



Mathematics

Stage 6

Consultation Report

Courses: **Mathematics Advanced**
Mathematics Extension 1
Mathematics Extension 2

2007

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1 Introduction

1.1 Background Information

Evaluation and review of the current Stage 6 Mathematics syllabuses

The current *Mathematics 2/3 Unit Syllabus – Years 11–12* was introduced in 1983, while the current *4 Unit Mathematics Syllabus* was introduced in 1980, with some amendment in 1989. The current General Mathematics course was introduced in 2000 as part of the New Higher School Certificate.

The Board of Studies initiated the revision of the suite of Stage 6 Mathematics courses, following the completion of new K–6 and Years 7–10 Mathematics syllabuses in 2002, to ensure an up-to-date and cohesive K–12 continuum of mathematics teaching and learning in New South Wales that meets the needs of the full range of students.

In 1998, the Board undertook the evaluation of all existing Higher School Certificate (HSC) courses against the specific criteria of the Government's White Paper *Securing Their Future* (August 1997). For Stage 6 Mathematics, two evaluation reports were developed: *Mathematics 2/3/4 Unit* and *Non-Calculus-Based Mathematics (incorporates Mathematics in Society and Mathematics in Practice)*.

Following the release of these reports, the Board endorsed the development of a single, non-calculus-based course (which became General Mathematics) to replace Mathematics in Society and Mathematics in Practice and the maintenance of the 2, 3 and 4 Unit courses for the immediate future, with 'minimal change to existing content'. The Board also agreed to 'a longer term, comprehensive review of the present 2/3/4 Unit courses by an appropriately constituted expert committee'.

The *General Mathematics Syllabus* was released to schools in June 1999, with the study of the Preliminary course undertaken for the first time in 2000, and the first HSC examination undertaken in 2001. As an interim arrangement for the introductory years of the new HSC, the Board of Studies maintained the course content, internal assessment arrangements and examination specifications of the 2, 3 and 4 Unit Mathematics courses from the previous HSC. The new HSC standards-referencing procedures that were introduced for all new HSC Board-developed courses were also put in place for these Mathematics courses, which were renamed Mathematics, Mathematics Extension 1 and Mathematics Extension 2 respectively.

In July 2000, the NSW Government announced the review of Years 7–10 Mathematics following its 1999 commitment in *Literacy and Numeracy Plan: Focusing on the basics* that: 'A new Years 7–10 Mathematics syllabus will be developed to ensure it provides students with the skills, knowledge and understanding required and appropriately prepares students for the New School Certificate and the New Higher School Certificate'. At about this time, the Board of Studies announced the review and development of the K–6 Mathematics syllabus.

The review and development of K–10 Mathematics consequently became the focus of Mathematics curriculum development in 2000–2002, with its completion a necessary prerequisite to the 'longer term, comprehensive review of the present 2/3/4 Unit courses' agreed to by the Board in 1998.

With the completion of the new K–6 and Years 7–10 syllabuses at the end of 2002, a plan was established for the review and development of the Stage 6 calculus-based Mathematics courses. In considering the plan, the Board felt that it would be necessary to review the full Stage 6 Mathematics provision, taking account of the needs of less able students as well as those who would undertake the higher-level calculus-based courses. The Board endorsed the plan for the review and development of the full Stage 6 Mathematics course provision in December 2004.

Scope of Mathematics Stage 6 review and development

The implementation of the plan in 2006, with the commencement of the *Mathematics Stage 6 Review and Development Project*, recognised the importance of teachers having appropriate time to focus on the implementation of the new *Mathematics Years 7–10 Syllabus*, and the value of obtaining feedback following 2004 and 2005, the initial years of implementation.

The first phase of the project, *Syllabus Review*, commenced in March 2006. The main purpose in undertaking the *Syllabus Review* phase was to review the existing Mathematics course provision and to establish Broad Directions for revision and development.

A range of strategies was used to gather data in the *Syllabus Review* phase. The most significant of these were:

- oral submissions
- written submissions
- a survey of a sample of schools
- a symposium
- a literature and curriculum review.

The information obtained through the data-gathering strategies used in the *Syllabus Review* phase was analysed to identify issues that need to be considered in the revision and development of Stage 6 Mathematics courses. Key findings were synthesised from the data and a set of draft Broad Directions for the revision and development compiled.

The Board's endorsement of the Broad Directions at its December 2006 meeting represented the conclusion of the *Syllabus Review* phase of the project. The Broad Directions have guided the development of the draft writing briefs for the calculus-based, and non-calculus-based, Stage 6 Mathematics courses.

