



B O A R D O F S T U D I E S
N E W S O U T H W A L E S

**Assessment and Reporting
in
Mathematics, Mathematics Extension 1 and
Mathematics Extension 2 Stage 6**

Effective from	2012 (Preliminary and HSC courses)
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This document contains the Board of Studies' requirements for assessing and reporting achievement in the Preliminary and HSC courses in Mathematics and Mathematics Extension 1, and the HSC course in Mathematics Extension 2 for the Higher School Certificate, and provides details of the HSC examinations in these courses. From time to time changes are made to HSC assessment and examination requirements. Such changes will be made available through updates to this document. Please note that the version on the Board of Studies website is always the current version.

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Assessment in Stage 6

Assessment is the process of gathering information and making judgements about student achievement for a variety of purposes. In the Preliminary and HSC courses those purposes include:

- assisting student learning
- evaluating and improving teaching and learning programs
- providing evidence of satisfactory achievement and completion in the Preliminary course
- providing the Higher School Certificate results.

Assessment for Learning provides a useful approach for the delivery of the Preliminary and HSC calculus-based mathematics courses. It provides opportunities in the context of everyday class activities for students to demonstrate their learning.

The approach is most effective when students:

- are involved in setting learning goals
- know and understand standards and expectations about what is expected and the standards of work
- receive feedback that helps them understand the next steps in their learning and plan how to undertake the next steps.

Reporting achievement at the HSC

The Higher School Certificate credentials received by students are used by the Board to report both the internal and external measures of achievement. Higher School Certificate results in the calculus-based mathematics courses comprise:

- **an assessment mark** derived from the mark submitted by the school and produced in accordance with the Board's requirements for the internal assessment program
- **an examination mark** derived from the HSC external examination
- **an HSC mark**, which is the average of the assessment mark and the examination mark
- **a performance band**, determined by the HSC mark.

Student performance in an HSC course is reported against standards on a course report. The course report contains a performance scale for the course describing levels (bands) of achievement, an HSC mark located on the performance scale, an assessment mark and an examination mark. The course report also shows, graphically, the statewide distribution of HSC marks of all students in the course.

The distribution of marks is determined by students' performances against the standards and not scaled to a predetermined pattern of marks.

The use of both internal assessment and external examinations of student achievement allows measurements and observations to be made at several points and in different ways throughout the HSC course. Taken together, the external examination and internal assessment provide a valid and reliable assessment of the achievement of the knowledge, skills and understanding described for each course.

The Board of Studies uses a standards-referenced approach to reporting student achievement in the Higher School Certificate. The standards in the HSC are:

- the knowledge, skills and understanding expected to be learnt by students – the syllabus standards
- the levels of achievement of the knowledge, skills and understanding – the performance standards.
- Both the syllabus standards and the performance standards are based on the aims, objectives, outcomes and content of the course. Together they specify what is to be learnt and how well it is to be achieved. Teacher understanding of the standards comes from the aims, objectives, outcomes and content in the syllabus together with:
- the performance descriptions that summarise the different levels of performance
- HSC examination papers and marking guidelines
- samples of students' achievement, collected in the standards packages and published on the Board's Assessment Resource Centre website.

Internal assessment

This section should be read in conjunction with advice on internal assessment in the Board's Assessment Certification and Examination (ACE) Manual.

Preliminary courses

The suggested components and weightings are designed to give guidance for the school's assessment of student achievement in the Preliminary course. They may be varied to suit school needs.

HSC courses

The Board requires schools to submit an assessment mark for each HSC candidate in Mathematics, Mathematics Extension 1 and Mathematics Extension 2. The internal assessment mark submitted by the school provides a summation of each student's achievements measured at several points throughout the course. The marks submitted for each course group at a school should reflect the rank order of students, and must be on a scale sufficiently wide to reflect adequately the relative differences in student performances.

Internal assessment provides a measure of a student's achievement based on a wider range of syllabus content and outcomes than may be covered by the external examination alone. The assessment components and weightings to be applied ensure a common focus for internal assessment in the course across schools, while allowing for flexibility in the design of tasks.

