

# Specialist Mathematics: Unit 3 Coursework

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## GENERAL COMMENTS

The tasks to be undertaken by students for school-assessed coursework in Specialist Mathematics Unit 3 are specified on page 164 of the *VCE Mathematics Study Design*. These tasks must be a part of the regular teaching and learning program, and completed mainly in class, under the supervision of the teacher. In addition to the Study Design, the Board has provided supporting advice to assist teachers in the implementation of coursework assessment in the 'Advice for teachers' sections of the Mathematics Study Design, the *Mathematics Assessment Guide Revised VCE 2000* and the *Revised VCE Studies 2000 Implementation Resource Kit*. Advice on a suggested theme and possible starting points for the application task was published in the December 1999 *VCE Bulletin*.

For school-assessed coursework in Unit 3, students were required to complete two analysis tasks in order to demonstrate achievement of the three outcomes. The student should be able to:

- define and explain key terms and concepts, as specified in the content from the required areas of study, and to apply a range of related mathematical routines and procedures
- apply mathematical processes in non-routine contexts and to analyse and discuss these applications of mathematics
- to select and appropriately use technology to develop mathematical ideas, produce results and carry out analysis in situations requiring problem-solving, modelling or investigative techniques or approaches.

In achieving the outcomes, students draw on knowledge described in the areas of study for the course.

Overall, school-assessed coursework was implemented in accordance with the Board's requirements. Teachers had either devised their own tasks or used a variety of resources to assist in developing tasks for coursework assessment. These resources included previous common assessment tasks or work requirement activities, advice provided by the Board or commercially published material. It is important to note that ideas and approaches from such sources should not be used without being suitably adapted.

Teachers were required to select **two** of the four following types of task with the second analysis task being of **different** type to the first analysis task:

- an assignment where students have the opportunity to work on a broader range of problems
- a short focused investigation, challenging problem or modelling task
- a set of application questions requiring extended response analysis in relation to a particular topic or topics
- item response analysis for a collection of multiple-choice questions.

These tasks should include both the production of mathematical results and **the analysis and interpretation** of these results. Analysis tasks should be structured to enable students to demonstrate achievement of each of the outcomes. In selecting and devising their analysis tasks, teachers considered the following:

- the **content/topics/areas** of study to be covered (a single area of study such as vectors, or coverage of double angle formulas through different approaches)
- the **context or contexts** to be used (practical or theoretical, specific situation or general investigation)
- the intended **nature and purpose** of the task (review of a topic, application of a particular process )
- the **focus** of the task (exploration of a particular concept or technique, such as asymptotic behaviour or vector proofs)
- the **scheduling and scope** of the task (when it occurs in the year plan, the intended length of the task; note: more open ended tasks could be longer)
- **relationship** to the other analysis task (combination of task types)
- relation of the task to **outcomes** and **assessment criteria**.

The 'assignment where students have the opportunity to work on a broader range of problems' type of analysis task was often used as an opportunity to review and revise a number of topics within the context of a single piece of work. It is important that analysis and interpretation of results is an integral part of students' response in an analysis task. This required some

discussion and comment and not just calculation, in particular with reference to the Key knowledge and skills for Outcome 2.

For the 'short focused investigation, challenging problem or modelling task' many teachers drew on ideas and approaches from challenging problem or problem-solving tasks set by the Board of Studies in previous years. They successfully adapted and developed parts of these tasks into a suitable analysis task while noting the significantly smaller scope of the analysis task.

Many teachers successfully used ideas and approaches found in questions from previous examination papers to devise suitable analysis tasks of the 'a set of application questions requiring extended-response analysis in relation to a particular topic or topics' type. Such questions should not be used without being suitably adapted. It is important to ensure that questions clearly link content to the context in which it is used, and provide appropriate opportunity for students to carry out some extended-response analysis. As the course has undergone several revisions of content in the last decade it is important to check the Study Design to ensure that content from past questions is still relevant to the current course, and that new content has not been overlooked.

For the 'item response analysis for a collection of multiple-choice questions' type of analysis task, students were more able to readily show **analysis** and **interpretation** of item responses when teachers had provided a specific structure for student work. A tabular format, with a clearly indicated space for the correct response and working along with spaces for the reasons for rejecting each of the incorrect responses, elicited the best work from students. Some associated working space where equations could be solved, tables of values produced or graphs drawn was also helpful. While teachers successfully used ideas and approaches found in questions from previous examination papers to devise suitable types of questions for this task, it should be noted that this selection needs some care as not all multiple-choice questions are equally well suited for this type of analysis. Questions from past papers should not be used without being suitably adapted.

Some teachers misinterpreted this type of task and set multiple-choice tests rather than analysis tasks. These tests did not meet the requirements, either in nature or scope of the intended task, as outlined in the Study Design.

In general, the topic and content covered in the analysis tasks indicated that the majority of teachers were following the teaching sequences indicated in pages 168–169 of the Study Design, or some variation of these.

### Student responses

Work was generally of a high standard and reflected the mathematical interest of the students taking this subject. The quality and presentation of work appropriately reflected the nature and scope of coursework assessment. Student responses were generally handwritten, rather than the product of extensive word processing and symbolic expression.

Student responses indicated increasing use of the graphics calculator, with less frequent use of computer-based software. Whichever form of technology is used, it is important that students be required to provide a clear record of its application through discussion of results that display understanding of the mathematics involved. For example, when students draw graphs using technology they should identify the key features of the graph/s produced and link these to the development of the answer to a question, or of the solution to a problem.

Some students demonstrated a general knowledge of the basic concepts and skills but little understanding of how these were applied in broader and non-routine contexts.

### Assessment

Most schools interpreted the Study Design correctly and used suitable tasks for assessment of coursework in Unit 3.

Schools need to provide sufficient documentation to students for **each** task. This includes:

- **conditions** under which the task is conducted – typically this might be a cover sheet with instructions for students detailing time allocated, the structure of the task, support material which the students may use, type of response required
- a complete copy of all materials which students are expected to work on for the set task
- a **schema** that outlines how marks for the task relate to assessment criteria and the outcomes.

The outcomes and criteria provide a basis for devising a task and related marking scheme. Where teachers decide to use other assessment criteria, they should include information about how they have been used in assessing student work. Teachers need to ensure that sufficient and appropriate opportunities for students to demonstrate Key knowledge and skills related to all outcomes have been incorporated into the tasks for coursework assessment.

Some work showed little evidence of subsequent feedback to students. Coursework assessment provides teachers with the opportunity to give students substantial feedback on their progress with respect to the material assessed in each task. Such feedback is an integral part of student learning.

The form of the logbook, and the presentation of student work in the logbook, varied across schools, ranging from working presented by students in their own format, to structured booklets that contained both the questions and space for answers and associated working. The utility of a particular format will depend on the nature and purpose of the analysis task devised. Whatever form of logbook is used, it should facilitate authentication of student work, and enable students to address each of the outcomes.