http://gomaths.net/doe2017

Mathematics Standard

Orange is the new standard

Simon Job
Greystanes High School

Based on Mathematics Standard Stage Syllabus, NESA, 2017 and support material. This is not an authorised NESA document. It was developed for the purposes of planning.
Six Board-developed Mathematics courses:

- Mathematics Standard 1
- Mathematics Standard 2
- Mathematics Life Skills
- Mathematics Advanced
- Mathematics Extension 1
- Mathematics Extension 2
# Implementation:

<table>
<thead>
<tr>
<th>Year 11</th>
<th>Year 12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2018</strong></td>
<td><strong>2019</strong></td>
</tr>
</tbody>
</table>
| - Mathematics Standard  
- Mathematics Standard ◊  
- Mathematics Life Skills | **Planned:**  
- Mathematics Advanced  
- Mathematics Extension 1 | **Planned:**  
- Mathematics Advanced  
- Mathematics Extension 1  
- Mathematics Extension 2 |
| **2019** | **2020** | |
| **2019** | **2020** | **HSC General 2**  
- Mathematics Standard 1  
- Mathematics Standard 2  
- Mathematics Life Skills | **Planned:**  
- Mathematics Advanced  
- Mathematics Extension 1  
- Mathematics Extension 2  
- HSC Minimum Standard |
Quick bits #1

Mathematics **General**

is now  Mathematics **Standard**
Quick bits #2

Preliminary referred to as Year 11

HSC referred to as Year 12
Quick bits #3

Mathematics General 1 CEC × ATAR
Mathematics Standard 1 BDC† ? ATAR*

† 6 BDC units required for HSC
* See HSC Examination in this presentation
Mathematics Standard 1 – Year 11 and Year 12 course components

Mathematics Standard Year 11
• Units: 2
• Indicative hours: 120

Mathematics Standard 1 Year 12
• Units: 2
• Indicative hours: 120

Mathematics Standard 1 or 2 – Year 11 and Year 12 course components

Mathematics Standard Year 11
• Units: 2
• Indicative hours: 120

Mathematics Standard 1 or 2 Year 12
• Units: 2
• Indicative hours: 120
In Year 11 Standard, content marked ◊ is required:
- to continue to the Year 12 Standard 1 course or
- to meet the Australian Core Skills Framework numeracy level 3

“Schools have flexibility in providing alternate approaches to Mathematics Standard in Year 11 to address material essential for Mathematics Standard 1 in Year 12.” Page 8
Estimating by time…

...there is ~25% less content following only the ◇ content.

This means that using a Standard 1 pathway in Year 11 will allow those students to spend extra time on that content.
### Mathematics Standard

**the Lozenge ◊ aka Coding of Year 11 Standard #3**

<table>
<thead>
<tr>
<th></th>
<th>Year 11</th>
<th>Year 11 ◊</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Algebra</strong></td>
<td>15%</td>
<td>14%</td>
</tr>
<tr>
<td>MS-A1: Formulae and equations</td>
<td>5 / 10</td>
<td></td>
</tr>
<tr>
<td>MS-A2: Linear Relationships</td>
<td></td>
<td>◊</td>
</tr>
<tr>
<td><strong>Measurement</strong></td>
<td>24%</td>
<td>15%</td>
</tr>
<tr>
<td>MS-M1: Applications of Measurement</td>
<td></td>
<td>◊</td>
</tr>
<tr>
<td>M1.1: Practicalities of measurement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M1.2: Perimeter, area and volume</td>
<td>2 / 10</td>
<td></td>
</tr>
<tr>
<td>M1.3: Units of energy and mass</td>
<td></td>
<td>---</td>
</tr>
<tr>
<td>MS-M2: Working with Time</td>
<td>7 / 9</td>
<td></td>
</tr>
<tr>
<td><strong>Financial Mathematics</strong></td>
<td>20%</td>
<td>27%</td>
</tr>
<tr>
<td>MS-F1: Money Matters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1.1: Interest and depreciation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1.2: Earning and managing money</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1.3: Budgeting and household expenses</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Statistical Analysis</strong></td>
<td>41%</td>
<td>44%</td>
</tr>
<tr>
<td>MS-S1: Data Analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S1.1: Classifying and representing data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S1.2: Exploring and describing data</td>
<td>15 / 20</td>
<td></td>
</tr>
<tr>
<td>MS-S2: Relative Frequency and Probability</td>
<td>12 / 17</td>
<td></td>
</tr>
</tbody>
</table>
the Focus Studies gone but not forgotten

Some of the Focus Study content integrated into the Standard syllabus.
Marked as AAM, Applications and Modelling. However AAM is not limited to past Focus Study content.

