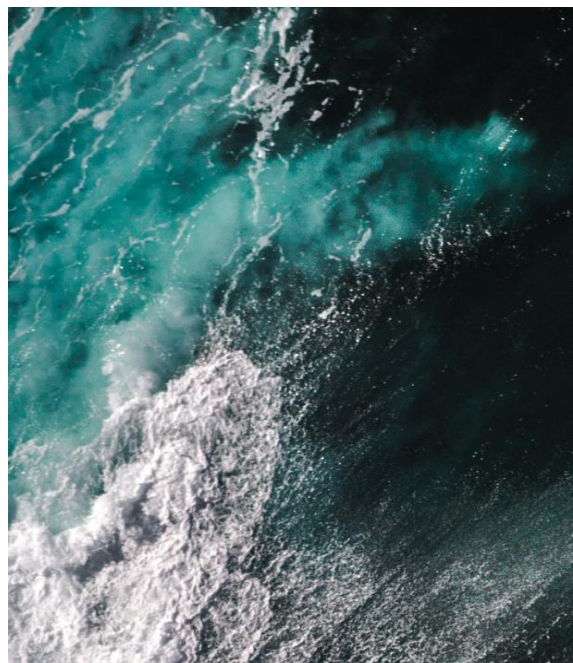


MATHEMATICS FRAMEWORK



From 2028

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MATHEMATICS

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
- digital literacy
- critical and creative thinking
- personal and social capability
- 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 and the Pacific
- Sustainability

Elaboration of these student capabilities and priorities is available on the [ACARA website](#).

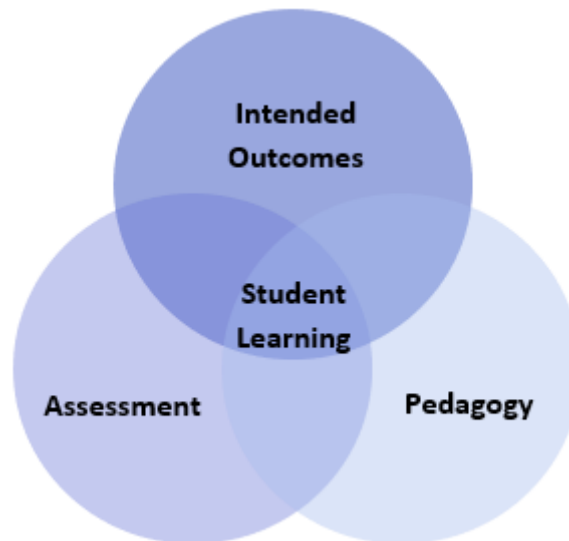
Frameworks

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 and a disciplined way of making sense of the world. It enables students to explore and solve problems through observation, reflection, reasoning and logical analysis. Mathematics involves the study of pattern, relationships, quantity, space, uncertainty and change, and has developed from counting, measuring and predicting into a sophisticated language expressed through symbolic, written, spoken and visual forms.

In a complex, data-rich and increasingly digital world, mathematics is fundamental to individual capability, informed decision-making and participation in society. It underpins learning and work across many fields, including science, technology, engineering, health, finance and environmental decision-making. Mathematics also has intrinsic value as a field of intellectual inquiry, offering elegance, creativity, curiosity and powerful ways of explaining and representing the real world.

Through learning mathematics, students develop understanding, fluency, problem-solving and reasoning in mutually reinforcing ways. They learn to identify appropriate mathematical processes, make connections within and beyond mathematics, transfer skills across contexts, interpret and evaluate quantitative information, and construct and communicate logical arguments. As students' progress, they are increasingly expected to justify their thinking, assess the reasonableness of results, and, where appropriate, use mathematical proof and formal argument.

Mathematics learning also develops mathematical literacy, critical and creative thinking, communication and collaboration. Students use numerical skills, representations and digital technologies, including emerging computational tools, with increasing precision, judgement and ethical awareness. In doing so, they learn to evaluate claims, question assumptions, and recognise the social and ethical consequences of decisions informed by mathematical results.

Mathematics equips students with knowledge, habits of mind and ways of working that support resilience, adaptability and lifelong learning. It enables them to engage confidently with unfamiliar problems, contribute meaningfully in further study, work and civic life, and participate in a world shaped by quantitative, spatial and statistical reasoning.

