



**Newton Moore Senior High School**  
**Mathematics**  
**Year 10 Course 1**  
**Mathematical Methods & Specialist Mathematics Preparation**  
**2016**



## Course Description

Newton Moore Senior High School (TDS Mathematics Year 7 - 12)

ADAPTED Year 10 Program 2015 for students bound for Mathematical Methods and Specialist Mathematics (Course 1)

This program is primarily designed for students who intend to study Mathematical Methods. Additional concepts are shown in italics for those preparing to also study Specialist Mathematics. As far as practicable, concepts that are important for preparation for Mathematics Applications are also included so that those students who thought they would do Mathematical Methods but decide against it during the course of Year 10 are still well prepared for Mathematics Applications.

### Rationale

In 2015 the new WACE Senior Secondary Courses will commence for Year 11 students. There are three courses for ATAR students (Mathematics Applications, Mathematical Methods and Specialist Mathematics) and three courses for students studying a General course (Essential Mathematics, Foundation Mathematics and Preliminary mathematics – aimed at Ed Support students).

As we are aiming to give our students the best preparation for these courses, it makes sense to tailor lower school programs with them in mind. The relevant Western Australian Curriculum objectives have been mapped to the Senior Secondary courses to create Backward Mapping documents. It is these documents that will guide programming for Year 10, 9, 8 and 7. The Backward Mapping documents are available on Connect Communities.

Year 10 has three streamed programs:

#### *Course 1 – Mathematical Methods/Specialist preparation*

This course matches the Year 10 Western Australian Curriculum quite well with selected 10A content also included. It is quite a full course as it prepares students for the most challenging of the Senior Secondary courses. Students studying Course 1 have the potential to achieve an A grade in all three Mathematics outcomes when the draft assessment pointers provided by the School Curriculum and Standards Association are used as the assessment reference. Additional concepts over and above the Year 10 assessment pointers are also included as they are deemed essential background for Mathematical Methods and/or Specialist Mathematics.

#### *Course 2 – Math Applications preparation*

This course has less algebra than suggested by the Year 10 Western Australian Curriculum as Math Applications limits its study of functions to linear and exponential. Therefore, these are the functions emphasised in this course, with a touch of quadratics. The data analysis section is very comprehensive. This program contains all Year 10 data analysis objectives as well as some from 10A. High achievers in this course could potentially achieve an A in Statistics and Probability, a B in Space and Measurement and a C grade in Number and Algebra. Some additional concepts over and above the Year 10 assessment pointers are also included as they are deemed important for Math Applications preparation (eg non right triangle trigonometry, standard deviation).

### *Course 3 – Essential/Foundation Mathematics preparation*

This course is at a level of difficulty lower than the Year 10 Western Australian Curriculum objectives as it is designed for those students who find Maths difficult. It includes objectives from Years 7 to 9, with some Year 10 data analysis and is a modified program. Students of this course could potentially achieve a C grade in Statistics and Probability and Measurement and Geometry and a D grade in Number and Algebra, allowing an overall C grade in Mathematics. Essential Mathematics is at a higher level than the current Stage 1 courses so this program might be more challenging than previous Course 3 programs. It can be modified if needed for those students progressing to Foundation Mathematics (Course 4).

#### **Text**

References are given for three separate texts:

Cambridge Essential Mathematics 10 + 10A (EM)

Jacaranda Maths Quest 10 + 10A for the Australian Curriculum (MQ)

Dr Terry Dwyer Mathematics 10 National Curriculum 10 + 10A (Dwyer)

#### **Assessment**

Specific assessment items are not listed in the program. It is expected that assessment will consist of tests, investigations and homework tasks. Possible investigation topics are referred to in the 'Suggested Activities' column. Tests should occur approximately twice a term but their content and timing should be decided according to individual school and class needs. An examination style assessment could be used as a taste of upper school assessment.