See Assignment or investigation-style task and “open-ended syllabus”.

Page 5 and 8
S1.1

construct and interpret tables and graphs related to real-world contexts, including but not limited to: motor vehicle safety including driver behaviour, accident statistics, blood alcohol content over time, running costs of a motor vehicle, costs of purchase and insurance, vehicle depreciation, rainfall graphs, hourly temperature, household and personal water usage.

Preliminary
Mathematics and Driving

HSC General 1
Mathematics and Personal Resource Usage
## Similar but different

<table>
<thead>
<tr>
<th>K-10</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Across the Curriculum</td>
<td>Identified</td>
</tr>
<tr>
<td>Identified</td>
<td>Identified</td>
</tr>
<tr>
<td>Working Mathematically</td>
<td>Identified</td>
</tr>
<tr>
<td>Identified</td>
<td>Embedded but not identified</td>
</tr>
<tr>
<td>Australian Curriculum</td>
<td>Identified</td>
</tr>
</tbody>
</table>
Learning Across the Curriculum

As per K-10, identified by icons in the syllabus.

Learning Across the Curriculum Icons

Learning across the curriculum content, including cross-curriculum priorities, general capabilities and other areas identified as important learning for all students, is incorporated and identified by icons in the syllabus.

Cross-curriculum priorities
- Aboriginal and Torres Strait Islander
- Asia and Australia’s engagement
- Sustainability

General capabilities
- Critical and creative thinking
- Ethical understanding
- Information and communication technology capability
- Intercultural understanding
- Literacy
- Numeracy
- Personal and social capability

Other learning across the curriculum areas
- Civics and citizenship
- Difference and diversity
- Work and enterprise
Working Mathematically

K-10 Syllabus
Communicating
Problem Solving
Reasoning
Understanding
Fluency

Standard Stage 6 Syllabus
Communicating
Problem Solving
Reasoning
Understanding
Fluency
+Justification
Outcomes
All aspects of Working Mathematically, as described within this syllabus, are integral to the outcomes of the Mathematics Standard Stage 6 course, in particular outcomes 11-9, 12-9, 11-10 and 12-10.

* See Assignment or investigation-style task.
The Australian Curriculum

<table>
<thead>
<tr>
<th>Australian Curriculum Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essential Mathematics</td>
</tr>
<tr>
<td>General Mathematics</td>
</tr>
<tr>
<td>Mathematical Methods</td>
</tr>
<tr>
<td>Specialist Mathematics</td>
</tr>
<tr>
<td>Australian Curriculum Course</td>
</tr>
<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td>Essential Mathematics</td>
</tr>
<tr>
<td>General Mathematics</td>
</tr>
<tr>
<td>Mathematical Methods</td>
</tr>
<tr>
<td>Specialist Mathematics</td>
</tr>
</tbody>
</table>
Course Requirements

**Mathematics General (2012)**
All of the **Stage 5.1** content of the Mathematics 7-10 Syllabus (2002)

**Building on Mathematics Learning in Stage 5**

**Mathematics Standard**
All substrands of Stage 5.1 and with the following substrands of Stage 5.2:

- Financial mathematics
- **Linear relationships**
- Non-linear relationships,
- Right-angled triangles (Trigonometry)
- Single variable data analysis
- **Probability**

Considered implicit in this syllabus

BUT Topic Guidance Measurement Year 11:

**Prior learning**

“… builds on … Stage 5.2 substrands of…

- Area and Surface Area and Volume”
School-based Assessment

“NESA provides a consistent approach to Stage 6 school-based assessment requirements for all Board Developed Courses.”
School-based Assessment

**Informal** assessment

Through-out the teaching and learning cycle

**Formal** assessment

formal written examination
A formal written examination is defined as a task such as a half yearly, yearly or trial HSC examination. It is undertaken individually, under supervised examination conditions and includes one or more unseen questions or items. A formal written examination is used to gather evidence about student achievement of a range of syllabus outcomes, at a point in time. A formal written examination typically draws from most or all content areas, topics or modules.