Goals

All courses written under this Framework should enable students to:

- develop understanding of mathematical concepts, structures, representations and relationships
- critically select and apply mathematical concepts, models and techniques to solve problems in familiar, unfamiliar and complex contexts
- communicate mathematically in clear and systematic ways using appropriate language, symbols, representations and conventions
- develop and communicate mathematical judgements, arguments and explanations through inquiry, reasoning and, where appropriate, proof
- develop and apply spatial reasoning, visualisation and representational skills to interpret and solve problems across number, algebra, measurement, space, statistics, and probability
- interpret results, draw conclusions, and evaluate the reasonableness and limitations of solutions to refine responses
- apply digital and computational tools, including algorithms and emerging technologies, critically, effectively and ethically in mathematical work
- appreciate mathematics as a discipline and a creative field of inquiry, and evaluate its potential to generate knowledge in social, environmental, financial or civic contexts

Content

Concepts, Knowledge and Skills

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 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 include:

- foundational facts, algorithms and computational strategies including operations and relationships between numbers
- properties of valid and logical reasoning
- equivalence and comparative statements
- estimation strategies to support reasoning and decision-making
- number patterns
- variables, relations and functions
- proportional relationships and scaling in real world contexts
- properties of geometric shapes and solids
- spatial orientation, position and location in two and three dimensions
- transformations, symmetry and congruence in geometric contexts
- measurement and units
- data collection, representation and analysis
- probability and counting techniques
- logical reasoning and proof
- average and instantaneous rates of change leading into fundamentals of calculus
- financial calculations and projections

Skills:

- select and apply appropriate mathematical concepts, models and techniques to analyse and solve problems in a range of contexts
- transfer knowledge between concepts and from routine to unfamiliar problems in a range of contexts
- communicate mathematical ideas clearly and effectively through written, verbal, symbolic, and visual representations supported by mathematical reasoning and evidence
- evaluate the reasonableness of conclusions or solutions
- apply technology effectively as a tool for supporting mathematical thinking
- adhere to the principles of academic integrity
- reflect on own thinking and learning habits to refine and improve practice

Teaching Strategies

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

Assessment

The criteria within the achievement standards and specifications of the Task Type Table provide a common 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 communication.

Assessment Task Types

Assessment in Mathematics should include a balanced range of task types and assessment conditions to ensure valid, reliable and authentic evidence of student learning.

A - Test/examination	B - Practical/simulation	C – Research
<p><i>Student work is produced under direct supervision within a specified time and context.</i></p> <p>Suggested tasks:</p> <ul style="list-style-type: none"> • topic test • examination 	<p><i>Students complete work under supervision; tasks may involve previously examined stimulus material. Tasks require justification of understanding in authentic contexts and may include open-ended questions e.g., multiple correct answers.</i></p> <p>Suggested tasks:</p> <ul style="list-style-type: none"> • investigation/inquiry task • student defined/selected problem and solution • modelling task • practical activity/demonstration • supervised written response based on authentic scenarios or real-world application • multimodal communication task based on authentic scenarios (e.g., pitch, poster, vodcast, interview, oral explanation) • problem solving meeting/discussion/round table 	<p><i>Student work is produced over time (including unsupervised components), with one or more supervised checkpoints and/or authentication processes to confirm method, authorship and understanding. Some weighting is placed upon the work completed in unsupervised contexts.</i></p> <p>Suggested tasks:</p> <ul style="list-style-type: none"> • project/assignment with milestone check-ins • modelling project with supervised checkpoint • portfolio with oral defence • presentation with supervised validation in class e.g., Q&A rationale • journal/reflective commentary • take-home project component • independent research/collection of data • take home stimulus material with in-class assessed component on stimulus
<p>Weightings Advice:</p> <ul style="list-style-type: none"> • At least one task from category A and one task from category B or C per semester. • No task is to be weighted less than 20% or more than 50% for a 1.0 unit. 		

Additional Assessment Advice

- For a standard unit (1.0), students must complete a minimum of three assessment tasks and a maximum of five.
- For a half standard unit (0.5), students must complete a minimum of two and a maximum of three assessment tasks.
- Students must be provided a variety of assessment types to cover all Achievement Standards and appropriate course contexts.
- Assessment tasks should incorporate emerging technologies, where appropriate, whilst ensuring authenticity and integrity of course learnings.
- Assessment tasks that involve social, environmental, financial or civic contexts is encouraged.
- Assessment tasks must provide opportunities for students to demonstrate higher order thinking in both routine and unfamiliar problems.
- For tasks completed in unsupervised conditions, schools need to have mechanisms to uphold academic integrity, for example, low percentage weighting, student declaration, plagiarism software, oral defence, interview, other validation tasks.
- Group work may be used as a mode of assessment where appropriate. Where group tasks are used, requirements for individual evidence and contribution should be clearly specified.