Students studying Course 1 have the potential to achieve an A grade in all three Mathematics outcomes when the draft assessment pointers provided by the School Curriculum and Standards Association are used as the assessment reference. *See the end of this program for Assessment Pointers.*

#### **Year 10 Achievement Standard**

By the end of Year 10, students recognise the connection between simple and compound interest. They solve problems involving linear equations and inequalities. They make the connections between algebraic and graphical representations of relations. Students solve surface area and volume problems relating to composite solids. They recognise the relationships between parallel and perpendicular lines. Students apply deductive reasoning to proofs and numerical exercises involving plane shapes. They compare data sets by referring to the shapes of the various data displays. They describe bivariate data where the independent variable is time. Students describe statistical relationships between two continuous variables. They evaluate statistical reports. Students expand binomial expressions and factorise monic quadratic expressions. They find unknown values after substitution into formulas. They perform the four operations with simple algebraic fractions. Students solve simple quadratic equations and pairs of simultaneous equations. They use triangle and angle properties to prove congruence and similarity. Students use trigonometry to calculate unknown angles in right angled triangles. Students list outcomes for multistep chance experiments and assign probabilities for these experiments. They calculate quartiles and interquartile ranges.

#### **Proficiency Strands: Year 10 Mathematics**

**Understanding:** Knowing why (Connect, understand, identify, sort, describe, interpret)

applying the four operations to algebraic fractions, finding unknowns in formulas after substitution, making the connection between equations of relations and their graphs, comparing simple and compound interest in financial contexts and determining probabilities of two and three step experiments

**Fluency:** Knowing how (calculate, recognise, choose, recall, manipulate)

factorising and expanding algebraic expressions, using a range of strategies to solve equations and using calculations to investigate the shape of data sets

**Problem Solving:** Finding out how (apply, design, plan, imagine, check)

calculating the surface area and volume of a diverse range of prisms to solve practical problems, finding unknown lengths and angles using applications of trigonometry, using algebraic and graphical techniques to find solutions to simultaneous equations and inequalities, and investigating independence of events

**Reasoning:** Finding out why (explain, justify, deduce, prove, infer, compare, contrast)

formulating geometric proofs involving congruence and similarity, interpreting and evaluating media statements and interpreting and comparing data sets

The Proficiency Strands underpin all teaching and learning in Mathematics at every level. Activities should be designed to ensure all proficiencies are developed.

## Course Outline


Time	Summary	Year 10(10A) Content Descriptions <i>MM normal type, SM italic</i>
Weeks 1 – 10	<b>Algebra Skills</b> <ul style="list-style-type: none"> <li>Algebraic fractions</li> <li>Solving Equations</li> <li>Using Formulae</li> </ul>	Solve linear equations involving simple algebraic fractions (ACMNA240)  Apply the four operations to simple algebraic fractions with numerical denominators (ACMNA232)  Substitute values into formulas to determine an unknown (ACMNA234)
	<b>Linear Functions</b> <ul style="list-style-type: none"> <li>Graphing Lines</li> <li>Parallel and Perpendicular lines</li> </ul>	Solve problems involving linear equations, including those derived from formulas (ACMNA235)  Solve problems involving parallel and perpendicular lines (ACMNA238)
	<b>Simultaneous Equations and linear inequalities</b> <ul style="list-style-type: none"> <li>Graphical Techniques</li> <li>Algebraic Techniques</li> <li>Linear inequalities</li> </ul>	Solve linear simultaneous equations, using algebraic and graphical techniques including using digital technology (ACMNA237)  Solve linear inequalities and graph their solutions on a number line (ACMNA236)
Weeks 10 - 18	<b>Trigonometry (right triangles)</b> <ul style="list-style-type: none"> <li>Trig ratios</li> <li>Finding angles</li> <li>Angle of elevation, depression</li> </ul>	Solve right angled triangle problems including those involving direction and angles of elevation and depression (ACMMG245)

