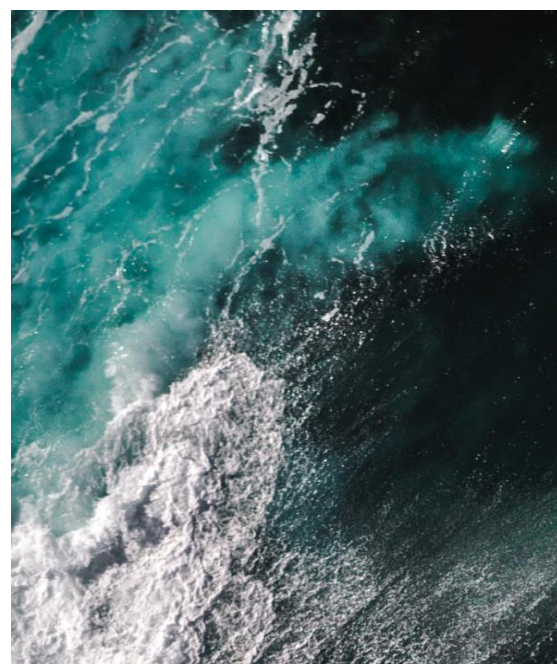


# MATHEMATICS FRAMEWORK

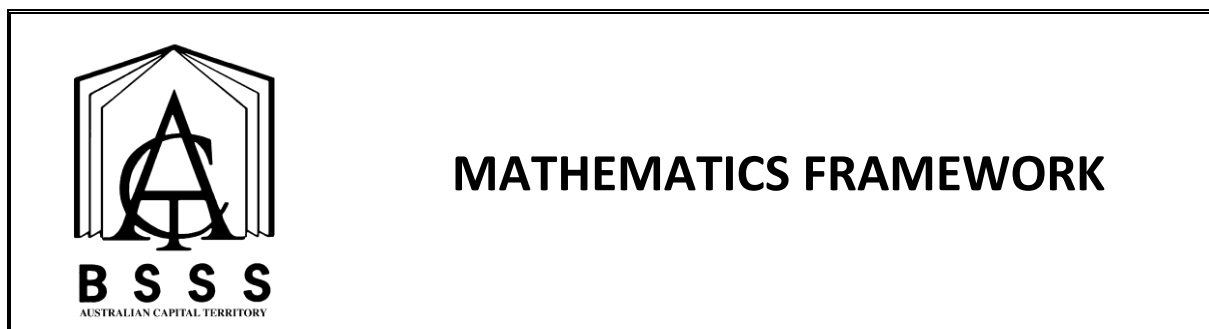


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## Introduction

All courses of study for the ACT Senior Secondary Certificate should enable students to develop essential capabilities for twenty-first century learners. These ‘capabilities’ comprise an integrated and interconnected set of knowledge, skills, behaviours and dispositions that students develop and use in their learning across the curriculum.

The capabilities include:

- literacy
- numeracy
- information and communication technology (ICT)
- critical and creative thinking
- personal and social
- ethical understanding
- intercultural understanding

Courses of study for the ACT Senior Secondary Certificate should be both relevant to the lives of students and incorporate the contemporary issues they face. Hence, courses address the following three priorities. These priorities are:

- Aboriginal and Torres Strait Islander histories and cultures
- Asia and Australia’s engagement with Asia
- Sustainability

Elaboration of these student capabilities and priorities is available on the ACARA website at:

[www.australiancurriculum.com.au](http://www.australiancurriculum.com.au).

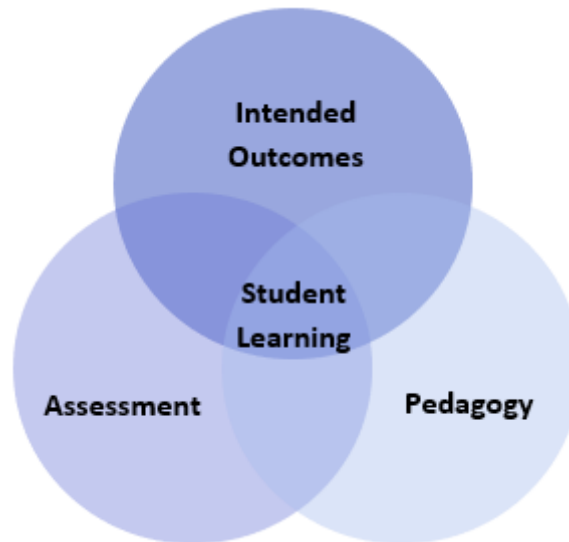
## Frameworks

Frameworks provide the basis for the development and accreditation of any course within a broad subject area and provide a common basis for the assessment, moderation and reporting of student outcomes in courses based on the Framework.

Frameworks support a model of learning that integrates intended student outcomes, pedagogy and assessment. This model is underpinned by a set of beliefs and a set of learning principles.

## Underpinning beliefs

- All students are able to learn.
- Learning is a partnership between students and teachers.
- Teachers are responsible for advancing student learning.