1.2 Timeline

Steps in the Syllabus Development Process	Dates
<p>Syllabus Review</p> <ul style="list-style-type: none"> • Oral submissions • Written submissions • Symposium • Survey of a sample of schools • Literature and curriculum review 	<p>24–25 May 2006 closed 30 June 2006 19 August 2006 closed 18 September 2006 August–September 2006</p>
<p>Writing Brief Development</p> <ul style="list-style-type: none"> • Preparation of draft writing briefs and surveys • Consultation (five weeks) • Development of consultation reports and revision of draft writing briefs 	<p>January 2007 – April 2007 1 May 2007 – 1 June 2007 June 2007 – August 2007</p>
<p>Syllabus Development</p> <ul style="list-style-type: none"> • Development of draft syllabuses and surveys • Consultation (eight weeks) • Development of consultation reports and revision of draft syllabuses • Distribution of syllabuses • Development and distribution of specimen examination papers and marking guidelines 	<p>September 2007 – April 2008 May 2008 – June 2008 July 2008 – October 2008 November 2008 (Date to be determined)</p>
<p>Note: Support Materials The nature of proposed support materials is presented in section 7 of the Draft Writing Brief.</p>	

1.3 Broad Directions for the Mathematics Stage 6 Writing Briefs – endorsed by the Board of Studies on 12 December 2006

Note: *The Board of Studies endorsed these Broad Directions on 12 December 2006. They reflect the consultation undertaken in Phase 1 of the syllabus development process and inform the development of Section 4 of the Draft Writing Brief, which is subject to consultation. The Broad Directions are not subject to consultation.*

Broad Directions:

- That the set of Stage 6 Mathematics courses include an additional offering to accommodate the purposes of students who wish to study a Board-developed Mathematics course in Stage 6 but who are currently choosing not to, as well as those whose purposes are not accommodated through the study of General Mathematics.
- That in the revision, due attention be given to clarifying the purpose of each course and identifying future learning or vocational pathways of the intended candidatures.

- That the nested structure of the current Mathematics ('2 Unit'), Mathematics Extension 1 and Mathematics Extension 2 courses, and the calculus-basis to these courses, be retained.
- That any revision or development of the calculus-based courses maintain the current rigour and level of challenge of the courses.
- That the amount of content prescribed for Stage 6 Mathematics courses reflect the amount that can be taught, and learnt by the typical student, in the indicative time.
- That in reviewing the content of Stage 6 Mathematics courses, particular attention be given to the purpose of the Mathematics ('2 Unit') course for Mathematics ('2 Unit')-only students, and the appropriateness and relevance of the course content for those students.
- That the inclusion of additional study of statistics be considered, while addressing implications in relation to the extent of relevant teacher expertise, professional development, future pathways of students, school Mathematics staffing, and school timetabling.
- That the current General Mathematics course material be largely maintained within the structure of Stage 6 non-calculus-based Mathematics courses.
- That, in reviewing the content of the calculus-based-courses, the appropriateness and relevance of the applications within the courses be explored, with a view to ensuring that they are contemporary and that they meet the needs of students.
- That, in the consideration of the use of technology in Stage 6 Mathematics courses, due regard must be given to the related access and equity issues.
- That the use of technology with capabilities beyond the level of scientific calculators be encouraged in the learning and teaching, and school-based assessment, of all Stage 6 Board-developed Mathematics courses.
- That the non-calculus-based Stage 6 Mathematics courses be developed with the view that technology with capabilities beyond the level of scientific calculators will need to be utilised for aspects of the associated HSC examinations.
- That the use of technology in HSC examinations for the calculus-based courses be further investigated and clarified in the Writing Brief phase.
- That the appropriateness of the current processes for the examination of Stage 6 Mathematics courses be reviewed, with particular emphasis on the examination of Mathematics ('2 Unit')-only candidates.
- That the syllabus documents within the Stage 6 Mathematics syllabus package incorporate applications, implications and considerations for the teaching of the syllabus content, including in relation to depth of coverage.
- That each Stage 6 Mathematics course be named so as to avoid confusion with the discipline itself.

1.4 The Development of the Draft Writing Brief

The development of the Draft Writing Brief was undertaken under the direction of the Inspector Mathematics and the Senior Project Officer, Mathematics Stage 6. For the development of the Draft Writing Brief, contract writers were required. Advertisements were placed in the *Board Bulletin* calling for expressions of interest from experienced Mathematics curriculum writers. Applicants were placed on a register of writers. From this register, writers with appropriate expertise were chosen.

