**Scope and Sequence: Mathematics Standard Year 11 – Standard pathway through AAM units**

***Sample for implementation for Year 11 from 2018***

The Mathematics Standard syllabus provides many opportunities for students to apply and further develop the knowledge understanding and skills described in the content. In considering various applications of mathematics, students will be required to construct and use mathematical models. These opportunities for explicit application and modelling are identified within the syllabus by the code **AAM**.

The following sample scope and sequence provides a suggested pathway for an approach which focuses on teaching these application and modelling opportunities as separate units. The titles given to these separated application and modelling units are suggestions only.

Further information about potential content that could be taught is included in: *Mathematics Standard pathway (Years 11 and 12) through separate AAM units: Further Explanatory Information.*

| Term 1 |  | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Topic* | Algebra  | Financial Mathematics | Measurement | Algebra, Measurement | Measurement |
| *Unit title* | Formulae and Equations A1 | Earning and Managing Money F1.2 | Units of Measurement M1.1, M1.3  | Medication A1, M1.3 | Working with Time M2 |
| *Outcomes* | MS11-1, MS11-6, MS11-9, MS11-10 | MS11-2, MS11-5, MS11-6, MS11-9, MS11-10 | MS11-3, MS11-4, MS11-9, MS11-10 | MS11-1, MS11-6, MS11-9, MS11-10 | MS11-3, MS11-4, MS11-9, MS11-10 |

| Term 2 |  | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Topic* | Statistical Analysis | Algebra | Algebra, Statistical Analysis | Statistical Analysis |
| *Unit title* | Classifying and Representing Data S1.1 | Linear Relationships A2 | Driving Safely A1, S1.1 | Relative Frequency and Probability S2 |
| Assignment / Investigation |
| *Outcomes* | MS11-2, MS11-7, MS11-9, MS11-10 | MS11-1, MS11-2, MS11-6, MS11-9, MS11-10 | MS11-1, MS11-2, MS11-6, MS11-7, MS11-9, MS11-10 | MS11-8, MS11-9, MS11-10 |

| Term 3 |  | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Topic* | Statistical Analysis | Measurement | Financial Mathematics |
| *Unit title* | Exploring and Describing Data S1.2 | Perimeter, Area and Volume M1.2 | Simple Interest F1.1 |
| *Outcomes* | MS11-2, MS11-7, MS11-9, MS11-10 | MS11-3, MS11-4, MS11-9, MS11-10 | MS11-2, MS11-5, MS11-6, MS11-9, MS11-10 |

**Scope and Sequence: Mathematics Standard 2 Year 12 – Standard 2 pathway through AAM units**

***Sample for implementation for Year 12 from Term 4, 2018***

| Term 4 |  | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Topic* | Financial Mathematics, Statistical Analysis, Measurement | Networks | Measurement, Statistical Analysis, Financial Mathematics |
| *Unit title* | Buying and Running a CarF1.3, F1.1, S1.1, M7 | Introduction to Networks N2.1, N2.2 | Water, Energy and Sustainability M1.3, S1.1, F1.3, M7 |
| Assignment / Investigation |
| *Outcomes* | MS11-2, MS11-5, MS11-6, MS11-7,MS11-9, MS11-10, MS2-12-3, MS2-12-4, MS2-12-9, MS2-12-10 | MS2-12-8, MS2-12-9, MS2-12-10 | MS11-2, MS11-5, MS11-6,MS11-9, MS11-10, MS2-12-3, MS2-12-4, MS2-12-9, MS2-12-10 |
| Term 1 |  | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 |
| *Topic* | Financial Mathematics | Measurement | Algebra |
| *Unit title* | Investments F4.1 | Depreciation and Loans F4.2 | Non-right-angled Trigonometry M6 | Using Map ScalesM7 | Simultaneous Linear Equations A4.1 |
| *Outcomes* | MS2-12-5, MS2-12-9, MS2-12-10 | MS2-12-5, MS2-12-9, MS2-12-10 | MS2-12-3, MS2-12-4, MS2-12-9, MS2-12-10 | MS2-12-3, MS2-12-4, MS2-12-9, MS2-12-10 | MS2-12-1, MS2-12-6, MS2-12-9, MS2-12-10 |
| Term 2 |  | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 |
| *Topic* | Statistical Analysis | Statistical Analysis, Measurement | Financial Mathematics | Algebra |
| *Unit title* | Bivariate Data Analysis S4 | HealthS4, M7 | Annuities F5 | Non-Linear Relationships A4.2 |
| *Outcomes* | MS2-12-2, MS2-12-7, MS2-12-9, MS2-12-10 | MS2-12-2, MS2-12-3, MS2-12-4, MS2-12-7, MS2-12-9, MS2-12-10 | MS2-12-5, MS2-12-9, MS2-12-10 | MS2-12-1, MS2-12-6, MS2-12-9, MS2-12-10 |
| Term 3 |  | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 |
| *Topic* | Statistical Analysis | Networks |
| *Unit title* | The Normal Distribution S5 | Critical Path Analysis N3 |
| *Outcomes* | MS2-12-2, MS2-12-7, MS2-12-9, MS2-12-10 | MS2-12-8, MS2-12-9, MS2-12-10 |