## Learning Principles

1. Learning builds on existing knowledge, understandings and skills.  
*(Prior knowledge)*
2. When learning is organised around major concepts, principles and significant real world issues, within and across disciplines, it helps students make connections and build knowledge structures.  
*(Deep knowledge and connectedness)*
3. Learning is facilitated when students actively monitor their own learning and consciously develop ways of organising and applying knowledge within and across contexts.  
*(Metacognition)*
4. Learners' sense of self and motivation to learn affects learning.  
*(Self-concept)*
5. Learning needs to take place in a context of high expectations.  
*(High expectations)*
6. Learners learn in different ways and at different rates.  
*(Individual differences)*
7. Different cultural environments, including the use of language, shape learners' understandings and the way they learn.  
*(Socio-cultural effects)*
8. Learning is a social and collaborative function as well as an individual one.  
*(Collaborative learning)*
9. Learning is strengthened when learning outcomes and criteria for judging learning are made explicit and when students receive frequent feedback on their progress.  
*(Explicit expectations and feedback)*

## Rationale

Mathematics is a way of thinking in which problems are explored and solved through observation, reflection and logical reasoning. It is the study of pattern, relation, dimension, quantity, uncertainty, shape and change.

From its origins in counting and measuring, mathematics has developed into a highly sophisticated language used to describe much of the contemporary world. It is a concise system of communication, with written, symbolic, spoken and visual components.

Students identify appropriate mathematical processes, transfer skills between contexts, make informed decisions, make connections and develop mathematical arguments. Students undertaking mathematics will develop their critical and creative thinking, problem solving skills, oral and written communication, information and communication technologies (ICT) capability, ability to collaborate, and sense of personal and social responsibility. This is achieved through setting and monitoring personal and academic goals, taking initiative, and building adaptability, communication, and teamwork. Students develop their ethical understanding by considering the social consequences of making decisions based on mathematical results.

## Goals

All courses based on this Framework should enable students to:

- critically and creatively apply mathematical concepts, models and techniques
- evaluate the reasonableness of solutions to problems
- develop a critical appreciation of the use of information and communication technology in mathematics
- communicate using appropriate mathematical language
- develop mathematical judgements and arguments through inquiry
- learn with purpose and persistence, independently and collaboratively
- evaluate the potential of mathematics to generate knowledge in the public good
- reflect on thinking and learning.

## Content

Courses developed under this Framework provide details of course content through the component units of the course. While this content will differ according to the particular course, all content will be chosen to enable students to work towards the achievement of the common and agreed goals of the Framework.

### Concepts and Knowledge

- numbers
- equivalence and comparison
- operations and relationships
- properties
- basic facts and algorithms
- estimation
- patterns
- variables
- proportionality
- relations and functions
- equations and inequalities
- shapes and solids
- orientation and location
- transformations
- measurement
- data (collection, representation, distribution)
- chance.

### Skills

- computational fluency
- analysis
- synthesis
- evaluation
- critical and creative thinking
- communication
- measurement
- modelling
- problem solving
- reasoning and proof
- interpersonal and intrapersonal
- reflection.

## Teaching Strategies

Course developers are encouraged to outline teaching strategies that are grounded in the Learning Principles and encompass quality teaching. Teaching strategies and assessment tasks should promote intellectual quality, establish a rich learning environment and generate relevant connections between learning and life experiences.

## Assessment

The identification of criteria within the achievement standards and assessment tasks types and weightings provide a common and agreed basis for the collection of evidence of student achievement.

**Assessment Criteria** (the dimensions of quality that teachers look for in evaluating student work) provide a common and agreed basis for judgement of performance against unit and course goals, within and across colleges. Over a course, teachers must use all these criteria to assess students’ performance but are not required to use all criteria on each task. Assessment criteria are to be used holistically on a given task and in determining the unit grade.

**Assessment Tasks** elicit responses that demonstrate the degree to which students have achieved the goals of a unit based on the assessment criteria. The Common Curriculum Elements (CCE) is a guide to developing assessment tasks that promote a range of thinking skills (see Appendix B). It is highly desirable that assessment tasks engage students in demonstrating higher order thinking.

**Rubrics** are constructed for individual tasks, informing the assessment criteria relevant for a particular task and can be used to assess a continuum that indicates levels of student performance against each criterion.

### Assessment Criteria

Students will be assessed on the degree to which they demonstrate an understanding of:

- concepts and techniques
- reasoning and communications.

### Assessment Task Types

<b>Suggested tasks:</b>	
<ul style="list-style-type: none"> <li>• project/assignment</li> <li>• modelling projects</li> <li>• portfolio</li> <li>• journal</li> <li>• validation activity</li> </ul>	<ul style="list-style-type: none"> <li>• presentation such as a pitch, poster, vodcast, interview</li> <li>• practical activity such as a demonstration</li> <li>• test/examination</li> <li>• online adaptive tasks/quiz</li> </ul>
<b>Weightings in A/T/M 1.0:</b>	
No task be weighted more than 50% for a standard 1.0 unit.	

## Achievement Standards

Years 11 and 12 achievement standards are written for A/T courses. A single achievement standard is written for M courses.

