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:

	Year 11	Year 12
2018	● Mathematics Standard ● Mathematics Standard ◊ ● Mathematics Life Skills	HSC General 2
2019	*Planned:* • Mathematics Advanced • Mathematics Extension 1	● Mathematics Standard 1 ● Mathematics Standard 2 ● Mathematics Life Skills
2020		*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

Page 8	Page numbers refer to the *Mathematics Standard Stage Syllabus, NESA, 2017* unless specified. http://syllabus.nesa.nsw.edu.au/mathematics-standard-stage6/
Page 9 A&R	A&R = *Assessment and Reporting in Mathematics Standard Stage 6* http://syllabus.nesa.nsw.edu.au/mathematics-standard-stage6/

<u>Three</u> 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
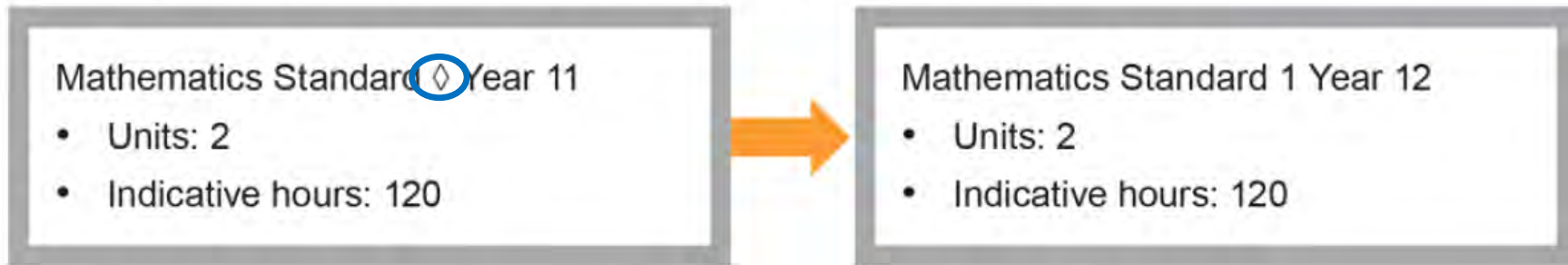
Mathematics Standard 1 or 2 – Year 11 and Year 12 course components

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

Mathematics Standard 1 or 2 Year 12
- Units: 2
- Indicative hours: 120
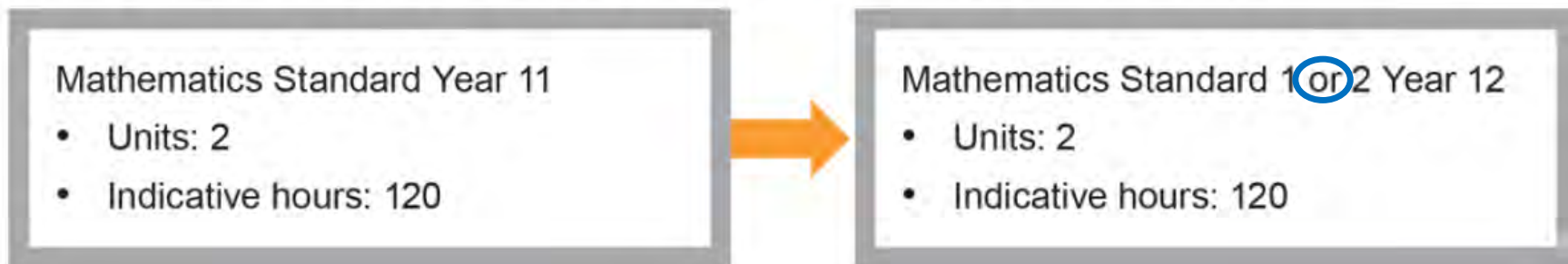
the **Lozenge** ◊ aka Coding of Year 11 Standard

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**

Page 5 and 8

the **Lozenge** ◊ aka Coding of Year 11 Standard #2

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.

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

		Year 11	Year 11 ◊
	Algebra	**15%**	**14%**
MS-A1	Formulae and equations		5 / 10
MS-A2	Linear Relationships		◊
	Measurement	**24%**	**15%**
MS-M1	Applications of Measurement		
M1.1	Practicalities of measurement		◊
M1.2	Perimeter, area and volume		2 / 10
M1.3	Units of energy and mass		---
MS-M2	Working with Time		7 / 9
	Financial Mathematics	**20%**	**27%**
MS-F1	Money Matters		
F1.1	Interest and depreciation		◊
F1.2	Earning and managing money		◊
F1.3	Budgeting and household expenses		◊
	Statistical Analysis	**41%**	**44%**
MS-S1	Data Analysis		
S1.1	Classifying and representing data		◊
S1.2	Exploring and describing data		15 / 20
MS-S2	Relative Frequency and Probability		12 / 17