A variety of types of task should be used to give students the opportunity to demonstrate outcomes in different ways and to improve the validity and reliability of the assessment.

The standards-referenced approach to assessment for the HSC involves schools ensuring that:

- assessment tasks reflect the weightings and components specified in this document
- tasks are designed to focus on objectives and outcomes
- the types of assessment task are appropriate for the outcomes being assessed
- students are given the opportunity to demonstrate their level of achievement of the outcomes in a range of different task types
- the assessment criteria for each task are such that higher marks are gained by demonstration of better achievement in relation to the syllabus outcomes
- students know the assessment criteria before they begin a task
- marks earned on individual tasks are expressed on a scale sufficiently wide to reflect the relative differences in student performances.

Students should receive meaningful feedback about what they are able to do, and what they need to do in order to improve their level of performance.

The HSC examination

The external HSC examination provides a measure of student achievement in a range of syllabus outcomes that can be reliably measured in an examination setting. The external examination and its marking relate to syllabus standards by:

- providing clear links to syllabus outcomes
- enabling students to demonstrate the levels of achievement outlined in the course performance scale
- applying marking guidelines based on criteria that relate to the quality of the response
- aligning performance in the examination each year to the standards established for the course.

Board requirements for the HSC internal assessment mark

The Board requires that the assessment tasks used to determine the HSC internal assessment mark must comply with the components and weightings specified. The collection of information for the HSC internal assessment mark must not begin before the completion of the Preliminary course, except in the case of Mathematics Extension 1.

Schools are required to develop an HSC internal assessment program that:

- specifies the various assessment tasks and the weightings allocated to each task
- provides a schedule of the tasks designed for the whole course.

Note that school-based assessment marks submitted to the Board must NOT include:

- measures of objectives and outcomes that address values and attitudes. (However, as these objectives are important elements of any course, schools may decide to report on them separately to students and parents, perhaps using some form of descriptive statements.)
- measures that reflect student conduct.

See the Board's ACE Manual for further information.

Assessment components and weightings

Preliminary courses

The suggested components and weightings for the Preliminary courses are set out below.

Component	Description	Weighting
Concepts, skills and techniques	Use of concepts, skills and techniques to solve mathematical problems in a wide range of theoretical and practical contexts	50
Reasoning and communication	Application of reasoning and communication in appropriate forms to construct mathematical arguments and proofs and to interpret and use mathematical models	50
		100

HSC courses

The mandatory components and weightings for the HSC courses are set out below.

For Mathematics Extension 1, the internal assessment mark submitted to the Board may be based on the whole course (ie both Preliminary and HSC courses).

Component	Description	Weighting
Concepts, skills and techniques	Use of concepts, skills and techniques to solve mathematical problems in a wide range of theoretical and practical contexts	50
Reasoning and communication	Application of reasoning and communication in appropriate forms to construct mathematical arguments and proofs and to interpret and use mathematical models	50
		100

Measuring attainment of the assessment components will involve assessing a student's ability in relation to aspects of the Mathematics, Mathematics Extension 1 and Mathematics Extension 2 courses such as:

Concepts, skills and techniques

- recalling mathematical terminology and concepts
- identifying the nature of mathematical problems from theoretical and practical contexts, and appropriate techniques for solution
- applying appropriate techniques to solve routine problems.

Reasoning and communication

- interpreting information from theoretical and practical contexts given in written, diagrammatic or graphical form, and representing given information in other ways
- explaining terminology, concepts, techniques for solution or aspects of a solution, using written and/or spoken language and diagrams
- interpreting and using mathematical models, and constructing mathematical arguments and proofs to solve familiar and unfamiliar problems
- evaluating methods of solution in terms of efficiency and breadth of application, and recognising limitations to the validity of solutions.

Notes on assessment of Mathematics, Mathematics Extension 1 and Mathematics Extension 2

Teachers may use their discretion in determining the manner in which they allocate tasks within the course content.

Up to 20% of the internal assessment mark submitted to the Board of Studies for the Mathematics course may be based on the Preliminary course.