A Year 12 student in any unit is assessed using the Year 12 achievement standards. A Year 11 student in any unit is assessed using the Year 11 achievement standards. Year 12 achievement standards reflect higher expectations of student achievement compared to the Year 11 achievement standards. Years 11 and 12 achievement standards are differentiated by cognitive demand, the number of dimensions and the depth of inquiry.

An achievement standard cannot be used as a rubric for an individual assessment task. Assessment is the responsibility of the college. Student tasks may be assessed using rubrics or marking schemes devised by the college. A teacher may use the achievement standards to inform development of rubrics. The verbs used in achievement standards may be reflected in the rubric. In the context of combined Years 11 and 12 classes, it is best practice to have a distinct rubric for Years 11 and 12. These rubrics should be available for students prior to the commencement of an assessment task so that success criteria are clear.

**Achievement Standards for Mathematics A Course – Year 11**

	<i>A student who achieves an A grade typically</i>	<i>A student who achieves a B grade typically</i>	<i>A student who achieves a C grade typically</i>	<i>A student who achieves a D grade typically</i>	<i>A student who achieves an E grade typically</i>
<b>Concepts and Techniques</b>	<ul style="list-style-type: none"> <li>• applies mathematical concepts in a variety of complex contexts to routine and non-routine problems</li> <li>• select and applies mathematical techniques to solve routine and non-routine problems in a variety of complex contexts</li> <li>• uses digital technologies effectively to solve routine and non-routine problems in a variety of contexts</li> </ul>	<ul style="list-style-type: none"> <li>• applies mathematical concepts in a variety of contexts to routine and non-routine problems</li> <li>• applies mathematical techniques to solve routine and non-routine problems in a variety of contexts</li> <li>• uses digital technologies appropriately to solve routine and non-routine problems in a variety of contexts</li> </ul>	<ul style="list-style-type: none"> <li>• applies mathematical concepts in some contexts to routine and non-routine problems</li> <li>• applies simple mathematical techniques to solve routine problems in some contexts</li> <li>• uses digital technologies appropriately to solve routine problems in some contexts</li> </ul>	<ul style="list-style-type: none"> <li>• applies simple mathematical concepts in limited contexts to routine problems</li> <li>• applies simple mathematical techniques to solve routine problems in limited contexts</li> <li>• uses digital technologies to solve routine problems in structured contexts</li> </ul>	<ul style="list-style-type: none"> <li>• applies simple mathematical concepts in structured contexts</li> <li>• applies simple mathematical techniques to solve routine problems in structured contexts</li> <li>• uses digital technologies to solve routine problems in structured contexts</li> </ul>
<b>Reasoning and Communications</b>	<ul style="list-style-type: none"> <li>• represents some complex mathematical concepts in numerical and graphical form in routine and non-routine problems for a variety of contexts</li> <li>• communicates mathematical information in oral, written and/or multimodal forms, which are well reasoned, using accurate and appropriate language</li> <li>• reflects with insight on own thinking and learning, evaluates planning, time management, use of appropriate strategies to work independently and collaboratively</li> <li>• evaluates the potential of Mathematics to generate knowledge in the public good</li> </ul>	<ul style="list-style-type: none"> <li>• represents mathematical concepts in numerical and graphical form in routine and non-routine problems for a variety of contexts</li> <li>• communicates mathematical information in oral, written and/or multimodal forms, which are clear, using accurate and appropriate language</li> <li>• reflects on own thinking and learning, analyses inter and intrapersonal skills including planning, time management, use of appropriate strategies to work independently and collaboratively</li> <li>• analyses the potential of Mathematics to generate knowledge in the public good</li> </ul>	<ul style="list-style-type: none"> <li>• represents mathematical concepts in numerical and graphical form to some routine and non-routine problems for routine contexts</li> <li>• communicates mathematical judgements in oral, written and/or multimodal forms, using appropriate language</li> <li>• reflects on own thinking and learning, explains planning, time management, use of appropriate strategies to work independently and collaboratively</li> <li>• explains the potential of Mathematics to generate knowledge in the public good</li> </ul>	<ul style="list-style-type: none"> <li>• represents simple mathematical concepts in numerical or graphical form in routine problems for routine contexts</li> <li>• communicates simple mathematical judgements in oral, written and/or multimodal forms, with some use of appropriate language</li> <li>• reflects on their own thinking with some reference to planning, time management, use of appropriate strategies to work independently and collaboratively</li> <li>• describes the potential of Mathematics to generate knowledge in the public good</li> </ul>	<ul style="list-style-type: none"> <li>• represents simple mathematical concepts in numerical or graphical form in routine problems for structured contexts</li> <li>• communicates simple mathematical information in oral, written and/or multimodal forms, with limited use of appropriate language</li> <li>• reflects on their own thinking with little or no reference to planning, time management, use of appropriate strategies to work independently and collaboratively</li> <li>• identifies some ways in which Mathematics is used to generate knowledge in the public good</li> </ul>