# Mathematics Standard pathway (Years 11 and 12) through separate AAM units: Further Explanatory Information

This information describes suggested content that could be included within each separate application and modelling unit referred to in the scope and sequence. It is not part of, nor required for the scope and sequence.

**Medication**

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| **Topic** | **Subtopic** | **Content** |
| Measurement | MS-M1.3Applications of Measurement: Units of energy and mass | * review the use of metric units of mass in solving problems, including grams, kilograms and tonnes, their abbreviations and how to convert between them Literacy icon
 |
| Algebra | MS-A1 Formulae and Equations | * calculate required medication dosages for children and adults from packets, given age or weight, using Fried’s formula, Young’s formula or Clark’s formula as appropriate **AAM** Literacy icon
	+ Fried’s formula: $Dosage for children 1-2 years=\frac{age (in months) × adult dosage}{150}$
	+ Young’s formula: $Dosage for children 1-12 years=\frac{age of child (in years) × adult dosage}{age of child (in years) + 12}$
	+ Clark’s formula: $Dosage= \frac{weight in kg × adult dosage}{70}$
 |

**Driving Safely**

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| **Topic** | **Subtopic** | **Content** |
| Algebra | MS-A1 Formulae and Equations | * review substitution of numerical values into linear and non-linear algebraic expressions and equations ◊
	+ solve problems involving formulae, including but not limited to calculating distance, speed and time (with change of units of measurement as required) or calculating stopping distances of vehicles using a suitable formula **AAM** Personal and social capability icon
 |
| Algebra | MS-A1 Formulae and Equations | * calculate and interpret blood alcohol content (BAC) based on drink consumption and body weight **AAM** Ethical understanding icon Civics and citizenship icon
	+ use formulae, both in word form and algebraic form, to calculate an estimate for blood alcohol content ($BAC)$, including $BAC\_{Male}=\frac{10N-7.5H}{6.8M}$ and $BAC\_{Female}=\frac{10N-7.5H}{5.5M}$ where $N$ is the number of standard drinks consumed, $H$ is the number of hours of drinking, and $M$ is the person’s weight in kilograms.
	+ determine the number of hours required for a person to stop consuming alcohol in order to reach zero BAC, eg using the formula $time=\frac{BAC}{0.015}$
	+ describe limitations of methods estimating BAC
 |
| Statistical Analysis | MS-S1.1Data Analysis: Classifying and representing data (grouped and ungrouped) | * review how to organise and display data into appropriate tabular and/or graphical representations **AAM**◊ **Paperclip icon**  Information and communication technology capability icon Literacy icon
	+ display categorical data in tables and, as appropriate, in both bar charts or Pareto charts
	+ display numerical data as frequency distribution tables and histograms, cumulative frequency distribution tables and graphs, dot plots and stem and leaf plots (including back-to-back when comparing two datasets)
	+ 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, hourly temperature, household and personal water usage Sustainability icon Civics and citizenship icon
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**Buying and Running a Car**