Class and cohort tests that include a small number of content areas, topics or modules will continue to be relevant and appropriate methods of formal assessment. These types of tasks would not be considered as formal written examinations.
## School-based Assessment

### Year 11/12

<table>
<thead>
<tr>
<th>Component</th>
<th>Weighting %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding, fluency and communication</td>
<td>50</td>
</tr>
<tr>
<td>Problem solving, reasoning and justification</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

* See [Working Mathematically](#)
School-based Assessment

Year 11

- three assessment tasks
- weighting of 20% – 40%
- one task must be an assignment or investigation-style, weighting of 20% – 30%

NESA Examples:
1. Assignment/investigation
2. In-class open book test
3. Yearly Examination

1. Mathematical experiment and report
2. Assignment/investigation
3. Yearly Examination

1. Extended modelling and problem-solving task
2. Assignment/investigation
3. Yearly Examination
School-based Assessment

Year 12
• a maximum of four assessment tasks
• Weighting of 10% – 40%
• a maximum of one task may be a formal written examination  
  NESA News 8 June 2017
• one task must be an assignment or investigation-style with a weighting of 15% – 30%

NESA Examples:
1. In-class test
2. Assignment/investigation
3. Extended modelling and problem-solving task

1. Assignment/investigation
2. In-class supervised test
3. Field study activity and report
4. Trial HSC Examination

1. In-class project or stimulus activity
2. Assignment/investigation
3. In-class open-book test
4. Trial HSC Examination

A&R = Assessment and Reporting in Mathematics Standard Stage 6  
Support Materials – Sample Assessment Schedules  
Assignment or investigation-style task

• achievement of a range of outcomes
• application of Working Mathematically components
• demonstration of knowledge and skills in different ways to the HSC examinations
Assignment or investigation-style task

“The task provides application and modelling opportunities.”

See AAM coding.
Assignment or investigation-style task

Outcomes that are content specific should be assessed and should include the following:

**Year 11**

MS11–9: uses appropriate technology to investigate, organise and interpret information in a range of contexts

MS11–10: justifies a response to a given problem using appropriate mathematical terminology and/or calculations

**Mathematics Standard 1**

MS1–12–9: chooses and uses appropriate technology effectively and recognises appropriate times for such use

MS1–12–10: uses mathematical argument and reasoning to evaluate conclusions, communicating a position clearly to others

**Mathematics Standard 2**

MS2–12–9: chooses and uses appropriate technology effectively in a range of contexts, and applies critical thinking to recognise appropriate times and methods for such use

MS2–12–10: uses mathematical argument and reasoning to evaluate conclusions, communicating a position clearly to others and justifying a response
Assignment or investigation-style task

The following examples provide some approaches to task types:

• an investigative project or assignment involving presentation of work in class
• an independently chosen project or investigation
• scaffolded learning tasks culminating in an open-ended or modelling style problem
• a guided investigation or research task involving collection of data and analysis.
“Up to 30% of the internal assessment mark submitted to the Board of Studies may be based on the Preliminary Mathematics General course.”

“The collection of information for the Year 12 school-based assessment mark must not begin before the completion of the Year 11 course.”
HSC Examination – Standard 2

All students studying Mathematics Standard 2 will sit for an HSC examination.

Examination specifications for Mathematics Standard 2 will be available in Term 3 2017.

From the consultation:

<table>
<thead>
<tr>
<th>Proposal</th>
<th>Time</th>
<th>Marks</th>
<th>Section 1 Objective Response</th>
<th>Section 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2 h 30 min</td>
<td>100 marks</td>
<td>25 marks</td>
<td>75 marks</td>
</tr>
<tr>
<td>2</td>
<td>2 h</td>
<td>75 marks</td>
<td>15 marks</td>
<td>60 marks</td>
</tr>
<tr>
<td>3</td>
<td>2 h</td>
<td>75 marks</td>
<td>10 marks</td>
<td>65 marks</td>
</tr>
</tbody>
</table>
Students studying Mathematics Standard 1 may elect to undertake an optional HSC examination. The examination mark may* be used by the Universities Admissions Centre (UAC) to contribute to the student’s Australian Tertiary Admission Rank (ATAR).

