

Mathematical Methods: Unit 3 Coursework

GENERAL COMMENTS

The tasks to be undertaken by students for school assessed coursework in Mathematical Methods Unit 3 are specified on page 133 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:

- a function and calculus application task with several components of increasing complexity, that relates to all three outcomes and
- two tests that relate to Outcomes 1 and 2.

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.

SPECIFIC INFORMATION

Application Task

Most schools adhered to the requirements for school-assessed coursework specified in the Study Design, with many using the advice from the *Mathematics Assessment Guide Revised VCE 2000*. There were a number of examples of application tasks that had been set by teachers based on previous Investigative Project material. Many of these were appropriately modified to suit the

purposes of the application task and to enable students to demonstrate achievement of the three outcomes.

A typical example of this was the use of the 'Cycling The Yarra' context (a starting point from the 1996 CAT 1 Investigative Project) or a similar variation of this type of context. Other teachers devised application tasks using a theme and starting point of their own choice. Both real-life and theoretical contexts were used in devising application tasks. This type of task is particularly suitable for the exploration of mathematical concepts, skills and processes in real-life contexts.

There were a number of issues that arose:

- The task should be completed mainly in class time and typically would be undertaken over a period of up to two weeks. It was evident that most students did the task mainly in class time, and that the tasks themselves were pitched at an appropriate level of difficulty for students of Mathematical Methods Units 3 and 4. However, in some instances it was unclear as to whether the task set, and its implementation, was of the required scope. The application tasks provide a substantive basis for student demonstration of achievement of Outcome 2, i.e. 'On completion of this unit each student should be able to apply mathematical processes in **non routine** contexts and to **analyse and discuss** these applications of mathematics'.
- The scope of the application task is an important component of task design that provides students with the opportunity to demonstrate achievement of Outcome 2, and related aspects of Outcome 3, i.e. 'On completion of each unit the student should be able 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**'.

Students should work progressively on the application task, mainly in class, under the supervision of their teacher. It appeared that some schools permitted students to complete most of the application task outside class time. This is not appropriate and may create authentication and work-load problems.

- Some teachers set tasks that did not clearly meet the design requirements for an application task, which is to be a **function and calculus** application task with **several components of increasing complexity**. There should be a clear context that underpins the components of the task and it should be explored in some depth. The components of an application task, as described in the *Mathematics Assessment Guide Revised VCE 2000*, and elaborated through the specific examples published on pages 14 and 15 of the December 1999 *VCE Bulletin*, are:
 - introduction of a context through specific cases or examples
 - consideration of general features of this context
 - variation or further specification, of assumptions or conditions involved in the context to focus on a particular feature related to the context.

There should be elements of investigation, in particular in the second component, and the potential for students to generate different sets and/or types of responses based upon, for example, variation of assumptions or values of key parameters. Students should also consider assumptions, domain and range constraints, special cases and limitations of models as applicable. The results of analysis should be interpreted in terms of features of the application context.

It is not appropriate for students to complete application tasks in a booklet where a high level of structure for the expected task response in the form of questions and working space for their completion is provided, as was noted in a small number of instances. Work produced by students should clearly be their own and produced mainly in class. It should not be difficult for teachers to authenticate the task. Work on the application task in logbooks was not always evident.

Some teachers used a test as part of their application task. While teachers may choose to use a test based on the same context as the application task to assist in the authentication of student work, such a test is not to be regarded as part of the application task for the purpose of allocation of marks for school-assessed coursework.

The use of technology was widespread in all tasks, although it was not always explicit. It is recommended that application tasks be devised so that part of the work effectively requires the use of technology to, for example, produce tables of values or families of graphs or solve more complex equations or systems of equations. Given that most schools completed their application task in class time, not surprisingly, graphics calculators appeared to be the most common technology employed by students.

Tests

Teachers constructed tests using a suitable combination of multiple-choice, short-answer and some more extended-response items with a high degree of consistency. Typically, teachers made use of past examination questions to provide ideas and approaches for constructing their own tests, as well as incorporating some original questions of their own. Although the tests varied in length and complexity, nearly all conformed to the Board's requirements for this type of task as described in the Study Design and the *Mathematics Assessment Guide Revised VCE 2000*.

Care needs to be taken when questions from past papers are used. Students undertake examinations at the end of Units 3 and 4, typically after some review of the material from the areas of study for these units. Questions used in tests should reflect the breadth and depth of content coverage development prior to the scheduling of the test. There were some examples of schools that inappropriately used more than two tests for coursework assessment. While teachers may wish to use tests as a means of providing students with feedback on their progress in other instances, the Study Design stipulates that only two tests should contribute to school-assessed coursework.

Assessment

There was evidence that most teachers used the outcomes and related criteria in their assessment of student work, and that many had taken care to devise marking schemes in accordance with the weightings given in the *Mathematics Assessment Guide Revised VCE 2000*. While most teachers appeared to have followed the advice provided in the guide this was not always the case. Teachers need to more clearly link coursework assessments to the outcomes for the unit.