**Achievement Standards for Mathematics T Course – Year 11**

	<i>A student who achieves an A grade typically</i>	<i>A student who achieves a B grade typically</i>	<i>A student who achieves a C grade typically</i>	<i>A student who achieves a D grade typically</i>	<i>A student who achieves an E grade typically</i>
<b>Concepts and Techniques</b>	<ul style="list-style-type: none"> <li>critically applies mathematical concepts in a variety of complex contexts to routine and non-routine problems</li> <li>selects and applies advanced mathematical techniques to solve complex problems in a variety of contexts</li> <li>constructs, selects and applies complex mathematical models to routine and non-routine problems in a variety of contexts</li> <li>uses digital technologies efficiently to solve routine and non-routine problems in a variety of contexts</li> </ul>	<ul style="list-style-type: none"> <li>applies mathematical concepts in a variety of contexts to routine and non-routine problems</li> <li>selects and applies mathematical techniques to solve routine and non-routine problems in a variety of contexts</li> <li>selects and applies mathematical models to routine and non-routine problems to a variety of contexts</li> <li>uses digital technologies effectively to solve routine and non-routine problems in a variety of contexts</li> </ul>	<ul style="list-style-type: none"> <li>applies mathematical concepts in some contexts to routine and non-routine problems</li> <li>applies mathematical techniques to solve routine and non-routine problems in some contexts</li> <li>applies mathematical models to routine and non-routine problems in some contexts</li> <li>uses digital technologies appropriately to solve routine and non-routine problems in some contexts</li> </ul>	<ul style="list-style-type: none"> <li>applies simple mathematical concepts in limited contexts to routine problems</li> <li>applies simple mathematical techniques to solve routine problems in limited contexts</li> <li>applies simple mathematical models to routine problems in limited contexts</li> <li>uses digital technologies appropriately to solve routine problems in limited contexts</li> </ul>	<ul style="list-style-type: none"> <li>applies simple mathematical concepts in structured contexts</li> <li>uses simple mathematical techniques to solve routine problems in structured contexts</li> <li>demonstrates limited familiarity with mathematical models in structured contexts</li> <li>uses digital technologies to solve routine problems in structured contexts</li> </ul>
<b>Reasoning and Communications</b>	<ul style="list-style-type: none"> <li>represents complex mathematical concepts in numerical, graphical and symbolic form in routine and non-routine problems in a variety of contexts</li> <li>communicates mathematical judgements and arguments in oral, written and/or multimodal forms, which are succinct and well-reasoned, using appropriate and accurate language</li> <li>evaluates the reasonableness of solutions to routine and non-routine problems in a variety of contexts</li> <li>reflects with insight on their own thinking and that of others and evaluates planning, time management, use of appropriate strategies to work independently and collaboratively</li> <li>evaluates the potential of Mathematics to generate knowledge in the public good</li> </ul>	<ul style="list-style-type: none"> <li>represents mathematical concepts in numerical, graphical and symbolic form in routine and non-routine problems a variety of contexts</li> <li>communicates mathematical judgements and arguments in oral, written and/or multimodal forms, which are clear and reasoned, using appropriate and accurate language</li> <li>analyses the reasonableness of solutions to routine and non-routine problems</li> <li>reflects on their own thinking and analyses planning, time management, use of appropriate strategies to work independently and collaboratively</li> <li>analyses the potential of Mathematics to generate knowledge in the public good</li> </ul>	<ul style="list-style-type: none"> <li>represents mathematical concepts in numerical, graphical and symbolic form to some routine and some non-routine problems in some contexts</li> <li>communicates mathematical judgements and arguments in oral, written and/or multimodal forms, using appropriate and accurate language</li> <li>explains the reasonableness of solutions to some routine and non-routine problems</li> <li>reflects on their own thinking and explains planning, time management, use of appropriate strategies to work independently and collaboratively</li> <li>explains the potential of Mathematics to generate knowledge in the public good</li> </ul>	<ul style="list-style-type: none"> <li>represents simple mathematical concepts in numerical, graphical or symbolic form in routine problems in limited contexts</li> <li>communicates simple mathematical judgements or arguments in oral, written and/or multimodal forms, with some use of appropriate language</li> <li>describes the appropriateness of solutions to routine problems</li> <li>reflects on their own thinking with some reference to planning, time management, use of appropriate strategies to work independently and collaboratively</li> <li>describes the potential of Mathematics to generate knowledge in the public good</li> </ul>	<ul style="list-style-type: none"> <li>represents simple mathematical concepts in numerical, graphical or symbolic form in structured contexts</li> <li>communicates simple mathematical information in oral, written and/or multimodal forms, with limited use of appropriate language</li> <li>identifies solutions to routine problems in structured contexts</li> <li>reflects on their own thinking with little or no reference to planning, time management, use of appropriate strategies to work independently and collaboratively</li> <li>identifies some ways in which Mathematics is used to generate knowledge in the public good</li> </ul>