The project team developed the Draft Writing Brief using the findings of a literature review, surveys, oral and written submissions, a symposium, and other consultation and research.

The development of the Draft Writing Brief involved writers working at the Office of the Board of Studies, commencing in January 2007. The Draft Writing Brief was completed in preparation for publication and distribution for the designated consultation period 1 May – 1 June 2007.

2 Consultation Methodology

Consultation on the Mathematics Stage 6 Calculus-based Courses Draft Writing Brief involved a combination of quantitative and qualitative methodology.

2.1 Data Collection

The Mathematics Stage 6 Calculus-based Courses Draft Writing Brief and the accompanying survey were published on the Board's website and distributed for consultation to schools, key groups and individuals.

Surveys

The Mathematics Stage 6 Calculus-based Courses Draft Writing Brief was accompanied by a survey (Appendix A) that allowed for a judgement on a 4 point Likert scale, as well as extended comment, on each section of the Draft Writing Brief. Surveys were sent to all schools, the Board's consultative network, Mathematics academics, Mathematics Education academics, teacher unions, professional associations and parent and community organisations. The survey enabled the gathering of a large cross-section of quantitative data and qualitative comment.

A total of 133 survey responses was received by 15 June 2007. Of these 133 responses, approximately 43% were from groups and 53% from individuals. The option was provided to respond to surveys online, by email, or in hard copy. A further 37 responses were submitted that did not address the survey questions specifically, but provided a range of comments on particular aspects of the Draft Writing Brief.

The results of these surveys were tabulated and analysed in relation to both the qualitative and quantitative material in the survey responses as well as the strengths and weaknesses of the Draft Writing Brief identified by the respondents. The consultation report incorporates the quantitative data and analysis and key qualitative comments.

Focus groups

During the consultation period, focus groups of teachers, academics, and sector and professional association representatives, were held in different regions across the state. A profile of potential participants that represented a range of experience was established. Board Liaison Officers then contacted schools, TAFEs and universities to identify the participants. A total of 152 teachers and academics were consulted. The purpose was to obtain feedback on the Mathematics Stage 6 Calculus-based Courses Draft Writing Brief by conducting a discussion based on a series of questions. (Appendix C).

Focus groups were held as follows:

Focus Group	Location	Date
South Coast	Batemans Bay	Tuesday 8 May 2007
Riverina	Wagga Wagga	Wednesday 9 May 2007
MANSW	Office of the Board of Studies	Thursday 10 May 2007
Academics (Metropolitan)	Office of the Board of Studies	Wednesday 16 May 2007
Metropolitan East/ Metropolitan North	Office of the Board of Studies	Monday 21 May 2007
Western (1)	Bathurst	Tuesday 22 May 2007
Hunter	Newcastle	Wednesday 23 May 2007
Metropolitan North-West/ Metropolitan South-West	Parramatta	Monday 28 May 2007
North Coast	Coffs Harbour	Tuesday 30 May 2007
North West	Armidale	Wednesday 31 May 2007
Western (2)	Broken Hill	Monday 4 June 2007

The meetings were chaired by the Inspector Mathematics/Senior Project Officer, Mathematics Stage 6. One member of the group recorded participants' comments.

2.2 Data Analysis

The notes compiled for each of the focus group meetings were distributed to a representative of the participants to confirm that they represented an accurate summary of the main issues raised at the meeting. These issues were then incorporated into Section 3 of the Consultation Report.

The data collected from the surveys was analysed in two ways. The quantitative data from the Likert items was entered into a spreadsheet in order to collate and summarise the results. The qualitative responses to the surveys, and key group and individual responses, were read and analysed by Board Officers to synthesise the main issues, prepare the commentary and to select representative quotes for each section of the Draft Writing Brief. The responses were also read by representatives of the Mathematics Stage 6 Board Curriculum Committee.

3 Consultation Findings

3.1 Key Findings of the Consultation

Overall response

There has been a positive overall reaction to the Draft Writing Brief and this is evidenced in the analysis of survey responses, key group and individual responses, and the focus groups. In particular, there was general endorsement of the:

- inclusion of an additional course to accommodate the purposes of those students who wish to study a Board-developed Mathematics course in Stage 6 but who are currently choosing not to, as well as those whose purposes are not accommodated through the study of General Mathematics
- the level of rigour and challenge in the courses
- inclusion of statistics
- renaming of the current Stage 6 Mathematics course to Mathematics Advanced
- range of support materials proposed.