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| **Topic** | **Subtopic** | **Content** |
| Financial Mathematics | MS-F1.3Money Matters: Budgeting and household expenses | * plan for the purchase of a car **AAM** ◊ Critical and creative thinking icon Personal and social capability icon
	+ investigate on-road costs for new and used vehicles, including sale price (or loan repayments), registration, insurance and stamp duty at current rates Literacy icon Civics and citizenship icon
	+ consider sustainability when choosing a vehicle to purchase, eg fuel consumption rates Sustainability icon
	+ calculate and compare the cost of purchasing different vehicles using a spreadsheet Critical and creative thinking icon  Information and communication technology capability icon
 |
| Financial Mathematics | MS-F1.3Money Matters: Budgeting and household expenses | * plan for the running and maintenance of a car **AAM** ◊ Critical and creative thinking icon Personal and social capability icon
	+ describe the different types of insurance available, including compulsory and non-compulsory third-party insurance, and comprehensive insurance Literacy icon Personal and social capability icon
	+ investigate other running costs associated with ownership of a vehicle, eg cost of servicing, repairs and tyres Literacy icon Personal and social capability icon
	+ calculate and compare the cost of running different vehicles, using a spreadsheet Critical and creative thinking icon  Information and communication technology capability icon
 |
| Financial Mathematics | MS-F1.1Money Matters: Interest and Depreciation | * calculate the depreciation of an asset, using the straight-line method as an application of the simple interest formula **AAM** ◊
* use $S=V\_{0}-Dn$, where $S$ is the salvage value of the asset after $n$ periods, $V\_{0}$ is the initial value of the asset, $D$ is the amount of depreciation per period, and $n$ is the number of periods
* use a spreadsheet to calculate and graph compound interest as a recurrence relation involving repeated applications of simple interest **AAM** ◊  Information and communication technology capability icon
 |
| Statistical Analysis | MS-S1.1Data Analysis: Classifying and representing data (grouped and ungrouped) | * review how to organise and display data into appropriate tabular and/or graphical representations **AAM** ◊ **Paperclip icon**  Information and communication technology capability icon Literacy icon
	+ display categorical data in tables and, as appropriate, in both bar charts or Pareto charts
	+ display numerical data as frequency distribution tables and histograms, cumulative frequency distribution tables and graphs, dot plots and stem and leaf plots (including back-to-back when comparing two datasets)
	+ 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 and vehicle depreciation Sustainability icon Civics and citizenship icon
 |
| Measurement | MS-M7Rates and Ratio | * use rates to solve and describe practical problems
	+ use rates to make comparisons, eg using unit prices to compare best buys, working with speed, comparing heart rates after exercise and considering targeted heart rate ranges during training Critical and creative thinking icon  Information and communication technology capability icon Personal and social capability icon
	+ calculate the amount of fuel used on a trip, given the fuel consumption rate, and compare fuel consumption statistics for various vehicles
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**Water, Energy and Sustainability**