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Achievement Standards

Separate achievement standards are written for Year 11 and Year 12 A/T courses. A single achievement standard is written for M courses. A single achievement standard is written for Bridging Numeracy 11 and 12.

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.

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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>
Concepts and Techniques	<ul style="list-style-type: none"> consistently selects and accurately applies mathematical concepts and techniques, and technologies where appropriate, to find creative and efficient solutions to routine, unfamiliar and complex problems across a wide range of contexts constructs, selects and applies mathematical models to find concise and accurate solutions to routine, unfamiliar and complex problems across a wide range of contexts synthesises conceptual knowledge, skills and understanding efficiently to solve unfamiliar and complex problems across a wide range of contexts 	<ul style="list-style-type: none"> selects and accurately applies mathematical concepts and techniques, and technologies where appropriate, to find efficient solutions to routine, unfamiliar and some complex problems across a range of contexts selects and applies mathematical models to find accurate solutions to routine, unfamiliar and some complex problems across a range of contexts synthesises conceptual knowledge, skills and understanding to solve unfamiliar and some complex problems across a range of contexts 	<ul style="list-style-type: none"> applies relevant mathematical concepts and techniques, and technologies where appropriate, to find accurate solutions to routine and some unfamiliar problems in familiar contexts applies mathematical models to find accurate solutions to routine and some unfamiliar problems in familiar contexts applies specified conceptual knowledge, skills and understanding to solve routine and some unfamiliar problems in familiar contexts 	<ul style="list-style-type: none"> applies mathematical concepts and techniques, and technologies where appropriate, to find mostly accurate solutions to routine problems in familiar contexts applies simple mathematical models to find mostly accurate solutions to routine problems in familiar contexts applies specified conceptual knowledge, skills and understanding to solve routine problems in familiar contexts 	<ul style="list-style-type: none"> uses simple mathematical concepts and techniques, and technologies where appropriate, with limited accuracy when solving routine problems in familiar contexts applies simple mathematical models with limited accuracy when finding solutions to routine problems in familiar contexts applies specified conceptual knowledge, skills and understanding to solve some routine problems in familiar contexts
Reasoning and Communication	<ul style="list-style-type: none"> communicates mathematical reasoning using disciplinary language, symbols, representations and conventions consistently, clearly and accurately in routine, unfamiliar and complex contexts interprets mathematical results in context, synthesising evidence to draw logical, well-justified conclusions evaluates the reasonableness and limitations of solutions and/or models, and communicates well-reasoned judgements with clarity and precision 	<ul style="list-style-type: none"> communicates mathematical reasoning using disciplinary language, symbols, representations and conventions consistently and accurately in routine, unfamiliar and some complex contexts interprets mathematical results in context, analysing evidence to draw logical conclusions analyses the reasonableness and limitations of solutions and/or models, and communicates judgements with clarity and precision 	<ul style="list-style-type: none"> communicates mathematical reasoning using disciplinary language, symbols, representations and conventions accurately in routine and unfamiliar contexts interprets mathematical results in context and uses evidence to draw some logical conclusions explains the reasonableness and limitations of solutions and/or models, and communicates judgements with some clarity and precision 	<ul style="list-style-type: none"> communicates some mathematical reasoning using disciplinary language, symbols, representations and conventions with some accuracy in routine and some unfamiliar contexts interprets some mathematical results to draw simple conclusions with some links to the context describes whether solutions or models are reasonable using some evidence and communicates simple observations 	<ul style="list-style-type: none"> communicates limited mathematical reasoning using minimal disciplinary language, symbols, representations and conventions in routine contexts interprets isolated mathematical results with little or no reference to context identifies answers or results and makes general statements with limited accuracy