From the consultation:

<table>
<thead>
<tr>
<th>Proposal</th>
<th>Time</th>
<th>Marks</th>
<th>Section 1 Objective Response</th>
<th>Section 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2 h</td>
<td>75 marks</td>
<td>15 marks</td>
<td>60 marks</td>
</tr>
<tr>
<td>2</td>
<td>2 h</td>
<td>75 marks</td>
<td>10 marks</td>
<td>65 marks</td>
</tr>
</tbody>
</table>
Optional HSC Examination – Standard 1

*may:

No official statement from UAC.

Status of Standard 1 has not yet been decided.
HSC Examination - Technology

Which calculators are approved for use in the HSC examination for ANY Mathematics syllabus (Standard 1, Standard 2, Advanced, Extension 1, Extension 2)?

Candidates may use a ‘Board-approved calculator’ that appears on the Board’s list of Approved Scientific Calculators for the Higher School Certificate Examinations (updated annually).

Also, from the Examination Specification consultation:

NESA-approved calculators, a pair of compasses, set squares, a protractor and a mathematical curve-drawing template may be used.

Curriculum Development - Stage 6 Mathematics Advanced and Extension Syllabuses Frequently asked questions
Open-ended Syllabus

• “including but not limited to” 11 times

Syllabus:
- solve problems involving surface area of solids including but not limited to prisms, cylinders, spheres and composite solids

Topic Guidance:
Students should be extended to calculate:
- the surface area of:
  • prisms and pyramids
  • cylinders (without ‘top’ and/or ‘bottom’) and closed cylinders
  • Spheres

“Whilst the syllabus does not specifically name the various shapes mentioned in the topic guidance, the points from the syllabus do allow for such shapes to be assessed.”

Email: Anna Wethereld, 10/042017

• “for example” 49 times
  similar in use to “but not limited to” in many places
Mathematics Standard vs Mathematics General

This is not an authorised NESA document. It was developed for the purposes of planning.

By Simon Job. Correction/omissions to simon.job@det.nsw.edu.au
15/04/2017
No guarantee of accuracy or correctness.

Key

- STANDARD
- PRELIMINARY
- HSC (Gen 2)
- Focus Studies
- NEW

- STANDARD 1
- HSC (Gen 1)
Year 11

**MS-S1**
Data Analysis

**DS1**
Classifying and representing data (grouped and ungrouped)

**DS2**
Exploring and describing data arising from a single continuous variable

**MS-S2**
Relative Frequency and Probability

**PB1**

**PB2**

Year 12

**MS-S4**
Bivariate Data Analysis

**DS1**

**DS5**
The Normal Distribution

**MS-S3**
Further Statistical Analysis

**DS1**
The statistical investigation process for a survey

**FSHe**
Exploring and describing data arising from two quantitative variables

**FSHe**

**FSHu**

**CEC**
**Year 11**

- **MS-N1**: Networks and Paths

**Year 12**

- **MS-N2**: Network Concepts
  - New
- **MS-N3**: Critical Path Analysis
  - New

**NEW**
What is gone?

Compound interest tables
Graphs of tax rates
Radar charts
Manipulating algebraic terms
Algebraic fractions
Expand and factorise algebraic expressions
Digital downloads
A new style of syllabus

2012 General
• Preliminary: 46 pages
• Content:
  • Preliminary and HSC
• Considerations
  • Examinable
• Preliminary content repeated in HSC

2017 Standard
Year 11: 15 pages
• Content:
  • TBA
• Considerations
  • Not examinable*
  • 16 times we are told to “review” content
• Content not repeated
• Glossary

*“Materials contained outside this document are for consideration and guidance only, unlike in the current General Mathematics Syllabus.”
Email: Anna Wethereld, 10/042017
<table>
<thead>
<tr>
<th>Content</th>
<th>General</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prelim</td>
<td>HSC</td>
</tr>
<tr>
<td>ALGEBRA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equations and Formulae</td>
<td>AM1</td>
<td>AM3</td>
</tr>
<tr>
<td>Linear Relationships</td>
<td>AM2</td>
<td>AM4</td>
</tr>
<tr>
<td>MEASUREMENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ratios and Rates</td>
<td>MM1</td>
<td>FS</td>
</tr>
<tr>
<td>Perimeter, Area and Volume / SA</td>
<td>MM2</td>
<td>MM4</td>
</tr>
<tr>
<td>FINANCIAL MATHEMATICS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compound Interest Formula</td>
<td>FM2</td>
<td>FM4</td>
</tr>
</tbody>
</table>

There are more examples of this!
Credit to Stuart Palmer for finding these. Based on a document shared in the WINDSSM course.
Stage 6 Standard is more a continuation of Stage 5 (5.2) than the General course.