**Achievement Standards for Mathematics A Course – Year 12**

	<i>A student who achieves an A grade typically</i>	<i>A student who achieves a B grade typically</i>	<i>A student who achieves a C grade typically</i>	<i>A student who achieves a D grade typically</i>	<i>A student who achieves an E grade typically</i>
<b>Concepts and Techniques</b>	<ul style="list-style-type: none"> <li>applies mathematical concepts in a variety of complex contexts to routine and non-routine problems</li> <li>select and applies mathematical techniques to solve routine and non-routine problems in a variety of contexts</li> <li>uses digital technologies effectively to solve routine and non-routine problems in a variety of contexts</li> </ul>	<ul style="list-style-type: none"> <li>applies mathematical concepts in a variety of contexts to routine and non-routine problems</li> <li>applies mathematical techniques to solve routine and non-routine problems in a variety of contexts</li> <li>uses digital technologies appropriately to solve routine and non-routine problems in a variety of contexts</li> </ul>	<ul style="list-style-type: none"> <li>applies mathematical concepts in some contexts to routine and non-routine problems</li> <li>applies simple mathematical techniques to solve routine problems in some contexts</li> <li>uses digital technologies appropriately to solve routine problems in some contexts</li> </ul>	<ul style="list-style-type: none"> <li>applies simple mathematical concepts in limited contexts to routine problems</li> <li>uses simple mathematical techniques to solve routine problems in limited contexts</li> <li>uses digital technologies to solve routine problems in limited contexts</li> </ul>	<ul style="list-style-type: none"> <li>applies simple mathematical concepts in structured contexts</li> <li>uses simple mathematical techniques to solve routine problems in structured contexts</li> <li>uses digital technologies to solve routine problems in structured contexts</li> </ul>
<b>Reasoning and Communications</b>	<ul style="list-style-type: none"> <li>represents <del>some</del> complex mathematical concepts in numerical and graphical form in routine and non-routine problems in a variety of contexts</li> <li>communicates mathematical information in oral, written and/or multimodal forms, which are logical and reasoned, using appropriate language</li> <li>analyse the reasonableness of solutions to routine and non-routine problems in a variety of contexts</li> <li>reflects with insight on their own thinking and that of others and evaluates planning, time management, use of appropriate strategies to work independently and collaboratively</li> <li>evaluates the potential of Mathematics to generate knowledge in the public good</li> </ul>	<ul style="list-style-type: none"> <li>represents mathematical concepts in numerical and graphical form in routine and non-routine problems in a variety of contexts</li> <li>communicates mathematical information in oral, written and/or multimodal forms, which are logical and clear, using appropriate language</li> <li>explains the reasonableness of solutions to routine and non-routine problems</li> <li>reflects on their own thinking and analyses planning, time management, use of appropriate strategies to work independently and collaboratively</li> <li>analyses the potential of Mathematics to generate knowledge in the public good</li> </ul>	<ul style="list-style-type: none"> <li>represents mathematical concepts in numerical and graphical form to some routine and non-routine problems in some contexts</li> <li>communicates mathematical judgements in oral, written and/or multimodal forms, using appropriate language</li> <li>describes the reasonableness of solutions to some routine and non-routine problems</li> <li>reflects on their own thinking and explains planning, time management, use of appropriate strategies to work independently and collaboratively</li> <li>explains the potential of Mathematics to generate knowledge in the public good</li> </ul>	<ul style="list-style-type: none"> <li>represents simple mathematical concepts in numerical or graphical form in routine problems in structured contexts</li> <li>communicates simple mathematical judgements in oral, written and/or multimodal forms, with some use of appropriate language</li> <li>describes the appropriateness of solutions to routine problems</li> <li>reflects on their own thinking with some reference to planning, time management, use of appropriate strategies to work independently and collaboratively</li> <li>describes the potential of Mathematics to generate knowledge in the public good</li> </ul>	<ul style="list-style-type: none"> <li>represents simple mathematical concepts in numerical or graphical form in structured contexts</li> <li>communicates simple mathematical information in oral, written and/or multimodal forms, with limited use of appropriate language</li> <li>identifies solutions to routine problems</li> <li>reflects on their own thinking with little or no reference to planning, time management, use of appropriate strategies to work independently and collaboratively</li> <li>identifies some ways in which Mathematics is used to generate knowledge in the public good</li> </ul>