The overall positive response to the document is reflected in the following comments:

We think the new selection of content is a big improvement. It should help make Mathematics more relevant and accessible to the students targeted by such a course. Including statistics will make the course relevant to Uni courses which rely on statistical knowledge. Eliminating 'assumed knowledge' topics will allow more time for new concepts. Overall, these improvements are long overdue. Well done!

Mathematics Faculty – Independent School

If anything, the course has a greater unity with the removal of many small unrelated bits and the inclusion of topics which enhance the mathematical modelling theme.

Mathematics Faculty – Government Comprehensive Girls School

The reduction in the number of course topics and the scope of some course topics in the Advanced course is to be commended ... The Mathematics Extension I and II courses both appear more streamlined and manageable.

Head Teacher – Non-government Systemic Comprehensive Boys School

Overall I would like to commend you on the level of consultation you have engaged in, and the obvious attempts you have made to make the courses more contemporary, while at the same time preserving the strength of their content.

Head Teacher – Independent Boys School

While there was consistent overall endorsement of the Draft Writing Brief, several issues of concern were raised. These included:

- the amount of content prescribed in the Mathematics Advanced course may not reflect the amount that can be taught in the indicative time
- the statistics components may be too difficult for students at Stage 6 level
- access and equity in relation to the use of technology in assessment
- the process of examination of the Mathematics Advanced course.

3.2 Summary of Key Issues and Actions

This section lists key issues, sources (Board Curriculum Committee (BCC), Department of Education and Training (DET), Focus Groups (FG), Surveys) and actions in relation to each issue.

Key Issues related to Specific Sections of the Draft Writing Brief

ISSUE	SOURCE	ACTION
Rationale		
Last paragraph to include a broader range of examples, such as technology, education	BCC Surveys	Done
Too verbose – remove last sentence of third paragraph	DET FG	Done
Include ‘substantive communication through problem solving, group work’	Surveys	Noted (this is sector-specific wording)
Include statement about calculus	BCC FG	Done
Need to link to K–10 syllabus Rationale	FG	Agreed
Aim		
Give examples of fields using the skills developed in the courses	BCC Surveys	Done
Add ‘to prepare students for a range of tertiary-based courses’	BCC Surveys	Addressed in Rationale
Amend to read ‘the calculus-based Mathematics courses are designed to promote the development of knowledge, skills and understanding related to discrete and continuous change’	DET	Noted, but conceptually narrower
Objectives		
Should refer to technology	BCC Surveys	Done
Should include geometry, algebra and trigonometry in second dot point	BCC Surveys	Noted, but too specific for coverage of three courses
Amend third dot point to read ‘interpret, construct and use to make predictions’	Surveys	Done
Change ‘beauty’ to ‘power’	DET FG	Done

Content Organisation		
Set up to match K–10 syllabus	BCC Surveys	To be considered in Syllabus Development Phase
Prerequisite knowledge should be listed	BCC Surveys	Will be addressed in Syllabus Development Phase
Include common errors and misconceptions in applications section	Surveys	To be considered in development of support materials
Useful to have list of changes from old to new syllabuses	BCC FG	Noted (could be included in support materials)
Outcomes		
Outcomes need rewording in language suitable for school reports. Outcomes should cover all topics. Some are too specific, others too general	BCC DET Surveys	Outcomes reworded
Mathematics Advanced Preliminary needs a Statistics outcome	BCC Surveys	Outcome included
P9 should move to H9	BCC Surveys	Done
PE3 should also be included in HSC outcomes for Mathematics Extension 1 and Mathematics Extension 2	BCC Surveys	Outcome included
Need to consider whether Values and Attitudes outcome is necessary	FG	Noted, but a requirement of all Board-developed syllabuses
Include assumed outcomes from Years 7–10	BCC FG	To be undertaken in Syllabus Development Phase
Content		
Amount of content for the Mathematics Advanced course	Surveys	To be addressed more specifically in Syllabus Development Phase
No time allowed in Mathematics Advanced course for review and consolidation of Stage 5. This could reduce the candidature. This has implications for programming Stage 5 courses. Students will need to be high calibre – unrealistic expectation. 5.2 students already struggling with 2 Unit course and need the review of Stage 5 Algebra	BCC FG Surveys	Review and consolidation to be included, where appropriate, topic by topic
Mathematics Advanced Preliminary course too long, particularly if review of Basic Arithmetic and Algebra from Stage 5 is included	BCC FG Surveys	To be addressed in Syllabus Development Phase