No longer do we have items in the syllabus that were part of Stage 5, like there were in General. We have to decide for our students what assumed prior learning we may need to review.
<table>
<thead>
<tr>
<th>Stage 5.1</th>
<th>Stage 5.2</th>
<th>Year 11</th>
<th>Year 12 Standard 1</th>
<th>Year 12 Standard 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number and Algebra</strong></td>
<td><strong>Standard</strong></td>
<td><strong>Financial Mathematics</strong></td>
<td><strong>Measurement</strong></td>
<td><strong>Algebra</strong></td>
</tr>
<tr>
<td><strong>Financial Mathematics</strong></td>
<td><strong>Financial Mathematics</strong></td>
<td><strong>Financial Mathematics</strong></td>
<td><strong>Rates</strong></td>
<td><strong>Rates and Ratios</strong></td>
</tr>
<tr>
<td>MA5.1-4NA solves financial problems involving earning, spending and investing money</td>
<td>MA5.2-4NA solves financial problems involving compound interest</td>
<td>MS-F1 Money Matters</td>
<td>MS-M4 Rates</td>
<td><strong>Rate of Change</strong></td>
</tr>
<tr>
<td><strong>Ratios and Rates</strong></td>
<td><strong>Equations</strong></td>
<td><strong>Formulae and Equations</strong></td>
<td></td>
<td><strong>Linear Relationships</strong></td>
</tr>
<tr>
<td>MA5.2-5NA recognises direct and indirect proportion, and solves problems involving direct proportion</td>
<td>MA5.2-8NA solves linear and simple quadratic equations, linear inequalities and linear simultaneous equations, using analytical and graphical techniques</td>
<td>MS-A1 Formulae and Equations</td>
<td></td>
<td><strong>Linear Relationships</strong></td>
</tr>
<tr>
<td><strong>Linear Relationships</strong></td>
<td><strong>Linear Relationships</strong></td>
<td><strong>Linear Relationships</strong></td>
<td><strong>Types of Relationships</strong></td>
<td><strong>Types of Relationships</strong></td>
</tr>
<tr>
<td>MA5.1-6NA determines the midpoint, gradient and length of an interval, and graphs linear relationships</td>
<td>MA5.2-9NA uses the gradient-intercept form to interpret and graph linear relationships</td>
<td>MS-A2 Linear Relationships</td>
<td>MS-A3 Types of Relationships, A3.1 Simultaneous linear equations</td>
<td>MS-A4 Types of Relationships, A4.1 Simultaneous linear equations</td>
</tr>
<tr>
<td><strong>Non-Linear Relationships</strong></td>
<td><strong>Non-Linear Relationships</strong></td>
<td><strong>Types of Relationships</strong></td>
<td><strong>Types of Relationships</strong></td>
<td><strong>Types of Relationships</strong></td>
</tr>
<tr>
<td>MA5.1-7NA graphs simple non-linear relationships</td>
<td>MA5.2-10NA connects algebraic and graphical representations of simple non-linear relationships</td>
<td>MS-A3 Types of Relationships, A3.2 Graphs of practical situations</td>
<td>MS-A4 Types of Relationships, A4.2 Non-linear relationships</td>
<td></td>
</tr>
</tbody>
</table>
Support Materials

NESA

• Sample Scope and Sequence
• Sample Units
• Sample Assessment Schedules
• Sample Formal Assessment Task
• Topic guidance: All topics
Support Materials

DoE mEsh

Stage 6 mEsh is a project to develop support materials and professional learning for the new HSC mathematics, English, science and history. For mathematics there is 1 project officer and 17 project leaders.

The 17 Stage 6 project leaders will be working with a writing team to produce units of learning and alternative assessment activities for each of the topics in both the Year 11 and Year 12 Mathematics Standard 1 and 2 courses.

See Ruth Glasgow or Amy Birungi for more.
Time?

LAC

AAM

WM
Building a Scope and Sequence

Year 11

- Year 11 120 indicative hours
- Last year: 96 hours of teaching time in Terms 1-3
  That is, excluding other activities and assessment times.
- Year 11 needs to extend beyond first three terms.
  The NESA sample S&S does
- Year 11 is the only time students will see core concepts. (no repeats)
Mathematics Standard

Orange is the new standard

Simon Job
Greystanes High School

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