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>
Concepts and Techniques	<ul style="list-style-type: none"> consistently selects and accurately applies mathematical concepts and techniques, and technologies where appropriate, to find solutions to routine, unfamiliar and complex problems across a wide range of contexts consistently selects and applies mathematical models to find accurate solutions to routine, unfamiliar and complex problems across a wide range of contexts synthesises conceptual knowledge, skills and understanding efficiently to solve unfamiliar and complex problems across a wide range of contexts 	<ul style="list-style-type: none"> selects and accurately applies mathematical concepts and techniques, and technologies where appropriate, to find solutions to routine, unfamiliar and some complex problems across a range of contexts selects and applies mathematical models to find accurate solutions to routine and unfamiliar problems across a range of contexts synthesises conceptual knowledge, skills and understanding to solve unfamiliar and some complex problems across a range of contexts 	<ul style="list-style-type: none"> applies relevant mathematical concepts and techniques, and technologies where appropriate, to find accurate solutions to routine and some unfamiliar problems in familiar contexts applies mathematical models to find accurate solutions to routine and some unfamiliar problems in familiar contexts applies specified conceptual knowledge, skills and understanding to solve routine and some unfamiliar problems in familiar contexts 	<ul style="list-style-type: none"> applies mathematical concepts and techniques, and technologies where appropriate, to find mostly accurate solutions to routine problems in familiar contexts applies simple mathematical models to find mostly accurate solutions to routine problems in familiar contexts applies specified conceptual knowledge, skills and understanding to solve routine problems in familiar contexts 	<ul style="list-style-type: none"> uses simple mathematical concepts and techniques, and technologies where appropriate, with limited accuracy when solving routine problems in familiar contexts applies simple mathematical models with limited accuracy when finding solutions to routine problems in familiar contexts applies specified conceptual knowledge, skills and understanding to solve some routine problems in familiar contexts
Reasoning and Communication	<ul style="list-style-type: none"> communicates mathematical reasoning using disciplinary language, symbols, representations and conventions consistently and accurately in routine, unfamiliar and complex contexts interprets mathematical results in context, synthesising evidence to justify conclusions analyses the reasonableness and limitations of solutions and/or models, and communicates judgements with clarity and precision 	<ul style="list-style-type: none"> communicates mathematical reasoning using disciplinary language, symbols, representations and conventions accurately in routine and unfamiliar contexts interprets mathematical results in context, analysing evidence to draw conclusions explains the reasonableness and limitations of solutions and/or models, and communicates judgements with some clarity and precision 	<ul style="list-style-type: none"> communicates some mathematical reasoning using some disciplinary language, symbols, representations and conventions with reasonable accuracy in routine and some unfamiliar contexts interprets mathematical results in context and uses evidence to draw conclusions describes the reasonableness of solutions and/or models, identifies limitations, and communicates simple mathematical judgements 	<ul style="list-style-type: none"> communicates limited mathematical reasoning using limited representations and conventions in routine and some unfamiliar contexts interprets some mathematical results to draw simple conclusions with some links to the context describes whether solutions or models are reasonable using some evidence and communicates simple observations 	<ul style="list-style-type: none"> communicates limited mathematical reasoning using minimal representations and conventions in routine contexts interprets isolated mathematical results with little or no reference to context identifies answers or results and makes general statements with limited accuracy

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>
Concepts and Techniques	<ul style="list-style-type: none"> consistently selects and accurately applies mathematical concepts and techniques, and technologies where appropriate, to find creative solutions to routine, unfamiliar and complex problems across a wide range of contexts consistently selects and applies mathematical models to find accurate solutions to routine, unfamiliar and complex problems across a wide range of contexts synthesises conceptual knowledge, skills and understanding efficiently to solve unfamiliar and complex problems across a wide range of contexts 	<ul style="list-style-type: none"> selects and accurately applies mathematical concepts and techniques, and technologies where appropriate, to find solutions to routine, unfamiliar and some complex problems across a range of contexts selects and applies mathematical models to find accurate solutions to routine and unfamiliar problems across a range of contexts synthesises conceptual knowledge, skills and understanding to solve unfamiliar and some complex problems across a range of contexts 	<ul style="list-style-type: none"> applies relevant mathematical concepts and techniques, and technologies where appropriate, to find accurate solutions to routine and some unfamiliar problems in familiar contexts applies mathematical models to find accurate solutions to routine and some unfamiliar problems in familiar contexts applies specified conceptual knowledge, skills and understanding to solve routine and some unfamiliar problems in familiar contexts 	<ul style="list-style-type: none"> applies mathematical concepts, and techniques, and technologies where appropriate, to find mostly accurate solutions to routine problems in familiar contexts applies simple mathematical models to find mostly accurate solutions to routine problems in familiar contexts applies specified conceptual knowledge, skills and understanding to solve routine problems in familiar contexts 	<ul style="list-style-type: none"> uses simple mathematical concepts and techniques, and technologies where appropriate, with limited accuracy when solving routine problems in familiar contexts applies simple mathematical models with limited accuracy when finding solutions to routine problems in familiar contexts applies specified conceptual knowledge, skills and understanding to solve some routine problems in familiar contexts
Reasoning and Communication	<ul style="list-style-type: none"> communicates mathematical reasoning using disciplinary language, symbols, representations and conventions consistently, clearly and accurately in routine, unfamiliar and complex contexts interprets mathematical results in context, synthesising evidence to draw logical, well-justified conclusions evaluates the reasonableness and limitations of solutions and/or models, and communicates well-reasoned judgements with clarity and precision 	<ul style="list-style-type: none"> communicates mathematical reasoning using disciplinary language, symbols, representations and conventions consistently and accurately in routine, unfamiliar and some complex contexts interprets mathematical results in context, analysing evidence to draw logical conclusions analyses the reasonableness and limitations of solutions and/or models, and communicates judgements with clarity and precision 	<ul style="list-style-type: none"> communicates mathematical reasoning using disciplinary language, symbols, representations and conventions accurately in routine and unfamiliar contexts interprets mathematical results in context and uses evidence to draw some logical conclusions explains the reasonableness and limitations of solutions and/or models, and communicates judgements with some clarity and precision 	<ul style="list-style-type: none"> communicates some mathematical reasoning using minimal disciplinary language, symbols, representations and conventions with some accuracy in routine and some unfamiliar contexts interprets some mathematical results to draw simple conclusions with some links to the context describes whether solutions or models are reasonable using some evidence and communicates simple observations 	<ul style="list-style-type: none"> communicates limited mathematical reasoning using minimal representations and conventions in routine contexts interprets isolated mathematical results with little or no reference to context identifies answers or results and makes general statements with limited accuracy