<p>Good to include Statistics:</p> <ul style="list-style-type: none"> – could be separate 1 unit course – required for some university courses – include z scores – confidence intervals too difficult – statistics theory is too difficult 	<p>BCC FG Surveys</p>	<p>Central Limit Theorem and Confidence Intervals removed. The material to be addressed in the Mathematics Advanced course will be amended in the Syllabus Development Phase so that students have the opportunity to achieve a level of competence at least equivalent to that of the Mathematics General 2 course</p>
<p>More information about many areas of content required, eg counting techniques</p>	<p>BCC Surveys</p>	<p>To be addressed in Syllabus Development Phase</p>
<p>Intuitive approach to calculus preferred</p>	<p>BCC DET</p>	<p>To be addressed in Syllabus Development Phase</p>
<p>Retain Parameters and Conics</p>	<p>Surveys</p>	<p>Conics – opinion noted. More exploration of parameters in Extension courses to be undertaken in Syllabus Development Phase</p>
<p>Include Matrices</p>	<p>Surveys</p>	<p>Opinion noted</p>
<p>Little incentive for students to do Mathematics Advanced course. Would rather do General Mathematics or Mathematics Extension 1 due to level of difficulty, amount of content and scaling</p>	<p>BCC Surveys</p>	<p>Noted. Measures are being taken to address this issue</p>
<p>Logarithmic and Exponential Functions should be split – graphing in Preliminary course, calculus in HSC course</p>	<p>Surveys</p>	<p>Opinion noted</p>
<p>Retain financial applications of series – useful in business-type studies at university</p>	<p>Surveys</p>	<p>Opinion noted</p>
<p>Permutations and Combinations difficult for Mathematics Extension 1. Care needed when moving to Mathematics Advanced</p>	<p>BCC FG Surveys</p>	<p>Opinion noted</p>
Technology		
<p>Equity issues must be resolved</p>	<p>BCC FG Surveys</p>	<p>Noted and agreed (for ongoing discussion)</p>
<p>Separate non-calculator and calculator sections in HSC papers</p>	<p>Surveys</p>	<p>Noted. To be considered in Syllabus Development Phase</p>
<p>Ensure teaching of technology skills doesn't override conceptual skills</p>	<p>BCC Surveys</p>	<p>Noted and agreed</p>

Assessment and HSC examination		
Formula sheet should be provided in examination	BCC Surveys	To be addressed in Syllabus Development Phase
Mathematics Extension 1 examination should be three hours	BCC Surveys	To be addressed in Syllabus Development Phase
Continue component A and B with current weightings	BCC Surveys	To be addressed in Syllabus Development Phase
UAI of Mathematics Advanced students should not be affected by Mathematics Extension 1 students. Should be separate Mathematics Extension 1 paper with some common questions to avoid further loss of candidates	BCC DET Surveys	To be addressed in Syllabus Development Phase
Retain balance of Preliminary and HSC course questions	BCC FG Surveys	To be addressed in Syllabus Development Phase
Support Materials		
Professional development, including online courses, required before commencement of syllabus in order to successfully implement changes	BCC FG Surveys	Noted and agreed
Need specimen papers, student work samples	BCC FG Surveys	Specimen papers to be provided. Provision of student work samples to be considered in Syllabus Development Phase
Need listing of useful websites	BCC Surveys	To be considered in Syllabus Development Phase
Need to be able to share resources through Board of Studies website	BCC Surveys	To be considered in Syllabus Development Phase

3.3 Specific Sections of the Draft Writing Brief

The quantitative and qualitative consultation is represented in two ways: survey analysis and commentary and representative quotes. The Survey Analysis section represents the breakdown of the results of the data gathered in response to the surveys on the Draft Writing Brief.

The Commentary and Representative Quotes section represents a summary account of the surveys and written submissions from key groups, individuals, organisations and focus groups.

3.3.1 Rationale

The Rationale describes the nature of the subject in broad terms. It explains the place and purpose of the subject in the curriculum.

