

ASSESSMENT AND CURRICULUM INFORMATION FOR THE MATHEMATICS, MATHEMATICS EXTENSION 1 AND MATHEMATICS EXTENSION 2 COURSES

This document is adapted from the *Stage 6 Mathematics KLA Handbook (1996)*, pages 17 – 35, and contains the Preliminary/HSC course divisions (where applicable), School Assessment Guide and HSC Examination Specifications for the *Mathematics, Mathematics Extension 1* and *Mathematics Extension 2* courses.

COURSE DESCRIPTIONS

MATHEMATICS (formerly Mathematics 2 Unit)

SYLLABUS: *Mathematics 2 Unit*, published by the Board of Senior School Studies in 1982. (This syllabus was last reprinted in 1997.)

The *Mathematics* course is constructed on the assumption that students have achieved the outcomes in the Core of the Intermediate Mathematics course for the School Certificate, along with the recommended options.

The *Mathematics* Syllabus is divided into a Preliminary course and an HSC course, each of 120 (indicative) hours of school study, as follows:

Preliminary Course	HSC Course
Basic arithmetic and algebra (1.1–1.4)	Coordinate methods in geometry (6.8)
Real functions (4.1–4.4)	Applications of geometrical properties (2.5)
Trigonometric ratios (5.1–5.5)	Geometrical applications of differentiation (10.1–10.8)
Linear functions (6.1–6.5, 6.7)	Integration (11.1–11.4)
The quadratic polynomial and the parabola (9.1–9.5)	Trigonometric functions (including applications of trigonometric ratios 13.1–13.6, 13.7)
Plane geometry – geometrical properties (2.1–2.4)	Logarithmic and exponential functions (12.1–12.5)
Tangent to a curve and derivative of a function (8.1–8.9)	Applications of calculus to the physical world (14.1–14.3)
	Probability (3.1–3.3)
	Series (7.1–7.3) and Series applications (7.5)

Notes: Numbers given are syllabus references.
The *Mathematics* Preliminary course must be completed before the *Mathematics* HSC course is begun.

MATHEMATICS EXTENSION 1 (formerly Mathematics 3 Unit Additional)

SYLLABUS: *Mathematics 3 Unit*, published by the Board of Senior School Studies in 1982.
(This syllabus was last reprinted in 1997).

The course is constructed on the assumption that students have demonstrated achievement of the outcomes in the Core of the Advanced Mathematics course for the School Certificate, along with the recommended options.

As well as studying the *Mathematics Extension 1* Syllabus topics outlined in the table below, *Mathematics Extension 1* students study the entire *Mathematics* course.

The *Mathematics Extension 1* Syllabus is divided into a Preliminary course and an HSC course, each of 60 (indicative) hours of school study, as follows:

Preliminary Course	HSC Course
Other inequalities (1.4 E)	Methods of integration (11.5 E)
Further geometry, including circle geometry (2.6–2.10 E)	Primitive of \sin^2x and \cos^2x (13.6 E)
Further trigonometry (sums and differences, t formulae, identities and equations) (5.6–5.9 E)	Equation $\frac{dN}{dt} = k(N-P)$ (14.2 E)
Angles between 2 lines (6.6 E) Internal and external division of lines into given ratios (6.7 E)	Velocity and acceleration as a function of x (14.3 E)
Parametric representation (9.6 E)	Projectile motion (14.3 E) Simple harmonic motion (14.4 E)
Permutations and combinations (18.1 E)	Inverse functions and inverse trigonometric functions (15.1–15.5 E)
Polynomials (16.1–16.3 E)	Induction (7.4 E)
Harder applications of the <i>Mathematics</i> Preliminary course, including 9.4 E	Binomial theorem (17.1 – 17.3 E)
	Further probability (18.2 E)
	Iterative methods for numerical estimation of the roots of a polynomial equation (16.4 E)
	Harder applications of <i>Mathematics</i> HSC course topics, including 10.5 E, 13.4 E, 14.1 E

Notes: *Numbers given are syllabus references.*
'Applications of geometrical properties' (from the Mathematics HSC course) will need to be taught before the Preliminary Mathematics Extension 1 'Circle Geometry' topic.

Programming the *Mathematics Extension 1* course

Schools can be flexible when programming the *Mathematics Extension 1* course in order to meet the needs of their students. Topics from the *Mathematics Extension 1* HSC course may be taught before all the topics of the *Mathematics Extension 1* Preliminary course have been taught.