**Achievement Standards for Mathematics T Course – Year 12**

	<i>A student who achieves an A grade typically</i>	<i>A student who achieves a B grade typically</i>	<i>A student who achieves a C grade typically</i>	<i>A student who achieves a D grade typically</i>	<i>A student who achieves an E grade typically</i>
<b>Concepts and Techniques</b>	<ul style="list-style-type: none"> <li>critically and creatively applies mathematical concepts in a variety of complex contexts to routine and non-routine problems</li> <li>synthesises information to select and apply mathematical techniques to solve complex problems in a variety of contexts</li> <li>constructs, selects and applies mathematical models to a variety of contexts in routine and non-routine problems</li> <li>uses digital technologies efficiently to solve routine and non-routine problems in a variety of contexts</li> </ul>	<ul style="list-style-type: none"> <li>critically applies mathematical concepts in a variety of contexts to routine and non-routine problems</li> <li>analyses information to select and apply mathematical techniques to solve routine and non-routine problems in a variety of contexts</li> <li>selects and applies mathematical models to routine and non-routine problems in a variety of contexts</li> <li>uses digital technologies effectively to solve routine and non-routine problems in a variety of contexts</li> </ul>	<ul style="list-style-type: none"> <li>applies mathematical concepts in some contexts to routine and non-routine problems</li> <li>selects and applies mathematical techniques to solve routine and some non-routine problems in some contexts</li> <li>applies mathematical models to routine and non-routine problems in some contexts</li> <li>uses digital technologies appropriately to solve routine and non-routine problems in a variety of contexts</li> </ul>	<ul style="list-style-type: none"> <li>applies simple mathematical concepts in limited contexts to routine problems</li> <li>applies simple mathematical techniques to solve routine problems in limited contexts</li> <li>applies simple mathematical models to routine problems in limited contexts</li> <li>uses digital technologies appropriately to solve routine problems in limited contexts</li> </ul>	<ul style="list-style-type: none"> <li>applies simple mathematical concepts in structured contexts</li> <li>uses simple mathematical techniques to solve routine problems in structured contexts</li> <li>demonstrates limited familiarity with mathematical models to solve routine problems in structured contexts</li> <li>uses digital technologies to solve routine problems in structured contexts</li> </ul>
<b>Reasoning and Communications</b>	<ul style="list-style-type: none"> <li>represents some mathematical concepts in numerical, graphical and symbolic form in routine and non-routine problems in a variety of contexts</li> <li>communicates mathematical judgements and arguments in oral, written and/or multimodal forms, which are succinct and reasoned, using appropriate and accurate language</li> <li>evaluates the solutions to routine and non-routine problems in a variety of contexts</li> <li>evaluates methods and models for their strengths and limitations when developing solutions to routine and non-routine problems</li> <li>reflects with insight on their own thinking and that of others and evaluates planning, time management, use of appropriate strategies to work independently and collaboratively</li> <li>evaluates the potential of Mathematics to generate knowledge in the public good</li> </ul>	<ul style="list-style-type: none"> <li>represents mathematical concepts in numerical, graphical and symbolic form in routine and non-routine problems in a variety of contexts</li> <li>communicates mathematical judgements and arguments in oral, written and/or multimodal forms, which are clear and reasoned, using appropriate and accurate language</li> <li>analyses the solutions to routine and non-routine problems in some contexts</li> <li>analyses strengths and limitations of models used when developing solutions to routine and non-routine problems</li> <li>reflects on their own thinking and analyses planning, time management, use of appropriate strategies to work independently and collaboratively</li> <li>analyses the potential of Mathematics to generate knowledge in the public good</li> </ul>	<ul style="list-style-type: none"> <li>represents mathematical concepts in numerical, graphical and symbolic form in some routine and non-routine problems in some contexts</li> <li>communicates mathematical judgements and arguments in oral, written and/or multimodal forms, using appropriate and accurate language</li> <li>explains solutions to some routine and non-routine problems in some contexts</li> <li>explains strengths and limitations of models used when developing solutions to some routine and non-routine problems</li> <li>reflects on their own thinking and explains planning, time management, use of appropriate strategies to work independently and collaboratively</li> <li>explains the potential of Mathematics to generate knowledge in the public good</li> </ul>	<ul style="list-style-type: none"> <li>represents simple mathematical concepts in numerical, graphical or symbolic form in routine problems in structured contexts</li> <li>communicates simple mathematical judgements or arguments in oral, written and/or multimodal forms, with some use of appropriate language</li> <li>describes solutions to routine problems in limited contexts</li> <li>describes strengths or limitations of simple models when solving routine problems</li> <li>reflects on their own thinking with some reference to planning, time management, use of appropriate strategies to work independently and collaboratively</li> <li>describes the potential of Mathematics to generate knowledge in the public good</li> </ul>	<ul style="list-style-type: none"> <li>represents simple mathematical concepts in numerical, graphical or symbolic form in simple problems in structured contexts</li> <li>communicates simple mathematical information in oral, written and/or multimodal forms, with limited use of appropriate language</li> <li>identifies solutions to routine problems in structured contexts</li> <li>identifies strengths or limitations of simple models in relation to routine problems</li> <li>reflects on their own thinking with little or no reference to planning, time management, use of appropriate strategies to work independently and collaboratively</li> <li>identifies some ways in which Mathematics is used to generate knowledge in the public good</li> </ul>

