



**Newton Moore Senior High School**  
**Year 10**  
**Essential/Foundation Mathematics (Course 3)**  
**2016**



## Course Description

This program is primarily designed for students who intend to study Essential Mathematics. It is a modified program designed for students who find mathematics difficult and students will not be able to meet the Year 10 Achievement Standard by following it and thus would not qualify for an A grade (see below).

### Rationale

In 2015 the new WACE Senior Secondary Courses will commence for Year 11 students. There are three courses for ATAR students (Mathematics Applications, Mathematics 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).

### Scope and Sequence:

The program is designed in 5 week blocks. This enables the course to be easily split into two sections if, for example, the class is being shared by two teachers. There is a dual emphasis:

- Development of mathematical skills
- Gaining experience of communicating mathematical ideas through project work.

Of the four hours per week of mathematics, one to two hours should be dedicated to mathematical skill development, while the rest of the time is used for context based project work. Given that students studying Essential and Foundation Mathematics are expected to complete projects using Mathematics, this program has an emphasis on teaching students how to report Mathematics effectively.

The Numeracy Test occurs in March of Year 10 and again in September for those who need to resit. It consists of 60 multiple choice questions provided in an online format. Any student who is below Band 8 in the Numeracy component of Year 9 NAPLAN will be required to sit the Numeracy Test. The presence of regular Skills Tests (ideally in a similar format) is aimed at providing the best opportunity for students to pass the numeracy test, particularly for those who need to sit it twice.

The Australian Core Skills Framework (ACSF) has been developed to facilitate a consistent national approach to the identification and development of the core skills in diverse personal, community, work, and education and training contexts. This program has been designed with reference to the ACSF Numeracy Core Skill. Students studying this course have the opportunity to achieve at least Level 3 in the Numeracy Core Skill. Students who are unable to achieve Level 3, and therefore do not pass the Numeracy Test, would be leading towards the Foundations Course in Year 11.

### Text and Resources

The following two texts have been referenced in this program:

Cambridge Essential Mathematics 10 (Gold) (EM)

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

Given the modified nature of this course, texts written for Year 7, 8 and 9 Australian Curriculum also contain relevant material and should be utilised where there is no appropriate Year 10 text.

**Math300** is an online resource available from [www.maths300.esa.edu.au](http://www.maths300.esa.edu.au). The lessons demonstrate inquiry based learning which can be used for incorporating the proficiencies with the Western Australian Curriculum mathematics content.

The Australian Core Skills Framework is a useful reference containing lists of sample activities at each of the five levels, some of which have been used to design projects within this course. This framework is available either by phone order or downloads from the Australian Core Skills Framework website. <http://www.innovation.gov.au/Skills/LiteracyAndNumeracy/AustralianCoreSkillsFramework>.

### Assessment

Assessment will consist of Skills Tests, Topic Tests and Projects. Each 5 week block has two short Skills Tests (20 multiple choice/short answer questions), a Topic Test and a Project or Investigation. It is suggested that "Improve" could be used as a tool for assessing Skills through multiple choice and short answer questions. Improve is a formative assessment tool which supports teaching and learning and can be accessed through Scootle or using the URL [www.improve.edu.au](http://www.improve.edu.au).

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, based on the draft Assessment Pointers issued in November, 2013. *See the Assessment Pointers at the end of this program.*

