Mathematics Standard

What’s new, what stays the same.

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:

Implement in Year 11 2018:
- Mathematics Standard 1
- Mathematics Standard 2
- Mathematics Life Skills

Delayed for Year 11 implementation 2019:
- Mathematics Advanced
- Mathematics Extension 1
- Mathematics Extension 2
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
Three Standard Pathways

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.
<table>
<thead>
<tr>
<th></th>
<th>Year 11</th>
<th>Year 11 ◊</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aqua</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Algebra</td>
<td>15%</td>
<td>14%</td>
</tr>
<tr>
<td>MS-A1</td>
<td>Formulae and equations</td>
<td>5 / 10</td>
</tr>
<tr>
<td>MS-A2</td>
<td>Linear Relationships</td>
<td>◊</td>
</tr>
<tr>
<td><strong>Mint</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement</td>
<td>24%</td>
<td>15%</td>
</tr>
<tr>
<td>MS-M1</td>
<td>Applications of Measurement</td>
<td>◊</td>
</tr>
<tr>
<td>M1.1</td>
<td>Practicalities of measurement</td>
<td>◊</td>
</tr>
<tr>
<td>M1.2</td>
<td>Perimeter, area and volume</td>
<td>2 / 10</td>
</tr>
<tr>
<td>M1.3</td>
<td>Units of energy and mass</td>
<td>◊</td>
</tr>
<tr>
<td>MS-M2</td>
<td>Working with Time</td>
<td>7 / 9</td>
</tr>
<tr>
<td><strong>Fuchsia</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial Mathematics</td>
<td>20%</td>
<td>27%</td>
</tr>
<tr>
<td>MS-F1</td>
<td>Money Matters</td>
<td>◊</td>
</tr>
<tr>
<td>F1.1</td>
<td>Interest and depreciation</td>
<td>◊</td>
</tr>
<tr>
<td>F1.2</td>
<td>Earning and managing money</td>
<td>◊</td>
</tr>
<tr>
<td>F1.3</td>
<td>Budgeting and household expenses</td>
<td>◊</td>
</tr>
<tr>
<td><strong>Saffron</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statistical Analysis</td>
<td>41%</td>
<td>44%</td>
</tr>
<tr>
<td>MS-S1</td>
<td>Data Analysis</td>
<td>◊</td>
</tr>
<tr>
<td>S1.1</td>
<td>Classifying and representing data</td>
<td>◊</td>
</tr>
<tr>
<td>S1.2</td>
<td>Exploring and describing data</td>
<td>15 / 20</td>
</tr>
<tr>
<td>MS-S2</td>
<td>Relative Frequency and Probability</td>
<td>12 / 17</td>
</tr>
</tbody>
</table>
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 open-ended syllabus later.
the Focus Studies recognise these?

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.
# Similar but different

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

<table>
<thead>
<tr>
<th>Australian Curriculum Course</th>
<th>Content Items</th>
<th>NSW Standard</th>
<th>NSW Advanced (DRAFT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essential Mathematics</td>
<td>175</td>
<td>64 (37%)</td>
<td>24 (14%)</td>
</tr>
<tr>
<td>General Mathematics</td>
<td>111</td>
<td>57 (51%)</td>
<td>21 (19%)</td>
</tr>
<tr>
<td>Mathematical Methods</td>
<td>180</td>
<td>11 (6%)</td>
<td>132 (73%)</td>
</tr>
<tr>
<td>Specialist Mathematics</td>
<td>144</td>
<td></td>
<td>8 (6%)</td>
</tr>
</tbody>
</table>
Course Requirements

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

Revised in 2012…

Mathematics 7-10 2012
All substrands of Stage 5.1 and the following Stage 5.2 substrands:
• Financial Mathematics
• Non-Linear Relationships
• Right-Angled Triangles (Trigonometry)
• Single Variable Data Analysis

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.”

Guide to changes to Stage 6 Assessment from 2018
**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

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A&R = Assessment and Reporting in Mathematics Standard Stage 6

Support Materials – Sample Assessment Schedules
School-based Assessment

Year 12

- a maximum of four assessment tasks
- Weighting of 10% – 40%
- one task may be a formal written examination with a maximum weighting of 30%
- 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
“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

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).

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

Examination specifications for Mathematics Standard 1 and Mathematics Standard 2 will be available in Term 3 2017.
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).

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-F1
Money Matters
- Interest and depreciation
  - FM2
  - FM3
- Earning and managing money
  - FM1
  - FM3
- Budgeting and household expenses
  - FSDr
  - FSRe
  - NEW

Year 12

FM2
- NEW

NEW

FM1
- NEW

FM3
- NEW

FM4
- CEC
- FSDr
- NEW

FM5
- NEW

MS-F4
Investments and Loans
- FM2
- NEW

MS-F5
Annuities
- FM2
- FM5
- NEW

MS-F2
Investment
- FM2

MS-F3
Depreciation and Loans
- CEC
- FSDr
STATISTICAL ANALYSIS

Year 11

**MS-S1**
Data Analysis

- **DS1**
- **DS4**
- NEW

- **DS2**

**MS-S2**
Relative Frequency and Probability

- **PB1**
- **PB2**

Exploring and representing data (grouped and ungrouped)

Exploring and describing data arising from a single continuous variable

Year 12

**MS-S4**
Bivariate Data Analysis

- **DS1**

**MS-S5**
The Normal Distribution

- **DS5**

**MS-S3**
Further Statistical Analysis

The statistical investigation process for a survey

Exploring and describing data arising from two quantitative variables
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
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 1 course was.

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.
Support Materials

Sample Scope and Sequence
Sample Assessment Schedules
Topic guidance: Measurement (Year 11)
Time?

LAC
AAM
WM
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)