**Achievement Standards for Mathematics M Course – Years 11 and 12**

	<i>A student who achieves an A grade typically</i>	<i>A student who achieves a B grade typically</i>	<i>A student who achieves a C grade typically</i>	<i>A student who achieves a D grade typically</i>	<i>A student who achieves an E grade typically</i>
<b>Concepts and Techniques</b>	<ul style="list-style-type: none"> <li>• applies numeracy skills in a variety of contexts to routine and non-routine problems, with independence</li> <li>• uses digital technologies effectively to solve routine and non-routine problems in a variety of contexts, with independence</li> </ul>	<ul style="list-style-type: none"> <li>• applies numeracy skills in a variety of contexts to routine and non-routine problems, with some independence</li> <li>• uses digital technologies appropriately to solve routine and non-routine problems in a variety of contexts, with some independence</li> </ul>	<ul style="list-style-type: none"> <li>• applies numeracy skills in some contexts to routine and non-routine problems, with assistance</li> <li>• uses digital technologies appropriately to solve routine problems in limited contexts, with assistance</li> </ul>	<ul style="list-style-type: none"> <li>• applies simple numeracy skills in limited contexts to routine problems, with repeated cueing</li> <li>• uses digital technologies to solve routine problems in structured contexts, with repeated cueing</li> </ul>	<ul style="list-style-type: none"> <li>• applies simple numeracy skills in structured contexts, with direct instruction</li> <li>• uses digital technologies efficiently to solve routine and non-routine problems in a variety of contexts, with direct instruction</li> </ul>
<b>Reasoning and Communications</b>	<ul style="list-style-type: none"> <li>• represents numeracy skills in numerical and graphical form in routine and non-routine problems in a variety of contexts, with independence</li> <li>• communicates mathematical information in oral, written and/or multimodal forms, using appropriate language, with independence</li> <li>• reflects with insight on own thinking and learning in mathematics, with independence</li> </ul>	<ul style="list-style-type: none"> <li>• represents numeracy skills in numerical and graphical form in routine and non-routine problems, with some independence</li> <li>• communicates mathematical information in oral, written and/or multimodal forms, using appropriate language, with some independence</li> <li>• reflects on own thinking and learning in mathematics, with some independence</li> </ul>	<ul style="list-style-type: none"> <li>• represents numeracy skills in numerical and graphical form in some routine and non-routine problems, with assistance</li> <li>• communicates mathematical information in oral, written and/or multimodal forms, using appropriate language, with assistance</li> <li>• reflects on own thinking and learning in mathematics, with assistance</li> </ul>	<ul style="list-style-type: none"> <li>• represents simple numeracy skills in numerical or graphical form in routine problems, with repeated cueing</li> <li>• communicates simple mathematical information in oral, written and/or multimodal forms, using appropriate language, with repeated cueing</li> <li>• reflects on own thinking and learning in mathematics, with repeated cueing</li> </ul>	<ul style="list-style-type: none"> <li>• represents simple numeracy skills in numerical or graphical form in structured contexts, with direct instruction</li> <li>• communicates simple mathematical information in oral, written and/or multimodal forms, using appropriate language, with direct instruction</li> <li>• reflects on own thinking and learning in mathematics, with frequent prompting</li> </ul>

## **Moderation**

Moderation is a system designed and implemented to:

- provide comparability in the system of school-based assessment
- form the basis for valid and reliable assessment in senior secondary schools
- involve the ACT Board of Senior Secondary Studies and colleges in cooperation and partnership
- maintain the quality of school-based assessment and the credibility, validity and acceptability of Board certificates.

Moderation commences within individual colleges. Teachers develop assessment programs and instruments, apply assessment criteria, and allocate Unit Grades, according to the relevant Course Framework. Teachers within course teaching groups conduct consensus discussions to moderate marking or grading of individual assessment instruments and unit grade decisions.

### **The Moderation Model**

Moderation within the ACT encompasses structured, consensus-based peer review of Unit Grades for all accredited courses, as well as statistical moderation of course scores, including small group procedures, for T courses.

### **Moderation by Structured, Consensus-based Peer Review**

Review is a subcategory of moderation, comprising the review of standards and the validation of Unit Grades. In the review process, Unit Grades, determined for Year 11 and Year 12 student assessment portfolios that have been assessed in schools by teachers under accredited courses, are moderated by peer review against system wide criteria and standards. This is done by matching student performance with the criteria and standards outlined in the unit grade descriptors as stated in the Course Framework. Advice is then given to colleges to assist teachers with, and/or reassure them on, their judgments.

### **Preparation for Structured, Consensus-based Peer Review**

Each year, teachers teaching a Year 11 class are asked to retain originals or copies of student work completed in Semester 2. Similarly, teachers teaching a Year 12 class should retain originals or copies of student work completed in Semester 1. Assessment and other documentation required by the Office of the Board of Senior Secondary Studies should also be kept. Year 11 work from Semester 2 of the previous year is presented for review at Moderation Day 1 in March, and Year 12 work from Semester 1 is presented for review at Moderation Day 2 in August.

In the lead up to Moderation Day, a College Course Presentation (comprised of a document folder and a set of student portfolios) is prepared for each A, T and M course/units offered by the school and is sent into the Office of the Board of Senior Secondary Studies.

## **The College Course Presentation**

The package of materials (College Course Presentation) presented by a college for review on moderation days in each course area will comprise the following:

- a folder containing supporting documentation as requested by the Office of the Board through memoranda to colleges
- a set of student portfolios containing marked and/or graded written and non-written assessment responses and completed criteria and standards feedback forms. Evidence of all assessment responses on which the unit grade decision has been made is to be included in the student review portfolios.