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>
Concepts and Techniques	<ul style="list-style-type: none"> consistently selects and accurately applies mathematical concepts and techniques, and technologies where appropriate, to find solutions to routine and unfamiliar problems across a wide range of contexts selects and applies mathematical models to find accurate solutions to routine and unfamiliar problems across a wide range of contexts synthesises conceptual knowledge, skills and understanding efficiently to solve unfamiliar and complex problems across a wide range of contexts 	<ul style="list-style-type: none"> selects and accurately applies mathematical concepts and techniques, and technologies where appropriate, to find solutions to routine and unfamiliar problems across a range of contexts applies mathematical models to find accurate solutions to routine and unfamiliar problems across a range of contexts synthesises conceptual knowledge, skills and understanding to solve unfamiliar and some complex problems across a range of contexts 	<ul style="list-style-type: none"> applies relevant mathematical concepts and techniques, and technologies where appropriate, to find accurate solutions to routine and some unfamiliar problems in familiar contexts applies mathematical models to find accurate solutions to routine and some unfamiliar problems in familiar contexts applies specified conceptual knowledge, skills and understanding to solve routine and some unfamiliar problems in familiar contexts 	<ul style="list-style-type: none"> applies mathematical concepts and techniques, and technologies where appropriate, to find mostly accurate solutions to routine problems in familiar contexts applies simple mathematical models to find mostly accurate solutions to routine problems in familiar contexts applies specified conceptual knowledge, skills and understanding to solve routine problems in familiar contexts 	<ul style="list-style-type: none"> uses simple mathematical concepts and techniques, and technologies where appropriate, with limited accuracy when solving routine problems in familiar contexts applies simple mathematical models with limited accuracy when finding solutions to routine problems in familiar contexts applies specified conceptual knowledge, skills and understanding to solve some routine problems in familiar contexts
Reasoning and Communication	<ul style="list-style-type: none"> communicates mathematical reasoning using disciplinary language, symbols, representations and conventions accurately in routine and unfamiliar contexts interprets mathematical results in context, synthesising evidence to justify conclusions analyses the reasonableness and limitations of solutions and/or models, and communicates judgements with clarity and precision 	<ul style="list-style-type: none"> communicates mathematical reasoning using some disciplinary language, symbols, representations and conventions accurately in routine and some unfamiliar contexts interprets mathematical results in context, analysing evidence to draw conclusions explains the reasonableness and limitations of solutions and/or models, and communicates judgements with some clarity and precision 	<ul style="list-style-type: none"> communicates mathematical reasoning using symbols, representations and conventions with some accuracy in routine contexts interprets mathematical results in context and uses evidence to draw conclusions describes the reasonableness and limitations of solutions and/or models and communicates simple judgements 	<ul style="list-style-type: none"> communicates limited mathematical reasoning using minimal representations and conventions in routine and some unfamiliar contexts interprets some mathematical results to draw simple conclusions with some links to the context describes whether solutions or models are reasonable using some evidence and communicates simple observations 	<ul style="list-style-type: none"> communicates limited mathematical reasoning using minimal representations in routine contexts interprets isolated mathematical results with little or no reference to context identifies answers or results and makes general statements with limited accuracy