The Board considers that 3 to 5 tasks are sufficient to assess the components of each course.

Mathematics HSC examination specifications

The examination will consist of a written examination paper of three hours duration (plus five minutes reading time) containing two sections with a total mark value of 100 marks. All questions in the examination are compulsory.

The Mathematics examination paper will be based mainly on the Mathematics HSC course and will focus on the course objectives and HSC course outcomes. The Mathematics Preliminary course will be assumed knowledge for this examination. Questions focusing on Mathematics HSC course outcomes may also relate to knowledge, skills and understanding from the Mathematics Preliminary course.

A table of standard integrals will be provided.

In addition to basic examination equipment, a pair of compasses, set squares, a protractor and a mathematical curve-drawing template may be used.

Board-approved calculators may be used.

Section I (10 marks)

- There will be objective-response questions to the value of 10 marks.

Section II (90 marks)

- There will be SIX questions.
- All questions will be worth 15 marks.
- Each question will consist of a number of short-answer parts.

Mathematics Extension 1 HSC examination specifications

The examination will consist of a written examination paper of two hours duration (plus five minutes reading time) with a total mark value of 70 marks. All questions in the examination are compulsory.

The Mathematics Extension 1 examination paper will be based mainly on the Mathematics Extension 1 HSC course and will focus on the course objectives and HSC course outcomes. The Mathematics Extension 1 Preliminary course and the Mathematics course will be assumed knowledge for this examination. Questions focusing on Mathematics Extension 1 HSC course outcomes may also relate to knowledge, skills and understanding from the Mathematics Extension 1 Preliminary course and the Mathematics course.

A table of standard integrals will be provided.

In addition to basic examination equipment, a pair of compasses, set squares, a protractor and a mathematical curve-drawing template may be used.

Board-approved calculators may be used.

Section I (10 marks)

- There will be objective-response questions to the value of 10 marks.

Section II (60 marks)

- There will be FOUR questions.
- All questions will be worth 15 marks.
- Each question will consist of a number of short-answer parts.

Mathematics Extension 2 HSC examination specifications

The examination will consist of a written examination paper of three hours duration (plus five minutes reading time) with a total mark value of 100 marks. All questions in the examination are compulsory.

The Mathematics Extension 2 examination paper will be based mainly on the Mathematics Extension 2 course and will focus on the course objectives and outcomes. The Mathematics Extension 1 course and the Mathematics course will be assumed knowledge for this examination. Questions focusing on Mathematics Extension 2 course outcomes may also relate to knowledge, skills and understanding from the Mathematics Extension 1 course and the Mathematics course.

A table of standard integrals will be provided.

In addition to basic examination equipment, a pair of compasses, set squares, a protractor and a mathematical curve-drawing template may be used.

Board-approved calculators may be used.

Section I (10 marks)

- There will be objective-response questions to the value of 10 marks.

Section II (90 marks)

- There will be SIX questions.
- All questions will be worth 15 marks.
- Each question will consist of a number of short-answer parts.

Summary of external and internal HSC assessment

Mathematics

External examination	Mark
<i>Section I</i> Objective-response questions	10
<i>Section II</i> Short-answer questions	90
	100

Internal assessment	Weighting
Concepts, skills and techniques	50
Reasoning and communication	50
	100

Mathematics Extension 1

External examination	Mark
<i>Section I</i> Objective-response questions	10
<i>Section II</i> Short-answer questions	60
	70

Internal assessment	Weighting
Concepts, skills and techniques	50
Reasoning and communication	50
	100

Mathematics Extension 2

External examination	Mark
<i>Section I</i> Objective-response questions	10
<i>Section II</i> Short-answer questions	90
	100

Internal assessment	Weighting
Concepts, skills and techniques	50
Reasoning and communication	50
	100

Resources and advice

Further guidance and advice related to assessment and the HSC examinations in Mathematics, Mathematics Extension 1 and Mathematics Extension 2 can be found on the Board's website at www.boardofstudies.nsw.edu.au/syllabus_hsc/mathematics-advanced.html