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

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

Preliminary
Mathematics and Driving

HSC General 1
Mathematics and Personal Resource Usage

Similar but different

K-10	**Standard**
Learning Across the Curriculum more…	
Identified	Identified
Working Mathematically more…	
Identified	Embedded but **not** identified
Australian Curriculum more…	
Identified	Identified

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 Islan
- Asia and Australia's engagemen
- 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	**Standard Stage 6 Syllabus**
Communicating	Communicating
Problem Solving	Problem Solving
Reasoning	Reasoning
Understanding	Understanding
Fluency	Fluency
	+Justification

Working Mathematically

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

Australian Curriculum Courses

Essential Mathematics

General Mathematics

Mathematical Methods

Specialist Mathematics

The Australian Curriculum

Australian Curriculum Course	Content Items	NSW Standard		NSW Advanced (DRAFT)	
Essential Mathematics	175	64	(37%)	24	(14%)
General Mathematics	111	57	(**51%**)	21	(19%)
Mathematical Methods	180	11	(6%)	132	(**73%**)
Specialist Mathematics	144			8	(6%)

Course Requirements

Mathematics General (2012)

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

Page 17 G2

G2 = Mathematics General Stage 6 Syllabus 2012
http://www.boardofstudies.nsw.edu.au/syllabus_hsc/mathematics-general.html/

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

Page 11

BUT Topic Guidance Measurement Year 11:
Prior learning

"… builds on … Stage 5.2 substrands of…

- Area and Surface Area and Volume"

Page 17 7-10

7-10 = Mathematics K-10 Syllabus (2012)
http://syllabus.nesa.nsw.edu.au/mathematics/mathematics-k10/mathematics-learning-in-stage-5/

TG = Topic guidance: Measurement
http://syllabus.nesa.nsw.edu.au/mathematics-standard-stage6/

TG Page 1

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
http://syllabus.nesa.nsw.edu.au/mathematics-standard-stage6/

School-based Assessment

Informal assessment

Through-out the teaching and learning cycle

Formal assessment

└ formal written examination

School-based Assessment

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.

Page 5 A&R

+ NESA News
8 June 2017

School-based Assessment

Year 11/12

Component	Weighting %
Understanding, fluency and communication	50
Problem solving, reasoning and justification	50
	100

* See Working Mathematically

School-based Assessment

Year 11

- three assessment tasks

- weighting of 20% – 40%

- one task <u>must be</u> 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

Page 6 A&R

A&R = *Assessment and Reporting in Mathematics Standard Stage 6*
http://syllabus.nesa.nsw.edu.au/mathematics-standard-stage6/

Support Materials – Sample Assessment Schedules
http://syllabus.nesa.nsw.edu.au/mathematics-standard-stage6/

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 <u>must be</u> an assignment or investigation-style with a weighting of 15% – 30%

Page 7 A&R

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

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

Page 6 A&R

Assignment or investigation-style task

"The task provides application and modelling opportunities."

See AAM coding.

Page 6 A&R

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.

HSC internal assessment mark

"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:

Proposal	Time	Marks	Section 1 Objective Response	Section 2
1	2 h 30 min	100 marks	25 marks	75 marks
2	2 h	75 marks	15 marks	60 marks
3	2 h	75 marks	10 marks	65 marks

A&R = *Assessment and Reporting in Mathematics Standard Stage 6*
http://syllabus.nesa.nsw.edu.au/mathematics-standard-stage6/

Optional HSC Examination – Standard 1

Students studying **Mathematics Standard 1** may elect to undertake an **optional HSC examination**. The examination mark may*<u> </u> be used by the Universities Admissions Centre (UAC) to contribute to the student's Australian Tertiary Admission Rank (**ATAR**).

From the consultation:

Proposal	Time	Marks	Section 1 Objective Response	Section 2
1	2 h	75 marks	15 marks	60 marks
2	2 h	75 marks	10 marks	65 marks

Page 9 A&R

A&R = *Assessment and Reporting in Mathematics Standard Stage 6*
http://syllabus.nesa.nsw.edu.au/mathematics-standard-stage6/

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
http://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/Understanding-the-curriculum/curriculum-development/senior-years/mathematics-advanced-extension