Survey analysis

a. Approval: 86%	Disapproval: 9%
b. Approval: 82%	Disapproval: 10%
c. Approval: 83%	Disapproval: 10%

Overview of Agree/Disagree levels with prompted statements, n=133 (100%)	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Answered
1. The Rationale in section 5.1 (p. 18)					
a. The Rationale adequately describes the nature of Mathematics in broad terms.	29 (22%)	85 (64%)	9 (7%)	2 (2%)	8 (6%)
b. The Rationale reflects a contemporary view of Mathematics.	28 (21%)	81 (61%)	10 (8%)	3 (2%)	11 (8%)
c. The Rationale reflects the purpose of the calculus-based courses.	24 (18%)	86 (65%)	10 (8%)	3 (2%)	10 (8%)

Commentary and representative quotes

Hardly ‘creators’ of Maths – more like ‘discoverers’ of facts, patterns and phenomena.
Survey – Government School Executive Teacher

It should be more pertinent to the calculus course and distinct from the non-calculus course.
Survey – Non-Government Systemic School Teacher

This rationale emphasises the need for this course and the vision of our students and teachers as ‘creators’.
Survey – Government School Faculty

The rationale gives a good overview of the Mathematics syllabus.
Survey – Non-Government Systemic School Teacher

I am sure that while it reflects a Mathematician’s contemporary view it may not reflect the view of the wider community in relation to its ‘essential’ role.
Survey – Government School Teacher

The proposed changes seem necessary and appropriate to the modern era as long as calculus remains the driving force, not statistics.
Survey – Government School Teacher

3.3.3 Objectives

Objectives provide more specific statements of the intent of the courses. They amplify the aim and provide direction to teachers on the teaching and learning process emerging from the course(s). They define in broad terms the knowledge, skills, understanding and values and attitudes fundamental to the key learning area/subject. They act as organisers of the intended outcomes. The same objectives may apply across Stages in a key learning area/subject.

Survey analysis

a. Approval: 85% Disapproval: 8%
 b. Approval: 76% Disapproval: 12%

Overview of Agree/Disagree levels with prompted statements n=133 (100%)	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Answered
3. The Objectives in section 5.3 (p. 20)					
a. The proposed objectives demonstrate the intention of the calculus-based courses.	24 (18%)	89 (67%)	6 (5%)	4 (3%)	10 (8%)
b. The proposed objectives adequately define knowledge, skills, understanding and values and attitudes essential for the calculus-based courses.	19 (14%)	83 (62%)	12 (9%)	4 (3%)	15 (11%)

Commentary and representative quotes

No mention of technology development/use.

Survey – Government School Head Teacher

Very powerful and comprehensive.

Survey – Government School Faculty

All the topics in the course should be mentioned in at least one dot point.

Survey – Non-Government School Teacher

The use of the words beauty and elegance might not be appropriate. Perhaps appreciation of the links to real situations experienced by a range of cultures.

Survey – Government School Faculty

Good to see some emphasis on using mathematical models and communicating.

Survey – Non-Government School Teacher

3.3.4 Content Organisation

The Content Organisation section describes how the course content is to be organised.

Survey analysis

a. Approval: 85%	Disapproval: 7%
b. Approval: 82%	Disapproval: 10%

Overview of Agree/Disagree levels with prompted statements n=133 (100%)	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Answered
4. Content Organisation in section 5.4 (p. 21)					
a. The proposed content organisation assists understanding of the way the calculus-based courses are structured.	35 (26%)	79 (59%)	8 (6%)	1 (1%)	10 (8%)
b. The proposed presentation of content is appropriate for the calculus-based courses.	34 (26%)	75 (56%)	10 (8%)	2 (2%)	12 (9%)

Commentary and representative quotes

Would need to see the detailed content in order to assure 'continuity' in the 2U and Extension course.

Survey – Government School Faculty

The knowledge skills and understanding section needs to be clearly defined as to depth of coverage for each dot point and any new mathematics (not in the present syllabi) needs support material.

Good to see some emphasis on using mathematical models and communicating.

Survey – Non-Government School Teacher

Do not necessarily agree with the content.

Survey – Government School Faculty

How will the advice about the 'nature and use of technology' be updated when it changes so often. Will there be regular updates to these sections? Will the Board set up forums in which schools can share their technology resources.

Survey – Non-Government School Executive Teacher

3.3.5 Outcomes

Syllabus outcomes express the specific intended student learning that results from the teaching of the course(s). They are derived from the objectives and content. Outcomes provide clear statements of the knowledge, skills and understanding expected to be gained by most students as a result of effective teaching and learning by the end of a Stage.