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>
Concepts and Techniques	<ul style="list-style-type: none"> applies mathematical concepts and techniques to find solutions to routine and unfamiliar problems in a variety of contexts, with independence applies mathematical models to find solutions to routine and unfamiliar problems in a variety of contexts, with independence uses digital and emerging technologies effectively to solve routine and unfamiliar problems in a variety of contexts, with independence 	<ul style="list-style-type: none"> applies mathematical concepts and techniques to find solutions to routine and unfamiliar problems with some independence applies mathematical models to find solutions to routine and unfamiliar problems with some independence uses digital and emerging technologies appropriately to solve routine and unfamiliar problems in a variety of contexts, with some independence 	<ul style="list-style-type: none"> applies mathematical concepts and techniques to find solutions to routine and unfamiliar problems with assistance applies mathematical models to find solutions to routine and unfamiliar problems with assistance uses digital and emerging technologies appropriately to solve routine and unfamiliar problems in limited contexts, with assistance 	<ul style="list-style-type: none"> applies simple mathematical concepts and techniques to find solutions to routine problems with repeated cueing applies simple mathematical models to find solutions to routine problems with repeated cueing uses digital and emerging technologies to solve routine problems with repeated cueing 	<ul style="list-style-type: none"> applies simple mathematical concepts and techniques to find solutions to routine problems with direct instruction applies simple mathematical models to find solutions to routine problems with direct instruction uses digital and emerging technology to solve routine problems with direct instruction
Reasoning and Communications	<ul style="list-style-type: none"> represents numeracy skills in numerical and graphical form in routine and unfamiliar problems in a variety of contexts, with independence communicates mathematical information in oral, written and/or multimodal forms, using appropriate language, with independence reflects with insight on own learning and understanding in mathematics, with independence 	<ul style="list-style-type: none"> represents numeracy skills in numerical and graphical form in routine and unfamiliar problems, with some independence communicates mathematical information in oral, written and/or multimodal forms, using appropriate language, with some independence reflects on own thinking and learning in mathematics, with some independence 	<ul style="list-style-type: none"> represents numeracy skills in numerical and graphical form in some routine and unfamiliar problems, with assistance communicates mathematical information in oral, written and/or multimodal forms, using appropriate language, with assistance reflects on own thinking and learning in mathematics, with assistance 	<ul style="list-style-type: none"> represents simple numeracy skills in numerical or graphical form in routine problems, with repeated cueing communicates simple mathematical information in oral, written and/or multimodal forms, using appropriate language, with repeated cueing reflects on own thinking and learning in mathematics, with repeated cueing 	<ul style="list-style-type: none"> represents simple numeracy skills in numerical or graphical form in structured contexts, with direct instruction communicates simple mathematical information in oral, written and/or multimodal forms, using appropriate language, with direct instruction reflects on own thinking and learning in mathematics, with frequent prompting

Independence/Assistance refers to academic and intellectual assistance to understand and use ideas, not assistance provided as part of reasonable access and equity provisions.

