# Stage 1 Essential Mathematics

# Subject Assessment Report

## Overview

At Stage 1 the English and mathematics subjects and the Personal Learning Plan are moderated. For most schools, only the C and D grades are moderated, as the C grade represents the minimum grade required for SACE completion.

Stage 1 assessment reports give an overview of how students performed at the C and D grades in their school assessments, relative to the learning requirements, assessment design criteria, and performance standards set out in the relevant subject outlines. They provide information and advice on: teacher engagement and student engagement with the assessment types, including task design; the application of the performance standards in school assessments; and the quality of student performance.

Assessment Type 1: Skills and Applications Tasks

Successful achievement at the C grade

* The majority of schools that provided samples for moderation based their learning and assessment plans around one of the pre-approved learning and assessment plans available on the Essential Mathematics mini-site. Many of the skills and applications tasks (SATs) are variations on the tasks in the pre-approved plan, with occasional examples of innovative teaching practice. Most tasks provided students with ample opportunity to demonstrate evidence of achievement at the C grade, but opportunities for students to demonstrate achievement at the A grade were more limited.
* Use of calculator and non-calculator sections with consideration of the cohort was evident, and SATs that were supervised, rather than completed within time constraints, allowed students greater opportunity to be successful.
* Successful tasks included a progression of questions that enabled students to demonstrate (including all the calculations) an increase in both the depth and variety of their mathematical skills at all levels. These tasks provided routine lead-in questions and additional questions with increasing level of difficulty to extended students to use mathematical reasoning to draw conclusions and allowed students to progressively think through a problem towards a solution.
* When students successfully applied mathematical skills and techniques to find mostly accurate solutions to routine questions, they achieved at the C standard.
* Higher achievement was most evident when students applied problem-solving methods to less familiar situations. More engaging tasks placed these mathematical skills in wider everyday contexts such as budgeting and taxation, building, travel, and sport.

Application of the performance standards

* The Concepts and Techniques assessment design criterion was generally well addressed in the skills and applications tasks (SATs) that required simple mathematical answers to routine questions set in familiar everyday contexts. Most teachers showed a good understanding of the performance standards at the C grade.
* The C grade was easiest to confirm when teachers had shownclear links between the marks given to student work and the levels and specific features of the performance standards. This helped to clarify which aspects of the responses were successful, and which areas needed improvement.
* Confirmation of assessment decisions was assisted when teachers used the language of the performance standards in the task design and marking. Simple ways this can be achieved is using notation such as CT1/RC1 and words such as routine and complex against questions and/or marking to indicate where students are successful or unsuccessful in criteria.
* Many teachers attached copies of the performance standards and highlighted the descriptors that aligned with evidence of student learning for each task; this further assisted moderators to confirm assessment decisions.
* It is important for teachers to match the evidence in response to descriptors of the performance standards to determine the grade achieved, rather than simply converting percentages to grades. Converting the result achieved from a percentage to a grade frequently does not align with the performance standards, particularly if the design of the task does not provide opportunities across a range of grades.
* The Reasoning and Communication assessment design criterion was not as consistently assessed. More questions providing students with opportunities for to use mathematical reasoning to draw conclusions (RC2) would be beneficial.
* Questions requiring students to provide accurate interpretation of mathematical results in both familiar and unfamiliar contexts (including every-day, workplace, social and cultural contexts) should be included in tasks to allow students to achieve at the highest level of RC1.

Task design

* Many tasks were designed to enable students to achieve at the C grade to meet the compulsory numeracy requirements of the SACE. The tasks that best allowed for achievement at the A grade tended to have a focus on preparing students to study mathematics at Stage 2.
* Reflecting the Subject Outline, better tasks were written in a way that gave students many opportunities to apply practical problem-solving skills in everyday and workplace contexts, and to apply their skills in flexible and resourceful ways. Opportunities existed for students to start with familiar, routine problems to illustrate basic understanding before moving on to more complex problems.
* Where tasks assessed RC1 but did not ask for the interpretation of mathematical results, it was difficult for students to achieve at the C grade. When assessing particular assessment design criteria, teachers should ensure that the task has enough opportunities for students to produce sufficient evidence to meet the selected specific features of the criteria.
* SATs that were wordy, without simple arithmetic problems provided, disadvantaged some students, as they had difficulty determining the mathematical evidence required as the literacy demands were too high. It was recommended that tasks are written in simple, clear language to ensure accessibility for all students.

Assessment Type 2: Folio

Successful achievement at the C grade

* Most folio tasks provided opportunities for students to demonstrate their knowledge and understanding of routine mathematical information and concepts in familiar contexts. Mathematical skills were demonstrated in the calculations that students provided.
* There were many interesting examples of the use of spreadsheets through innovative contexts, including analysis of pay rates, and measurement of water flow rates through containers of different size and shape.
* Tasks were explicit. Some scaffolded through a step-by-step breakdown of the task requirements; others provided a model or template as a starting point for the final report or product. Some tasks extended students to show reasoning and communication skills and provided opportunities to attempt higher-order tasks with more open-ended requirements.
* In some cases, folio tasks needed to have some structure to provide students with opportunity to perform at all achievement levels.
* Where CT4 – ‘Use of electronic technology to find solutions to practical problems’ is assessed, ensure that students provide evidence of the use of electronic technology, e.g. formulas in spreadsheets

