy control
- Difficult-question strategy
- Examination routine
- Final priorities

The student leaves with a clear final preparation strategy rather than simply completing another mock examination.

CONTINUOUS ASSESSMENT MODEL

Assessment is embedded throughout the programme rather than separated into filler assessment sessions.

Initial Diagnostic → Topic-Level TMUA Problems → Advanced Mixed Problem Sets → Timed Practice → Official Past-Paper Questions → Independent Full-Paper Performance → Targeted Weakness Coaching → Final Performance Review

CORE PRINCIPLE

This is not a syllabus-completion course.

The objective is to develop six progressively stronger capabilities:

Knowledge → Recognition → Reasoning → Method Selection → Accuracy → Speed

A student who knows the mathematics but cannot recognise the structure of an unfamiliar problem will struggle on the TMUA.

The programme therefore places substantial emphasis on **difficult, unfamiliar and non-routine problem solving**, with the tutor actively analysing *how* the student thinks—not simply whether the final answer is correct.