Time	Summary	Year 10(10A) Content Descriptions MM normal type, SM italic
	<b>Index Laws and Surds</b> <ul style="list-style-type: none"> <li>• Negative indices</li> <li>• Fractional indices</li> <li>• Operations with surds</li> </ul>	<p>Simplify algebraic products and quotients using index laws (ACMNA231)</p> <p>Factorise algebraic expressions by taking out a common algebraic factor (ACMNA230)</p> <p>10A: Define rational and irrational numbers and perform operations with surds and fractional indices (ACMNA264)</p>
Weeks 22-28	<b>Quadratic Equations</b> <ul style="list-style-type: none"> <li>• Expanding binomial products</li> <li>• Factorising trinomials (<math>x^2 + bx + c</math>, <math>ax^2 + bx + c</math>)</li> <li>• Completing the Square</li> <li>• Solving Quadratic Equations</li> <li>• Applications of Quadratics</li> <li>• Solving Quadratics Equations by completing the square</li> <li>• Quadratic Formula</li> </ul>	<p>Solve simple quadratic equations using a range of strategies (ACMNA241)</p> <p>Expand binomial products and factorise monic quadratic expressions using a variety of strategies (ACMNA233)</p> <p>10A: Factorise monic and nonmonic quadratic expressions and solve a wide range of quadratic equations derived from a variety of contexts (ACMNA269)</p> <p>Substitute values into formulas to determine an unknown (ACMNA234)</p>
Weeks 29-31	<b>Graphing Quadratics</b> <ul style="list-style-type: none"> <li>• Sketching Parabolas from a table of values</li> <li>• Sketching Parabolas with transformations</li> <li>• Sketching <math>y = x^2 + bx + c</math> using factors</li> <li>• Sketching <math>y = x^2 + bx + c</math> by completing the square</li> <li>• Sketching <math>y = ax^2 + bx + c</math> using Quadratic Formula</li> </ul>	<p>Explore the connection between algebraic and graphical representations of ... quadratics ... using digital technology as appropriate (ACMNA239)</p> <p>10A: Describe, interpret and sketch parabolas ... and their transformations (ACMNA267)</p>

Time	Summary	Year 10(10A) Content Descriptions MM normal type, <i>SM italic</i>
Weeks 32 – 34	<b>Other Functions</b> <ul style="list-style-type: none"> <li>Graphs of Circles, Exponentials, Hyperbolas</li> </ul>	Explore the connection between algebraic and graphical representations ... circles ... using digital technology as appropriate (ACMNA239)  10A: Apply understanding of polynomials to sketch a range of curves and describe the features of these curves from their equation (ACMNA268)
	<b>Transformations</b> <ul style="list-style-type: none"> <li>Transformations of Circles, Exponentials, Hyperbolas</li> </ul>	10A: Describe, interpret and sketch parabolas, hyperbolas, circles and exponential functions and their transformations (ACMNA267)
35	<b>Revision/ Exam</b>	
Weeks 36-38	Probability and Sets <ul style="list-style-type: none"> <li>Introduce the language of sets</li> <li>Uses tree diagrams, 2 way tables and Venn diagrams</li> <li>Conditional probability</li> <li>Independence</li> </ul>	Describe the results of two and three step chance experiments, both with and without replacements, assign probabilities to outcomes and determine probabilities of events. Investigate the concept of independence (ACMSP246)  Use the language of 'if ....then', 'given', 'of', 'knowing that' to investigate conditional statements and identify common mistakes in interpreting such language (ACMSP247)
Weeks 39,40 (as much as time permits)	<b>Circle Geometry</b> <ul style="list-style-type: none"> <li>Angles in a circle</li> <li>Chords, secants and tangents</li> <li>Cyclic quadrilaterals</li> <li>Proof</li> </ul>	10A: Prove and apply angle and chord properties of circles(ACMMG272)
	<b>Further Proof</b> <ul style="list-style-type: none"> <li>Proofs with congruent and similar triangles</li> <li>Proofs with quadrilaterals</li> <li>Numerical/algebraic proof</li> </ul>	Formulate proofs involving congruent triangles and angle properties (ACMMG243)  Apply logical reasoning, including the use of congruence and similarity, to proofs and numerical exercise involving plane shapes (ACMMG244)

This course outline may be subject to change, any changes will be communicated to students.

Assessment Outline (taken from reporting to parents)

Task	Outcomes	Sem	Max Score	% Weight
 10MAT Course 1 Meth & Spec				
Semester 1 % Total Weight				◆
Semester 2 % Total Weight				◆
Total Weight				0.0

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