Application of the performance standards

* Generally, there was an accurate understanding and application of the performance standards for the Concepts and Techniques assessment design criterion. However, refining task opportunities for communicating evidence of Reasoning and Communication is required to ensure that this criterion is adequately covered. The evidence provided by students of reasoning and communication could be improved through addressing task design and/or the mode of evidence requested.
* RC2 – ‘Use of mathematical reasoning to draw conclusions and consider the appropriateness of solutions’ in particular seemed a common issue. Most folio tasks provided opportunities for students to draw a conclusion from their data however remember evidence of this criteria could be multimodal, oral, written, or a combination, e.g. verbally recording discussions about reasoning, and appropriateness of solutions.
* Confirmation of assessment decisions was facilitated when teachers used the language of the performance standards in their task design as well as in marking. For example, some teachers:
* used headings in the task to address the performance standards.
* made relevant comments in their marking, such as ‘you have found solutions to routine problems in familiar contexts’, and ‘some gathering of simple data in familiar contexts’.

Task design

* Tasks that asked students to respond to a range of questions, from routine to complex, when combined with relevance to real-world problem-solving enabled students to attempt more challenging problems allowed students to show achievement at all grade bands.
* Often students had difficulty showing evidence for RC1 – ‘Interpretation of mathematical results’ and RC2 – ‘Use of mathematical reasoning to draw conclusions and consider the appropriateness of solutions’. When tasks included questions that addressed the Reasoning and Communication assessment design criterion, which scaffolded how students could more explicitly show their understanding and communication, students were better able to provide their considerations and conclusions.
* Some folio tasks did not give enough opportunity for students to demonstrate their mathematical reasoning and interpretation of results, and hence students did not provide adequate communication of their understanding/conclusions.
* Electronic technology application should be explicitly stated within the task to ensure CT4 – ‘Use of electronic technology to find solutions to mathematical problems’ can be addressed. To demonstrate the use of electronic technology, students should provide formulae or more detail of how they used the electronic program(s) or technology.

Preparation and submission of student materials

* Schools are advised to refer to [Stage 1 moderation](https://www.sace.sa.edu.au/coordinating/admin/moderation/stage-1) on the SACE website for information on participation in Stage 1 moderation.
* Most schools that submitted student samples for moderation packaged and prepared the materials in accordance with the information sheet ‘[Preparing materials for Stage 1 moderation submission’](https://www.sace.sa.edu.au/documents/652891/704359/Preparing%2Bmaterials%2Bfor%2BStage%2B1%2Bmoderation%2Bsubmission.pdf/31814296-aa36-4875-a1ea-63604ddaff0d?t=1618901762870).
* Teachers provided their approved learning and assessment plans, task sheets with answers, and the Stage 1 moderation sample form. Most schools provided student samples from the C and D grade band that included three or four completed and assessed tasks for each student listed in the sample. Because the C and D grade samples are requested before the end of the semester, schools could submit three out of the four assessed tasks and still be advised of the moderation outcome.
* Please ensure each student task has been marked and a grade determination is provided, preferably with a shaded rubric or performance standards sheet.
* When uploading student work, it is important to check that the correct student work has been uploaded and that the scan quality is at a level that allows the moderation process to take place. It also assists the moderation process if all tasks from one student are scanned in one file.
* The moderation advice is then taken into consideration during the assessment of the final task by the teacher, and in determining the final assessment decisions for each assessment type when entering students’ results in Schools Online.
* Each school requested for Stage 1 Essential Mathematics moderation received notification of the moderation outcome via an email to principals.

### General Comments

Many schools completed addendums on the learning and assessment plans to change a topic or individual task to better suit the student cohort. When addendums are completed it is important to check that the changes still meet the subject outline specifications and are endorsed by the principal or principal’s delegate.

Teachers are encouraged to access the clarifying activities, available on the Essential Mathematics minisite (Stage 1 > Support materials). The clarifying activities help them interpret and consistently apply the performance standards to student work. Once teachers submit their assessment decisions on the provided samples of work, annotated versions of the student responses, with the benchmarked grade identified, can be downloaded and viewed.

It is important that an internal school moderation process is undertaken before submitting materials for moderation, particularly when multiple classes are included. The benchmarking activities provide schools with opportunities to complete in-school moderation activities to support consistency across classes in the application of performance standards.

Effective use of the addendum to a learning and assessment plan enabled moderators to confirm evidence reflective of the C and D grade levels. This included teachers detailing the changes made, explaining why the changes were required, and clearly identifying the focus of the assessment design criteria. It is important that all changes are recorded to support moderators to understand which criteria are being assessed in each assessment and to identify which tasks have been changed or are missing.

The subject outline states the requirement: ‘The set of assessments, as whole, gives students opportunities to demonstrate each of the specific features by the completion of study of the subject.’ With this in mind, teachers are encouraged to focus on fewer relevant specific features per task across both Assessment Type 1 and Assessment Type 2. This allows students to demonstrate a more directed focus on their development of mathematical skills. When samples consisted of assessment in which nearly every specific feature was assessed in each of the four tasks in the program of learning, students often had limited opportunity to address each of the performance standards adequately.