### Proficiency Strands: Year 10 Mathematics (components not covered by this program are grey)

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	Skills	Western Australian Curriculum Content Description
Term 1	Weeks 1 – 5	<ul style="list-style-type: none"> <li>Whole number calculations</li> <li>Routine fractions, decimals and percentages and conversions between them</li> <li>Fractions of amounts</li> <li>Calculator skills for non-routine fractions, decimals, percentages</li> <li>Rule of Order</li> <li>Calculations with money</li> <li>Ratio</li> <li>Rates</li> <li>Best buys</li> </ul>	<p>8: Carry out the four operations with rational numbers and integers, using efficient mental and written strategies and appropriate digital technologies (ACMNA183)</p> <p>7: Connect fractions, decimals and percentages and carry out simple conversions (ACMNA157)</p> <p>6: Explore the use of brackets and order of operations to write number sentences (ACMNA134)</p> <p>8: Solve a range of problems involving rates and ratios, with and without digital technologies (ACMNA188)</p>
	Weeks 6 - 10	<ul style="list-style-type: none"> <li>Review of Area and Perimeter concepts</li> <li>Units of area and perimeter</li> <li>Area and Perimeter of Circles</li> <li>Area of Composite Shapes including parts of circles</li> </ul>	<p>8: Choose appropriate units of measurement for area and volume and convert from one unit to another (ACMMG195)</p> <p>9: Investigate the relationship between features of circles such as circumference, area, radius and diameter. Use formulas to solve problems involving circumference and area (ACMMG197)</p> <p>9: Calculate the areas of composite shapes (ACMMG216)</p>
Term 2	Weeks 11-15	<ul style="list-style-type: none"> <li>Percentages of amounts</li> <li>Increase/decrease</li> <li>Discounts</li> <li>Commission</li> <li>Simple Interest</li> <li>Introduction to compound interest</li> <li>Spreadsheets</li> </ul>	<p>8: Solve problems involving the use of percentages, including percentage increases and decreases, with and without digital technologies (ACMNA187)</p> <p>9: Solve problems involving simple interest (ACMNA211)</p> <p>10: Connect the compound interest formula to repeated applications of simple interest using appropriate digital technologies (ACMNA229)</p>
	Weeks 16-20	<ul style="list-style-type: none"> <li>Pythagoras' Theorem – finding the hypotenuse and finding shorter sides</li> <li>Similarity</li> <li>Introduction to Trigonometry               <ul style="list-style-type: none"> <li>Finding missing sides</li> <li>Finding missing angles</li> </ul> </li> </ul>	<p>9: Investigate Pythagoras' Theorem and its application to solving simple problems involving right angled triangles (ACMMG222)</p> <p>9: Solve problems using ratio and scale factors in similar figures (ACMMG221)</p> <p>9: Use similarity to investigate the constancy of the sine, cosine and tangent ratios for a given angle in right angled triangles (ACMMG223)</p> <p>9: Apply trigonometry to solve right-angled triangle problems (ACMMG224)</p>

Term 3	Weeks 21-25	<ul style="list-style-type: none"> <li>• Collecting data</li> <li>• Review measures of Central Tendency and range</li> <li>• Boxplots <ul style="list-style-type: none"> <li>- quartiles and interquartile range</li> <li>- drawing and interpreting</li> <li>- compare multiple boxplots</li> </ul> </li> <li>• Pie Charts <ul style="list-style-type: none"> <li>- Drawing and interpreting</li> </ul> </li> <li>• Scatter Plots <ul style="list-style-type: none"> <li>- Drawing and interpreting</li> <li>- Describe trend and pattern</li> </ul> </li> </ul>	<p>10: Determine quartiles and interquartile range (ACMSP248)</p> <p>10: Construct and interpret box plots and use them to compare data sets (ACMSP249)</p> <p>8: Investigate techniques for collecting data, including census, sampling and observation (ACMSP284)</p> <p>8: Explore the practicalities and implications of obtaining data through sampling using a variety of investigative processes (ACMSP206)</p> <p>9: Identify everyday questions and issues involving at least one numerical and at least one categorical variable, and collect data directly from secondary sources (ACMSP228)</p> <p>Yr10: Use scatter plots to investigate and comment on relationships between two numerical variables (ACMSP251)</p>
--------	-------------	---	---

Term 4	Weeks 26-30	<ul style="list-style-type: none"> <li>• Substitution into Formula</li> <li>• Linear Rules from Tables</li> <li>• Graphing Linear Functions, including solving simultaneous equations graphically</li> <li>• Direct Proportion</li> <li>• Travel Graphs</li> </ul>	<p>7: Create algebraic expressions and evaluate them by substituting a given value for each variable (ACMNA176)</p> <p>9: Solve problems involving direct proportion. Explore the relationship between graphs and equations corresponding to simple rate problems (ACMNA208)</p> <p>8: Plot linear relationships on the Cartesian plane with and without the use of digital technologies (ACMNA193)</p> <p>8: Solve linear equations using [<i>algebraic and</i>] graphical techniques. Verify solutions by substitution (ACMNA194)</p>
--------	-------------	--	---

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

### Assessment Outline

The Year 10 Mathematics program for classes from 10.1 and 10.2 have been designed to take into consideration the incoming Western Australian Curriculum. Students will be provided opportunities to engage in and use the Western Australian Curriculum with a focus on the Proficiency Strands: Understanding, Fluency, Reasoning and Problem Solving. This will be achieved through immersion in the Mathematics' Content Strands: Number and Algebra, Measurement and Geometry and Statistics and Probability. Students will be assessed according to the Achievement Standards, which indicate the quality of learning that students should demonstrate within Year 10.