Specific requirements for subject areas and types of evidence to be presented for each Moderation Day will be outlined by the Board Secretariat through memoranda and Information Papers.

### **Visual evidence for judgements made about practical performances**

#### **(also refer to BSSS Website Guidelines)**

It is a requirement that schools' judgements of standards to practical performances (A/T/M) be supported by visual evidence (still photos or video).

The photographic evidence submitted must be drawn from practical skills performed as part of the assessment process.

Teachers should consult the BSSS guidelines at:

[http://www.bsss.act.edu.au/grade\\_moderation/moderation\\_information\\_for\\_teachers](http://www.bsss.act.edu.au/grade_moderation/moderation_information_for_teachers)

for current information regarding all moderation requirements including subject specific and photographic evidence.

## Appendix A – Framework Group

Name	Institution
Sheikh Faisal	Hawker College
Edward Mickleburgh	St Edmund’s College
Damien Nemeth	Merici College

## Appendix B – Common Curriculum Elements

Common curriculum elements assist in the development of high-quality assessment tasks by encouraging breadth and depth and discrimination in levels of achievement.

Organisers	Elements	Examples
create, compose and apply	apply	ideas and procedures in unfamiliar situations, content and processes in non-routine settings
	compose	oral, written and multimodal texts, music, visual images, responses to complex topics, new outcomes
	represent	images, symbols or signs
	create	creative thinking to identify areas for change, growth and innovation, recognise opportunities, experiment to achieve innovative solutions, construct objects, imagine alternatives
	manipulate	images, text, data, points of view
analyse, synthesise and evaluate	justify	arguments, points of view, phenomena, choices
	hypothesise	statement/theory that can be tested by data
	extrapolate	trends, cause/effect, impact of a decision
	predict	data, trends, inferences
	evaluate	text, images, points of view, solutions, phenomenon, graphics
	test	validity of assumptions, ideas, procedures, strategies
	argue	trends, cause/effect, strengths and weaknesses
	reflect	on strengths and weaknesses
	synthesise	data and knowledge, points of view from several sources
	analyse	text, images, graphs, data, points of view
	examine	data, visual images, arguments, points of view
investigate	issues, problems	
organise, sequence and explain	sequence	text, data, relationships, arguments, patterns
	visualise	trends, futures, patterns, cause and effect
	compare/contrast	data, visual images, arguments, points of view
	discuss	issues, data, relationships, choices/options
	interpret	symbols, text, images, graphs
	explain	explicit/implicit assumptions, bias, themes/arguments, cause/effect, strengths/weaknesses
	translate	data, visual images, arguments, points of view
	assess	probabilities, choices/options
identify, summarise and plan	select	main points, words, ideas in text
	reproduce	information, data, words, images, graphics
	respond	data, visual images, arguments, points of view
	relate	events, processes, situations
	demonstrate	probabilities, choices/options
	describe	data, visual images, arguments, points of view
	plan	strategies, ideas in text, arguments
	classify	information, data, words, images
	identify	spatial relationships, patterns, interrelationships
summarise	main points, words, ideas in text, review, draft and edit	

## Appendix C – Glossary of Verbs

Verbs	Definition
Analyse	Consider in detail for the purpose of finding meaning or relationships, and identifying patterns, similarities and differences
Apply	Use, utilise or employ in a particular situation
Argue	Give reasons for or against something
Assess	Make a Judgement about the value of
Classify	Arrange into named categories in order to sort, group or identify
Compare	Estimate, measure or note how things are similar or dissimilar
Compose	The activity that occurs when students produce written, spoken, or visual texts
Contrast	Compare in such a way as to emphasise differences
Create	Bring into existence, to originate
Demonstrate	Give a practical exhibition an explanation
Describe	Give an account of characteristics or features
Discuss	Talk or write about a topic, taking into account different issues or ideas
Evaluate	Examine and judge the merit or significance of something
Examine	Determine the nature or condition of
Explain	Provide additional information that demonstrates understanding of reasoning and /or application
Extrapolate	Infer from what is known
Hypothesise	Put forward a supposition or conjecture to account for certain facts and used as a basis for further investigation by which it may be proved or disproved
Identify	Recognise and name
Interpret	Draw meaning from
Investigate	Planning, inquiry into and drawing conclusions about
Justify	Show how argument or conclusion is right or reasonable
Manipulate	Adapt or change
Plan	Strategize, develop a series of steps, processes
Predict	Suggest what might happen in the future or as a consequence of something
Reflect	The thought process by which students develop an understanding and appreciation of their own learning. This process draws on both cognitive and affective experience
Relate	Tell or report about happenings, events or circumstances
Represent	Use words, images, symbols or signs to convey meaning
Reproduce	Copy or make close imitation
Respond	React to a person or text
Select	Choose in preference to another or others
Sequence	Arrange in order
Summarise	Give a brief statement of the main points
Synthesise	Combine elements (information/ideas/components) into a coherent whole
Test	Examine qualities or abilities
Translate	Express in another language or form, or in simpler terms
Visualise	The ability to decode, interpret, create, question, challenge and evaluate texts that communicate with visual images as well as, or rather than, words