MATHEMATICS EXTENSION 2 (formerly Mathematics 4 Unit)

SYLLABUS: *Mathematics 4 Unit*, revised syllabus, published by the Board of Secondary Education in October 1989. (This syllabus was last reprinted in 1997.)

As well as studying the *Mathematics Extension 2 Syllabus* topics listed below, *Mathematics Extension 2* students study the entire *Mathematics* course, and the entire *Mathematics Extension 1* course.

Mathematics Extension 2 Syllabus topics

- Graphs
- Complex Numbers
- Conics
- Integration
- Volumes
- Mechanics
- Polynomials
- Harder *Mathematics Extension 1* Syllabus topics.

SCHOOL ASSESSMENT GUIDE

ASSESSMENT REQUIREMENTS

<i>Mathematics</i>	:	a single mark out of 100
<i>Mathematics Extension 1</i>	:	a single mark out of 100 (<i>Mathematics</i> component)
	:	a single mark out of 50 (<i>Mathematics Extension 1</i> component)
<i>Mathematics Extension 2</i>	:	a single mark out of 100 (<i>Mathematics Extension 1</i> component)
	:	a single mark out of 100 (<i>Mathematics Extension 2</i> component)

Notes:

Mathematics

- Assessment for the HSC course must not commence until after the completion of the Preliminary course. Once the assessment of the HSC course has commenced, some Preliminary course work can be included in assessment tasks for *Mathematics*. No more than 20% of the *Mathematics* assessment is to be based on the Preliminary course.
- It is suggested that assessment for the Preliminary course follows the same guidelines as those for the HSC course.

Mathematics Extension 1

- School assessment for the *Mathematics Extension 1* HSC course can be based on the whole of the *Mathematics Extension 1* course (Preliminary and HSC courses). Assessment for this course should not begin until the school program of HSC assessments for other subjects begins (this is usually no earlier than Term 4 of Year 11).

In general

- The full range of marks appropriate to each course is available to teachers and should be used if warranted.
- The assessment procedures adopted should reflect the appropriate course outcomes and objectives.
- Recognising the cumulative nature of mathematical knowledge and the reinforcement of understanding and skills that arise from application and use over a period of time, greater weighting should be attached to assessments made towards the end of the HSC course.
- The number of assessment tasks should be kept to a minimum and such tasks must be differentiated from normal diagnostic and evaluative processes.

Assessing Syllabus Objectives

The Objectives in the *Mathematics* and *Mathematics Extension 1* Syllabus are:

- (a) to give understanding of important mathematical ideas such as variable, function, limit, etc, and to introduce students to mathematical techniques that are relevant to the real world;
- (b) to understand the need to prove results, to appreciate the role of deductive reasoning in establishing such proofs, and to develop ability to construct these proofs;
- (c) to enhance those mathematical skills required for further studies in mathematics, the physical sciences and the technological sciences.

The second and third aims in the *Mathematics Extension 2* Syllabus are:

- to study useful and important mathematical ideas and techniques appropriate to these levels of ability;
- to develop both an understanding of these ideas and techniques and an ability to apply them to the study and solution of a wide variety of problems.

In assessing *Mathematics* and *Mathematics Extension 1* students on the *Mathematics* course, the major emphasis should be placed on Objective (a). In assessing *Mathematics Extension 1* and *Mathematics Extension 2* students on the *Mathematics Extension 1* course, equal emphasis should be given to all three objectives. In assessing *Mathematics Extension 2* students on the *Mathematics Extension 2* course, the *Mathematics Extension 2* aims above should be given equal emphasis.

Components

The Aims and Objectives are grouped into two Components for the purpose of assessing students in these courses. The weightings appropriate to assessment of attainment of these Components are given in the following table:

Component	Weightings		
	Mathematics	Mathematics Extension 1	Mathematics Extension 2
A	80	35 (70*)	60
B	20	15 (30*)	40
Marks	100	50 (100*)	100

Note: *Bracketed figures are the Mathematics Extension 1 assessment weightings for students studying the Mathematics Extension 2 course.*

The assessment program for the HSC should reflect the relative amounts of time spent in teaching the various broad content areas and skills covered.