At this year level:

<p><b>Understanding</b> includes applying the four operations to algebraic fractions, finding unknowns in formulas after substitution, making the connection between equations of relations &amp; their graphs, comparing simple &amp; compound interest in financial contexts &amp; determining probabilities of two &amp; three step experiments</p>	<p><b>Fluency</b> includes factorising &amp; expanding algebraic expressions, using a range of strategies to solve equations &amp; using calculations to investigate the shape of data sets</p>	<p><b>Problem Solving</b> includes calculating the surface area &amp; volume of a diverse range of prisms to solve practical problems, finding unknown lengths &amp; angles using applications of trigonometry, using algebraic &amp; graphical techniques to find solutions to simultaneous equations &amp; inequalities, &amp; investigating independence of events</p>	<p><b>Reasoning</b> includes formulating geometric proofs involving congruence &amp; similarity, interpreting &amp; evaluating media statements &amp; interpreting &amp; comparing data sets</p>
--	---	---	--

Mathematics Sub-strands (National Curriculum)

Number & Algebra	Measurement & Geometry	Statistics & Probability
<ul style="list-style-type: none"> <li>• Number &amp; place value (F-8)</li> <li>• Fractions &amp; decimals (1-6)</li> <li>• Real numbers (7-10)</li> <li>• Money &amp; financial mathematics (1-10)</li> <li>• Patterns &amp; algebra (F-10)</li> <li>• Linear &amp; non-linear relationships (8-10)</li> </ul>	<ul style="list-style-type: none"> <li>• Using units of measurement (F-10)</li> <li>• Shape (F-7)</li> <li>• Geometric reasoning (3-10)</li> <li>• Location &amp; transformation (F-7)</li> <li>• Pythagoras &amp; trigonometry (9-10)</li> </ul>	<ul style="list-style-type: none"> <li>• Chance (1-10)</li> <li>• Date representation &amp; interpretation (F-10)</li> </ul>

Mathematics Year 10 Achievement Standard (National Curriculum)

By the end of Year 10, students:

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• recognise the connection between simple &amp; compound interest</li> <li>• solve problems involving linear equations &amp; inequalities</li> <li>• make the connections between algebraic &amp; graphical representations of relations</li> <li>• solve surface area &amp; volume problems relating to composite solids</li> <li>• recognise the relationships between parallel &amp; perpendicular lines</li> <li>• apply deductive reasoning to proofs &amp; numerical exercises involving plane shapes</li> <li>• compare data sets by referring to the shapes of the various data displays</li> <li>• describe bivariate data where the independent variable is time</li> <li>• describe statistical relationships between two continuous variables</li> </ul> | <ul style="list-style-type: none"> <li>• evaluate statistical reports</li> <li>• expand binomial expressions &amp; factorise monic quadratic expressions</li> <li>• find unknown values after substitution into formulas</li> <li>• perform the four operations with simple algebraic fractions</li> <li>• solve simple quadratic equations &amp; pairs of simultaneous equations</li> <li>• use triangle &amp; angle properties to prove congruence &amp; similarity</li> <li>• use trigonometry to calculate unknown angles in right-angled triangles</li> <li>• list outcomes for multi-step chance experiments &amp; assign probabilities for these experiments</li> <li>• calculate quartiles &amp; inter-quartile ranges</li> </ul> |
|---|---|

Tasks		Weighting	
Tests	8		65%
Semester 1 Exam	1	8%	15%
Exam (S2)	1	10%	20%
			100%

Task	Assessment Task	Task Title	Task Weighting	Number & Algebra	Measurement & Geometry	Statistics & Probability
1	Test 1	Algebra and Equations	5%	✓		
2	Test 2	Linear and Simultaneous Equations	5%	✓	✓	
3	<u>Test 3</u>	Trigonometry (Common)	10%	✓	✓	
4	Test 4	Surds and Indices	10%	✓	✓	✓
5	Test 5	Unit Circle and Further Trig	10%	✓	✓	
6	<u>Exam</u>	Semester One Exam	15%	✓	✓	✓
7	Test 6	Quadratics	10%	✓	✓	
8	Test 7	Functions	5%	✓	✓	
9	Test 8	Probability	10%	✓		✓
10	Exam	Semester Two Exam	10%	✓	✓	✓

The above weightings are intended to show the importance of each task. The allocation of a grade at the end of a semester is determined based on grade related descriptors issued by School Curriculum and Standards Authority