Achievement Standards for Bridging Numeracy A - Years 11 and 12

	A	B	C	D	E
Concepts and Techniques	<ul style="list-style-type: none"> comprehends and interprets independently everyday mathematical information that is embedded in familiar and routine texts and selects relevant information independently to consistently solve ACSF level 3 mathematical problems with a number of steps and some abstraction selects from and uses a variety of developing mathematical and problem-solving strategies to consistently solve ACSF level 3 mathematical problems, with some specialisation, independently in some less familiar contexts and a range of familiar contexts solves ACSF level 3 mathematical problems involving a number of steps consistently and independently in a range of familiar and some less familiar contexts comprehends routine mathematical texts that includes some unfamiliar elements, embedded information, abstraction, and specialised vocabulary when solving ACSF level 3 mathematical problems accurately works independently and uses own familiar support resources drawing on own hands-on, in-context materials, personal experience, mathematical and other prior knowledge to solve ACSF level 3 mathematical problems consistently 	<ul style="list-style-type: none"> comprehends and interprets everyday mathematical information that is embedded in familiar and routine texts and selects relevant information to solve increasingly complex mathematical problems at ACSF levels 2 and 3 with a number of steps and some abstraction selects from and uses a variety of developing mathematical and problem-solving strategies to solve increasingly complex mathematical problems at ACSF levels 2 and 3 in a range of familiar contexts, and demonstrates some specialisation in solving problems in familiar contexts solves solve increasingly complex mathematical problems at ACSF levels 2 and 3 involving a number of steps independently in a range of familiar contexts comprehends routine mathematical texts that includes some unfamiliar elements and specialised vocabulary when solving solve increasingly complex mathematical problems at ACSF levels 2 and 3 works independently and uses provided support resources drawing on own hands-on, in-context materials, personal experience, and mathematical knowledge to solve increasingly complex mathematical problems at ACSF levels 2 and 3 	<ul style="list-style-type: none"> comprehends everyday mathematical information that is embedded in familiar and routine texts and to solve mathematical problems with minimal direction with a number of steps uses a variety of developing mathematical and problem-solving strategies as directed to solve mathematical problems independently in range of familiar contexts solves mathematical problems involving a number of steps as directed in a range of familiar contexts uses information from routine mathematical texts and comprehends some familiar specialised vocabulary when solving mathematical problems uses provided support resources drawing on own hands-on, in-context materials and mathematical knowledge to solve mathematical problems 	<ul style="list-style-type: none"> comprehends some everyday mathematical information that is embedded in familiar and routine texts and to solve mathematical problems with direction uses provided mathematical and problem-solving strategies to solve mathematical problems in a few familiar contexts with some independence solves mathematical problems involving a number of steps as directed in a few familiar contexts uses information from routine mathematical texts with some success when solving mathematical problems uses provided support resources drawing on teacher assistance and mathematical knowledge to solve mathematical problems 	<ul style="list-style-type: none"> relies on support to identify mathematical information that is embedded in familiar and routine texts to solve problems with direction relies on support to solve mathematical problems in familiar contexts using mathematical strategies relies on support to solve mathematical problems involving a number of steps in a few familiar contexts relies on support to use routine mathematical texts when solving mathematical problems relies on support to use provided support resources drawing on fragments of mathematical knowledge to solve mathematical problems
Reasoning and communication	<ul style="list-style-type: none"> works independently and using a blend of personal 'in-the-head' methods and formal pen and paper methods to calculate and uses calculator/ technological processes and tools to undertake the problem-solving process uses a combination of both informal and formal oral mathematical and general language to present and discuss the mathematical and problem-solving process and result accurately and independently in familiar and less familiar contexts report on mathematical and problem-solving process using both informal and formal written ACSF level 3 mathematical language and symbols, and general language, consistently, accurately, and independently in familiar and less familiar contexts selects and uses a combination of both formal and informal symbolism, diagrams, graphs, and conventions relevant to ACSF level 3 mathematical knowledge consistently, independently, and accurately to present solutions 	<ul style="list-style-type: none"> works using a blend of personal 'in-the-head' methods and formal pen and paper methods to calculate and uses calculator/technological processes and tools to undertake the problem-solving process with prompting uses a combination of both informal and formal oral mathematical and general language to present and discuss the mathematical and problem-solving process and results in familiar contexts report on mathematical and problem-solving process using both informal and formal written ACSF level 2 and 3 mathematical language and symbols, and general language in familiar and less familiar contexts selects and uses a combination of both formal and informal symbolism, diagrams, graphs, and conventions relevant to the mathematical knowledge accurately to present solutions 	<ul style="list-style-type: none"> works using a blend of personal 'in-the-head' methods and formal pen and paper methods to calculate and uses calculator/ technological processes and tools to undertake the problem-solving process with step-by-step written instruction uses oral mathematical and general language as directed to present and discuss the mathematical and problem-solving process and results in familiar contexts report on mathematical and problem-solving process using written mathematical language and symbols as directed and general language accurately in familiar contexts uses symbolism, diagrams, graphs, and conventions relevant to the mathematics studied to present solutions 	<ul style="list-style-type: none"> uses directed methods including a blend of personal 'in-the-head' methods and formal pen and paper methods to calculate and uses calculator/ technological processes and tools to undertake the problem-solving process with some verbal instruction uses oral mathematical and general language as directed to present and discuss the mathematical and problem-solving process and results in familiar contexts with some support report on mathematical and problem-solving process using written mathematical language and symbols as directed and general language in familiar contexts with some support uses symbolism, diagrams, graphs, and conventions as directed to present solutions 	<ul style="list-style-type: none"> relies on support to use a blend of personal 'in-the-head' methods and formal pen and paper methods to calculate and uses calculator/ technological processes and tools to undertake the problem-solving process with step-by-step verbal instruction relies on support to report orally on the mathematical and problem-solving process and results in familiar contexts relies on support to report in written/visual formats on the mathematical and problem-solving process and results in familiar contexts relies on support to use symbolism, diagrams, graphs, and conventions as directed to present solutions

