

# Mathematical Applications

2009 ASSESSMENT REPORT

Mathematics Learning Area



Government  
of South Australia

**SACE**  
Board of SA

# MATHEMATICAL APPLICATIONS

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### GENERAL COMMENTS

As in previous years the moderation process, both of the support moderation related to marking standards during the year and the central moderation at the end of the year, was efficient and effective. The panel was most appreciative of the cooperation of the teachers involved, who adhered well to timelines, presented their materials in a well-ordered and accessible fashion, and responded appropriately to advice given.

The moderation of marking standards completed at the end of Semester 1 is designed to provide feedback to teachers based on the marking of the sample of student work submitted. As stated in the Mathematics Learning Area Manual teachers are asked to submit the folio of the highest achieving student as well as those of the lowest achieving student in each of the A, B, C and D bands. Additional folios covering the middle of the grade bands are also requested in case there is insufficient evidence to confirm scores or if there are any inconsistencies that need to be taken into account. Moderators provide detailed feedback on tasks, referring specifically to the supporting documents of the subject, and marking, based on the evidence within the student materials.

At final central moderation, the submission of the correct folios is especially important to gain a sound representative sample of the student work. To further facilitate the process, student work should be presented in hard copy form rather than electronically. Ideally the student name and achievement level should be identified on the folios as well as on the profile form. Including solutions to tests and examinations, and hard copies as well as electronic copies of the profile forms, is also very helpful.

The panel was impressed with the appropriateness of the grades allocated; the vast majority of teacher scores were confirmed. In 2009, the process from previous years where the contact moderator does not examine the work of his or her allocated schools at the end of the year has been continued. Rather, a pair of moderators with no prior relationship with the school review the student materials. The Chief Assessor makes the final decision if necessary.

Comments are made on the green feedback sheet only if there is a change to student grades or if there is a clerical error. There were a number of schools where student scores were adjusted due to clerical errors rather than changes resulting from task design or marking standards. Frequently this was the incorrect use of the Semester 2 profile form, which requires the moderated Semester 1 results to be transferred and incorporated into the final grade. Some teachers recorded the Semester 2 results only on the yellow results sheet. The SACE Board website provides a suitable spreadsheet to collect and aggregate individual marks, and its use is encouraged in preference to individually teacher generated spreadsheets. Other clerical errors occurred through errors of transcribing or incorrect entry of various components.

The folios chosen for a Merit award demonstrate outstanding achievement over each of the assessment components in a consistent fashion. In 2009, thirty students were awarded Merits which was just under 1% of the total number of candidates. The folios needed to meet the initial requirement of achieving a moderated score of 90% or greater for each of the six assessment components over the full year. A folio was

still considered for a Merit award if one component was slightly lower than this standard, provided the other components were exceptional. The portfolio work was examined in considerable depth, once it was clear that the student achievement in both the tests and examinations had reached a high level of mathematical understanding with suitable analysis. Individuality and independence were valued highly by the panel, as was clear and concise discussion, with thoughtful reflection.

## **ASSESSMENT COMPONENT: SKILLS AND APPLICATIONS TASKS**

Most teachers provided sound tests which not only assessed all the key questions and key ideas but also provided opportunities for genuine discussion and interpretation. Occasionally, because of the nature of the content covered, it became clear that tasks based on the previous curriculum statement were being used. It is important that teachers acquaint themselves with all the current documents pertaining to this subject, and that this is reflected in assessment practices.

To reach a full range of possible achievement against the second criterion of *analysis and interpretation of results and information*, the best skills and applications tasks allowed for interpretation based on the mathematics done, within the context of the problem, rather than generic questions and responses that could be drawn directly from notes. Similarly, to adequately assess the third criterion of *communication of mathematical information* marks need to be allocated specifically to this aspect. The correct rounding of answers, suitable labelling of graphs and diagrams, relevant application of terms, and the appropriate use of significant figures are some of the basic aspects that might appear in a skills and applications task, and which should be penalised if not addressed.

Marking of the mathematics was done well. Many teachers provided detailed and useful feedback to students through their marking and comments.

## **ASSESSMENT COMPONENT 2: PORTFOLIO**

The quality of the portfolio work presented by the students was very sound but the grading was also the most varied. In the first criterion of *mathematical skills and understandings* it is vital that the standard of mathematics required is that of a Stage 2 subject. Sometimes the expectation of the teacher was met but there was neither sufficient depth nor complexity to reach the maximum level of 10 using the rubric.

Generosity tended to occur most commonly when crediting evidence associated with the second criterion. To achieve the highest level of *analysis and interpretation of results and information*, a student is expected not only to comment cogently on the mathematics done, but also to compare and contrast results and provide possible reasons for outcomes. It would also be anticipated that there is some discussion on limitations and assumptions, which should relate directly to the calculations and the context of the problem.

As mentioned in the Skills and Applications Tasks section, marks need to be allocated for the third criterion of *communication of mathematical information*.

To assess the fourth criterion, not only should the work be neatly presented but the introduction should also indicate the student's understanding of the task and outline some approaches or techniques that may be undertaken, rather than merely repeating the context sheet.

To achieve a mark for *the ability to work cooperatively*, group work needs to be explicit within the body of the piece, with students not only using the information but also commenting upon the processes undertaken.

To maintain the integrity of the assessment, portfolio tasks need to be rotated from year to year, particularly those exemplars from the website, which have been tackled by very many schools. Please note that those tasks which have published solutions may not be used.

It is also imperative that teachers understand the potential pitfalls of a task designed by another. A statistics investigation is only as good as the data that is collected, particularly where measurements are taken or a survey conducted, and this became very clear when students were attempting to use a line of best fit for data which had absolutely no correlation. Teachers should also ensure through their portfolio conferencing with students that the data sets are suitable for analysis. This conferencing also allows confirmation that the work is indeed the student's own.

More than occasionally, portfolio tasks did not appear to have been marked for the accuracy of mathematics performed, nor comment made on the discussion and conclusions. Useful feedback for students is an essential part of the assessment cycle and although a rubric is a valid assessment tool, it is not a substitute for accurate marking.

### **ASSESSMENT COMPONENT 3: EXAMINATION**

Some schools were required, or chose, to submit new examination papers. These were subject to the usual moderation process where a panel used the checklists available on the SACE Board website to ensure that all appropriate key ideas were assessed and that the criteria for judging performance were addressed appropriately. The multiplier indicates whether the paper is considered "standard" at 0.30, more routine with a lower multiplier, or more complex with a higher one. Teachers made sound decisions on the degree of complexity which best suited the ability of their students to demonstrate their mathematical learning and skills.

Chief Assessor  
Mathematical Applications