Component A

This Component is primarily concerned with the student's knowledge, understanding and skills developed in each Content Area listed in the syllabus. In measuring attainment of this Component, assessment of the student's ability to recognise which skills are appropriate to the solution of standard problems should be included.

Component B

This Component is primarily concerned with the student's reasoning, interpretative, explanatory and communicative abilities. To measure attainment will involve assessing the student's ability to:

- understand information given verbally or in written, diagrammatic or graphical form, and express information given in one form in other ways;
- analyse and solve unfamiliar problems, construct logically sound solutions and recognise limitations to the validity of solutions;
- explain knowledge, methods or aspects of a solution using written and/or spoken language and diagrams;
- compare various methods of solution in terms of efficiency and breadth of application.

Notes on Components A and B

1. The HSC examination measures attainments relevant to both Components and any one assessment task may contribute to measuring attainments in both Components.
2. Component A may be adequately assessed by means of written tests, such as half-yearly, yearly or class tests containing items similar to those used in HSC examination papers.

Examination or test questions involving *problem-solving* strategies, the use of graphs or diagrams in the presentation or solution of a problem, or the proof of an unfamiliar result in geometry or other content areas, may be used to assess Component B areas.

3. Measures of attainment of Component B could include assessment of work produced using a variety of resources with a reasonable time allowed for consideration and modification of work and for its presentation. The skills involved need not be difficult or confined to one content area. Ability to present work in an appropriately selected form with information resources should be considered.

HSC EXAMINATION SPECIFICATIONS

MATHEMATICS

The *Mathematics* examination paper is of 3 hours duration (plus 5 minutes reading time).

For the *Mathematics* examination paper, the following apply:

- There will be TEN questions, based mainly on the topics prescribed for the HSC course.
- No more than the equivalent of two questions will be based on the Preliminary course. Questions from the Preliminary course will be short and represent a minor part of a total question. Marks can be awarded for demonstration of knowledge and skills from the Preliminary course (or earlier) when required for questions on the HSC course. That is, questions based on the Preliminary course can be asked when they lead in to questions based on topics from the HSC course. Marks from these lead-in questions will not be counted in the two-question allowance from the Preliminary course.
- All questions are compulsory, and of equal value.
- The examination paper will show the marks for each part of each question.
- All questions require a series of free-response answers.
- Students will use a separate writing booklet for each question.
- Board-approved calculators may be used. Geometrical instruments and approved geometrical templates may also be used.

MATHEMATICS EXTENSION 1

Mathematics Extension 1 students will be required to attempt TWO examination papers, the *Mathematics* examination paper, and an additional examination paper called the *Mathematics Extension 1* examination paper.

The *Mathematics Extension 1* examination paper is of 2 hours duration (plus 5 minutes reading time).

For the *Mathematics Extension 1* examination paper, the following apply:

- There will be SEVEN questions, based mainly on the topics prescribed for the HSC course.
- No more than the equivalent of two questions will be based on the Preliminary course. Questions from the Preliminary course will be short and represent a minor part of a total question. Marks can be awarded for demonstration of knowledge and skills from the Preliminary course (or earlier) when required for questions on the HSC course. That is, questions based on the Preliminary course can be asked when they lead in to questions based on topics from the HSC course. Marks from these lead-in questions will not be counted in the two-question allowance from the Preliminary course.
- All questions are compulsory, and of equal value.
- The examination paper will show the marks for each part of each question.
- All questions require a series of free-response answers.
- Students will use a separate writing booklet for each question.
- Board-approved calculators may be used. Geometrical instruments and approved geometrical templates may also be used.

MATHEMATICS EXTENSION 2

Mathematics Extension 2 students will be required to attempt TWO examination papers, the *Mathematics Extension 1* examination paper, and an additional examination paper called the *Mathematics Extension 2* examination paper.

The *Mathematics Extension 2* examination paper is of 3 hours duration (plus 5 minutes reading time), and is unique to the *Mathematics Extension 2* course.

For the *Mathematics Extension 2* examination paper, the following apply:

- There will be EIGHT questions, based on the topics prescribed for the course.
- All questions are compulsory, and of equal value.
- The examination paper will show the marks for each part of each question.
- All questions require a series of free-response answers.
- Students will use a separate writing booklet for each question.
- Board-approved calculators may be used. Geometrical instruments and approved geometrical templates may also be used.