Achievement Standards for Bridging Numeracy M – 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>
Concepts and Techniques	<ul style="list-style-type: none"> applies numeracy skills in a variety of contexts to routine and non-routine problems, with independence uses digital technologies effectively to solve routine and non-routine problems in a variety of contexts, with independence 	<ul style="list-style-type: none"> applies numeracy skills in a variety of contexts to routine and non-routine problems, with some independence uses digital technologies appropriately to solve routine and non-routine problems in a variety of contexts, with some independence 	<ul style="list-style-type: none"> applies numeracy skills in some contexts to routine and non-routine problems, with assistance uses digital technologies appropriately to solve routine problems in limited contexts, with assistance 	<ul style="list-style-type: none"> applies simple numeracy skills in limited contexts to routine problems, with repeated cueing uses digital technologies to solve routine problems in structured contexts, with repeated cueing 	<ul style="list-style-type: none"> applies simple numeracy skills in structured contexts, with direct instruction uses digital technologies to solve routine problems in structured contexts, with direct instruction
Reasoning and Communications	<ul style="list-style-type: none"> represents numeracy skills in numerical and graphical form in routine and non-routine problems in a variety of contexts, with independence communicates mathematical information in oral, written and/or multimodal forms, using appropriate language, with independence reflects with insight on own thinking and learning in mathematics, with independence 	<ul style="list-style-type: none"> represents numeracy skills in numerical and graphical form in routine and non-routine problems, with some independence communicates mathematical information in oral, written and/or multimodal forms, using appropriate language, with some independence reflects on own thinking and learning in mathematics, with some independence 	<ul style="list-style-type: none"> represents numeracy skills in numerical and graphical form in some routine and non-routine problems, with assistance communicates mathematical information in oral, written and/or multimodal forms, using appropriate language, with assistance reflects on own thinking and learning in mathematics, with assistance 	<ul style="list-style-type: none"> represents simple numeracy skills in numerical or graphical form in routine problems, with repeated cueing communicates simple mathematical information in oral, written and/or multimodal forms, using appropriate language, with repeated cueing reflects on own thinking and learning in mathematics, with repeated cueing 	<ul style="list-style-type: none"> represents simple numeracy skills in numerical or graphical form in structured contexts, with direct instruction communicates simple mathematical information in oral, written and/or multimodal forms, using appropriate language, with direct instruction reflects on own thinking and learning in mathematics, with frequent prompting

Independence/Assistance refers to academic and intellectual assistance to understand and use ideas, not assistance provided as part of reasonable access and equity provisions.

System Moderation

System moderation begins in schools whereby teachers cooperate to develop assessment, and grade and score student assessment according to the relevant curriculum.

Moderation Day is an essential component of the ACT senior secondary system which empowers school autonomy in curriculum and assessment. Moderation Day is a collaborative and professional event whereby schools undertake system quality assurance activities on behalf of their current and future students. Moderation Day fosters and enriches the development of quality assessment and validates student achievement. Continued best practice in teaching and learning is ensured through the formation of valid, constructive, and detailed feedback.

System Moderation:

- provides comparability of school-based assessment
- forms the basis for valid and reliable assessment in senior secondary schools
- involves the ACT Board of Senior Secondary Studies (BSSS) and schools in cooperation and partnership
- maintains the integrity of the ACT Senior Secondary Certificate.

The Moderation Model

Moderation within the ACT senior secondary system encompasses structured, consensus-based peer review of Unit Grades and quality of assessment for all BSSS courses twice per year. In addition to System Moderation, there is statistical moderation of course scores.

Moderation by Structured, Consensus-based Peer Moderation

Consensus-based peer moderation involves the review of student assessment against system wide criteria and standards and the validation of Unit Grades. This is done by matching student performance with the Framework Achievement Standards. In addition, feedback will be provided on the quality of the task.

Preparation for Structured, Consensus-based Peer Review

Schools retain originals or copies of student assessment evidence completed in the delivery of the unit and all unit documentation. Student assessment evidence must be sufficient to allow reviewing teachers to make an accurate judgment of grade standard. Schools will use ACS to present this information for System Moderation. Criteria for each Moderation Day will be communicated to schools in the proceeding calendar year.

Feedback from System Moderation

Feedback is provided to schools to affirm good practice and inform continuous improvement. This feedback is based on the BSSS Quality Assessment Guidelines and relevant course documents. It is expected that schools engage with feedback and address any longitudinal trends as outlined in the BSSS Policy and Procedures Manual.

Appendix A – Framework Group

Name	Institution
	University of Canberra
	St Mary MacKillop College
	Narrabundah College
	Radford College

Draft

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
	select	main points, words, ideas in text
identify, summarise and plan	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
Critically analyse	Analysis that engages with criticism and existing debate on the issue
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