Survey analysis

a. Approval: 72%	Disapproval: 18%
b. Approval: 73%	Disapproval: 14%
c. Approval: 76%	Disapproval: 12%

Overview of Agree/Disagree levels with prompted statements n = 133 (100%)	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Answered
5. Outcomes in section 5.5 (p. 23)					
a. The Outcomes for the Mathematics Advanced course are appropriate.	17 (13%)	79 (59%)	15 (11%)	9 (7%)	13 (10%)
b. The Outcomes for the Mathematics Extension 1 course are appropriate.	19 (14%)	78 (59%)	11 (8%)	8 (6%)	17 (13%)
c. The Outcomes for the Mathematics Extension 2 course are appropriate.	19 (14%)	82 (62%)	10 (8%)	5 (4%)	17 (13%)

Commentary and representative quotes

The proposed outcomes appear to be more considered than those currently in use which at times are either too general or amalgamate a variety of seemingly unrelated topic areas.

Survey – Government School Mathematics Faculty

Although the outcomes are better than the current outcomes (which are useless), they need to be more defined and not so vague.

Survey – Non-Government Systemic School Mathematics Faculty

With outcomes almost doubling in number consideration needs to be given as to how they will be reported on. Syllabus requirements and reporting requirements need to be in agreement.

Survey – Government School Mathematics Faculty

There is much more equity of outcomes ... these outcomes are very comprehensive.

Survey – Government School Mathematics Faculty

More detail is required. Too brief. This is an extremely good chance to be more descriptive to help students/teachers/parents plan, assess and evaluate teaching/learning practices.

Survey – Non-Government School Teacher

It is good that values and attitudes has not been given a number and is separated from the course specific outcomes. It appears that the outcomes are much more aligned to the content than previously which is excellent.

Survey – Non-Government School Mathematics Faculty

3.3.6 Content

Content describes the knowledge, skills, understanding and values and attitudes to be studied and developed by students over a Stage or Stages in a course and the development of processes of learning so that students are encouraged to be effective learners.

Survey analysis

a. Approval: 54%	Disapproval: 32%
b. Approval: 67%	Disapproval: 14%
c. Approval: 64%	Disapproval: 10%

Overview of Agree/Disagree levels with prompted statements n=133 (100%)	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Answered
6. The Content in section 5.6 (pp 29-41)					
a. The proposed Content for the Mathematics Advanced course is appropriate.	21 (16%)	51 (38%)	34 (26%)	8 (6%)	19 (14%)
b. The proposed Content for the Mathematics Extension 1 course is appropriate.	23 (17%)	67 (50%)	15 (11%)	4 (3%)	24 (18%)
c. The proposed Content for the Mathematics Extension 2 course is appropriate.	24 (18%)	61 (46%)	11 (8%)	3 (2%)	34 (26%)

Commentary and representative quotes

Good inclusion of Statistics into Mathematics Advanced. It provides a good opportunity for 'significance' in this course.

Survey – Government School Teacher

This content would be much more relevant to students and supply the skills and knowledge required by contemporary business and industry.

Survey – Government School Teacher

Data analysis as outlined is not appropriate at this level. The topic ... is difficult, demanding and remote.

Survey – Government School Retired Head Teacher

Statistics is important ... is taught best at Uni as the use and understanding is so varied.

Survey – Government School Selective School Mathematics Faculty

We need to look after the Advanced course – it is already much deeper than other subjects, requires more student effort. The system is killing the course.

Survey – Government School Teacher

2 unit Advanced requires a very high level of intellectual rigour – more than other 2 unit courses and students are not rewarded. Going to General to get better marks.

Focus Group Participant

There seems less time available for revision of basics (algebra and coordinate geometry) which the current candidature finds necessary.

Survey – Government School Mathematics Faculty

We worry about the assumption that so much will be done by the end of Yr 10 ... given the number of hours given to Yr 9/10 in particular.

Survey – Government School Mathematics Faculty

The cutting out of arithmetic and algebra at the beginning disadvantages TAFE students who have been out of education for a while.

Survey – TAFE Staff

Most students do not cope well with the lack of knowledge with only 5.2 work as a foundation. With the omission of review topics, this situation will be compounded for them.

Survey – Non-Government School Mathematics Faculty

K–10 continuum good in theory but spiral nature of previous course better for real learning. Students need to review previous work.

Survey – Independent School Mathematics Faculty

There is a possible problem with equal time allowed for Preliminary/HSC. Currently 3 terms are designated Prelim and 4 terms HSC. The Syllabus should reflect this.