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| **Topic** | **Subtopic** | **Content** |
| Measurement | MS-M1.3Applications of Measurement: Units of energy and mass | * use units of energy to solve problems involving the consumption of electricity, for example kilowatt hours, and investigate common appliances in terms of their energy consumption **AAM** Sustainability icon Literacy icon
 |
| Statistical Analysis | MS-S1.1Data Analysis: Classifying and representing data (grouped and ungrouped) | * review how to organise and display data into appropriate tabular and/or graphical representations **AAM** ◊ **Paperclip icon**  Information and communication technology capability icon Literacy icon
	+ display categorical data in tables and, as appropriate, in both bar charts or Pareto charts
	+ display numerical data as frequency distribution tables and histograms, cumulative frequency distribution tables and graphs, dot plots and stem and leaf plots (including back-to-back when comparing two datasets)
	+ construct and interpret tables and graphs related to real-world contexts, including but not limited to: rainfall, hourly temperature, household and personal water usage Sustainability icon Civics and citizenship icon
 |
| Statistical Analysis | MS-S1.1Data Analysis: Classifying and representing data (grouped and ungrouped) | * interpret and compare data in tabular and/or graphical representations **AAM** ◊ **Paperclip icon**  Information and communication technology capability icon Literacy icon
	+ choose appropriate tabular and/or graphical representations to enable comparisons
	+ compare the suitability of different methods of data presentation in real-world contexts, including their visual appeal, eg a heat map to illustrate climate change data or the median house prices across suburbs Sustainability icon Ethical understanding icon Difference and diversity icon
 |
| Financial Mathematics | MS-F1.3Money Matters: Budgeting and household expenses | * interpret and use information about a household’s electricity, water or gas usage and related charges and costs from household bills **AAM** ◊Sustainability icon Civics and citizenship icon
 |
| Measurement | MS-M7Rates and Ratio | * use rates to solve and describe practical problems **AAM**
	+ know that a watt (W) is the International System of Units (SI) derived unit of power and is equal to one joule per second
	+ interpret the energy rating of household appliances and compare running costs of different models of the same type of appliance, considering costs of domestic electricity, eg calculate the cost of running a 200-watt television for six hours if the average peak rate for domestic electricity is $0.15/kWh Sustainability icon
	+ investigate local council requirements for energy-efficient housing Sustainability icon
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**Using Map Scales**

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| **Topic** | **Subtopic** | **Content** |
| Measurement | MS-M7Rates and Ratio | * solve practical problems involving ratio, for example map scales, mixtures for building materials or cost per item **AAM** Critical and creative thinking icon  Information and communication technology capability icon
	+ work with ratio to express a ratio in simplest form, to find the ratio of two quantities and to divide a quantity in a given ratio
	+ use ratio to describe map scales
* obtain measurements from scale drawings, including but not limited to maps (including cultural mappings or models) or building plans, to solve problems **AAM** Aboriginal and Torres Strait Islander histories and cultures icon Critical and creative thinking icon
	+ interpret commonly used symbols and abbreviations on building plans and elevation views Literacy icon
	+ calculate the perimeter or area of a section of land, using the Trapezoidal rule where appropriate, from a variety of sources, including but not limited to a site plan, an aerial photograph, radial surveys or maps that include a scale  Information and communication technology capability icon
	+ calculate the volume of rainfall over an area, using $V=Ah$, from a variety of sources, including but not limited to a site plan, an aerial photograph, radial surveys or maps that include a scale  Information and communication technology capability icon
 |

**Health**

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| **Topic** | **Subtopic** | **Content** |
| Measurement | MS-M7Rates and Ratio | * use rates to solve and describe practical problems **AAM**
	+ use rates to make comparisons, eg using unit prices to compare best buys, working with speed, comparing heart rates after exercise and considering Targeted Heart Rate ranges during training Critical and creative thinking icon  Information and communication technology capability icon Personal and social capability icon
 |
| Statistical Analysis | MS-S4Bivariate Data Analysis | * implement the statistical investigation process to answer questions that involve identifying, analysing and describing associations between two numerical variables **AAM** **Paperclip icon**
* construct, interpret and analyse scatterplots for bivariate numerical data in practical contexts **AAM Paperclip icon** Aboriginal and Torres Strait Islander histories and cultures icon Asia and Australia’s engagement with Asia icon Ethical understanding icon Work and enterprise
* demonstrate an awareness of issues of privacy and bias, ethics, and responsiveness to diverse groups and cultures when collecting and using data
	+ investigate using biometric data obtained by measuring the body or by accessing published data from sources including government organisations, and determine if any associations exist between identified variables Critical and creative thinking icon  Information and communication technology capability icon
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