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
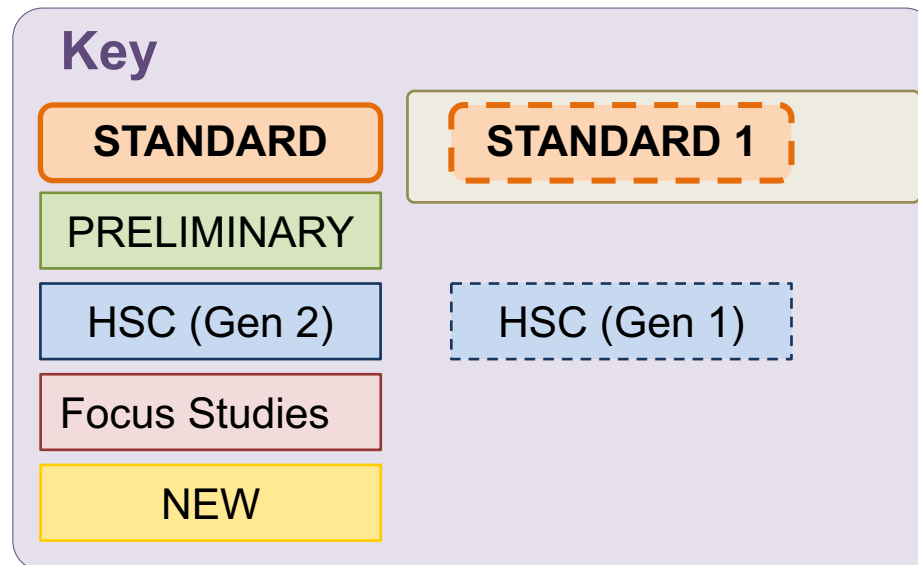
Mathematics Standard vs Mathematics General

Based on Mathematics Standard Stage Syllabus, NESA, 2017.
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	STANDARD 1
PRELIMINARY	
HSC (Gen 2)	HSC (Gen 1)
Focus Studies	
NEW	

Year 11

Year 12

MS-N2

Network Concepts

NEW

MS-N3

Critical Path Analysis

NEW

MS-N1

Networks and Paths

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

No repeats

Content	General		Standard	
	Prelim	HSC	Year 11	Year 12
ALGEBRA				
Equations and Formulae	**AM1**	**AM3**	**MS-A1**	
Linear Relationships	**AM2**	**AM4**	**MS-A2**	
MEASUREMENT				
Ratios and Rates	**MM1**	**FS**		**MS-M7**
Perimeter, Area and Volume / SA	**MM2**	**MM4**	**MS-M1**	
FINANCIAL MATHEMATICS				
Compound Interest Formula	**FM2**	**FM4**		**MS-F4**

There are more examples of this!
Credit to Stuart Palmer for finding these. Based on a document shared in the WINDSSM course.

Continuum of Learning

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.

7 - 10		Standard		
Stage 5.1	**Stage 5.2**	**Year 11**	**Year 12 Standard 1**	**Year 12 Standard 2**

Number and Algebra

Financial Mathematics

		Money Matters	**Financial Mathematics**	**Financial Mathematics**
Financial Mathematics MA5.1-4NA solves financial problems involving earning, spending and investing money	*Financial Mathematics* ◊ MA5.2-4NA solves financial problems involving compound interest	MS-F1 Money Matters	MS-F2 Investment MS-F3 Depreciation and Loans	MS-F4 Investments and Loans MS-F5 Annuities

Measurement

			Rates	**Rates and Ratios**
	Ratios and Rates MA5.2-5NA recognises direct and indirect proportion, and solves problems involving direct proportion		MS-M4 Rates	MS-M7 Rates and Ratios

Algebra

		Formulae and Equations		
	Equations MA5.2-8NA solves linear and simple quadratic equations, linear inequalities and linear simultaneous equations, using analytical and graphical techniques	MS-A1 Formulae and Equations		

		Linear Relationships	**Types of Relationships**	**Types of Relationships**
Linear Relationships MA5.1-6NA determines the midpoint, gradient and length of an interval, and graphs linear relationships	*Linear Relationships* MA5.2-9NA uses the gradient-intercept form to interpret and graph linear relationships	MS-A2 Linear Relationships	MS-A3 Types of Relationships, A3.1 Simultaneous linear equations	MS-A4 Types of Relationships, A4.1 Simultaneous linear equations

			Types of Relationships	**Types of Relationships**
Non-Linear Relationships MA5.1-7NA graphs simple non-linear relationships	*Non-Linear Relationships* ◊ MA5.2-10NA connects algebraic and graphical representations of simple non-linear relationships		MS-A3 Types of Relationships, A3.2 Graphs of practical situations	MS-A4 Types of Relationships, A4.2 Non-linear relationships

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)

http://gomaths.net/doe2017

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Orange is the new standard

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