Survey – Government School Mathematics Faculty

3.3.7 Use of technology

Survey analysis

Approval: 60%

Disapproval: 25%

Overview of Agree/Disagree levels with prompted statements n=133 (100%)	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Answered
7. Use of technology in section 5.7 (p. 42)					
The proposed approach to the use of technology in the HSC examinations is appropriate.	22 (17%)	57 (43%)	22 (17%)	11 (8%)	21 (16%)

Commentary and representative quotes

The logical thought in performing these processes is crucial for students to master.

Survey – Mathematics Coordinator

I think there should be a ‘non-calculator’ section of the HSC examination in which ‘basic algebraic, procedural, graphical and conceptual skills’ are assessed and then a technology section in which higher order skills/understanding are assessed.

Survey – Independent School Head of Department

Who will provide extra funding for the schools to purchase newer technology when we are still trying to purchase textbooks? Not all students have computers at home.

Survey – Government School Executive Member

Graphic calculators are expensive for low socio-economic and significant aboriginal representation.

Survey – Government Central School

It is good to see a prescribed list of calculator functions will be developed.

Survey – Non-Government Systemic School Teacher

The approach recognised that whilst technology provides a valuable asset to learning, it is not an essential component for assessment.

Survey – Government School Mathematics Faculty

3.3.8 Assessment and HSC examination

Commentary and representative quotes

Can we please have a formulae booklet for all courses. We are assessing mathematical knowledge, skills and understanding, not memory.

Survey – Independent School Head of Department

The Extension 1 exam is currently difficult to complete in the time allocated (2 hours). This is an opportune time to make the time demands of the examination more reasonable.

Survey – Government School Mathematics Faculty

The current arrangements ... work extremely well.

Survey – Non-Government Systemic School Teacher

The components for the internal assessment should be left to the school with main guidelines. Also good to specify the percentage of questions that comprise component A and component B.

Survey – Government Selective High School Mathematics Faculty

3.3.9 Support Materials

Survey analysis

a. Approval: 87%	Disapproval: 3%
b. Approval: 86%	Disapproval: 5%
c. Approval: 86%	Disapproval: 2%
d. Approval: 88%	Disapproval: 3%
e. Approval: 89%	Disapproval: 2%
f. Approval: 85%	Disapproval: 5%
g. Approval: 85%	Disapproval: 6%
h. Approval: 86%	Disapproval: 4%
i. Approval: 88%	Disapproval: 2%
j. Approval: 86%	Disapproval: 3%

Overview of Agree / Disagree levels with prompted statements n=133 (100%)	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Answered
9. Support Documents in section 7 (p. 45)					
The following should be included in support materials:					
a. Teaching and learning units	86 (65%)	29 (22%)	3 (2%)	1 (1%)	14 (11%)
b. Advice on programming	81 (61%)	33 (25%)	5 (4%)	1 (1%)	13 (10%)
c. Program overviews	80 (60%)	35 (26%)	3 (2%)	0 (0%)	15 (11%)
d. Advice in relation to teaching 'new' areas of course content	107 (80%)	10 (8%)	2 (2%)	1 (1%)	13 (10%)
e. Teaching suggestions to assist the development of meaningful and engaging units of work	89 (67%)	29 (22%)	2 (2%)	0 (0%)	13 (10%)
f. Sample HSC assessment programs	91 (68%)	23 (17%)	5 (4%)	1 (1%)	13 (10%)
g. Advice on the utilisation of different types of assessment tasks	86 (65%)	27 (20%)	6 (5%)	1 (1%)	13 (10%)
h. Sample assessment tasks	96 (72%)	19 (14%)	4 (3%)	1 (1%)	13 (10%)
i. Suggestions for the utilisation of technology in teaching and learning	97 (73%)	20 (15%)	3 (2%)	0 (0%)	13 (10%)
j. Applications that relate to real-world problems	92 (69%)	23 (17%)	2 (2%)	1 (1%)	15 (11%)

Commentary and representative quotes

There will be many teachers who will need to revise or relearn much of the new material. Time and resources will be needed for this to take place.

Survey – Government School Mathematics Faculty

These support materials should be available in 2008 for teachers to commence programming and planning for 2010.

Survey – Non-Government School Mathematics Faculty

FUNDING for the implementation of this new syllabus ... and the purchase of new textbooks. All the textbooks we have will be useless.

Survey – Government Selective School Mathematics Faculty