Maths
and the
HSC at St Ives

Maths and the HSC

➢ ***Maths is NOT compulsory in the HSC.***

(About 80% of students in NSW take some sort of Maths)

There are three levels of Maths offered in Year 11 :

- ***Mathematics General***
- ***Mathematics***
- ***Mathematics Extension 1***

and in Year 12 there is also:

- ***Mathematics Extension 2***

Mathematics General (2 Units)

- ***This is the most common Maths course.***

  (32 022 students enrolled in General Mathematics in 2015; roughly 52% of the students who took any Maths for the HSC. Often it is around 60%)

- ***It focuses on essential everyday Maths.***

  (Finance, Data, Measurement, Algebraic Modelling , Probability and the use of technology)

- ***It replaced General Mathematics in Year 11 2013.***

Currently in Year 12 at St Ives High School, 56% of the students studying any mathematics for the HSC are doing Mathematics General.

Preliminary Mathematics General

- ***In Year 11 all students follow the same course.***
  - *Earning & investing money; Tax and shares*
  - *Data collection and display; Statistics and society*
  - *Perimeter, area, volume and trigonometry*
  - *Probability*
  - *Algebraic manipulation and linear relationships*

- ***They also do two Focus Studies:***
  - Maths & Communication
    (Digital data and mobile phones)
  - Maths & Driving
    (Purchase and running costs; Safety)

- ***In Year 12, Mathematics General splits into two separate courses:***

Mathematics General 1 and Mathematics General 2

The Mathematics General course is designed to be practical.

All topics relate to everyday life or to common uses of Mathematics in the business world.

For example, the algebra is not too abstract, but aims to deal with formulas such as those used by paramedics and nurses. Linear modelling is related to applications such as break-even points, and profit/loss zones.

Spreadsheets are used throughout the course, particularly in the finance section, as many businesses use them to calculate wages, tax or to prepare budgets. Data is displayed using software programs, as well as by hand, as most business displays would be produced that way nowadays.

The Maths & Driving Focus Study aims to assist students as they get their L's and begin to think about owning and running a vehicle. Many are quite ignorant of stamp duty, rego, CTP or comprehensive insurance, let alone having a realistic idea of the costs involved. The safety aspect of driving considers speed, stopping distances, drink-driving, avoiding accidents and legal obligations and penalties.

Maths & Communication looks at the bits and bytes of data storage and the costs of owning a mobile phone.

Mathematics General 2 *is aimed at students who wish to receive an ATAR and go to university, but usually not to pursue mathematically based subjects.*

- ***It allows entry to most university courses.***
  (Including at some universities: engineering, commerce, architecture…)
- *It involves an external Board of Studies examination.*
- *The course emphasises practical uses of Maths*
  Credit, Annuities, Interpreting Data, Trigonometry, Probability and Algebra related to the workplace
- *Students do two more Focus Studies:*
  - *Maths & Health*
    (Body measurements, Medication; Life expectancy)
  - *Maths & Resources*
    (Water catchment and usage; Energy and sustainability)

Mathematics General 2 is designed for students who ARE intending to go to university but who are not interested in the more mathematical subjects. It provides an appropriate mathematical background for students who wish to enter occupations that require the use of standard mathematical skills and techniques. It is a Board Developed Course and qualifies towards the calculation of an ATAR.

Board of Studies recommended Stage 5 content for Mathematics General 2:
All substrands of Stage 5.1 ***and*** the following Stage 5.2 substrands:
Financial Mathematics
Non-Linear Relationships
Right-Angled Triangles (Trigonometry)
Single Variable Data Analysis

SIHS interpretation:

Students need to be studying for the Stage 5.2 course to succeed at Mathematics General 2.

Students in 10MMA6 are advised to select Mathematics General 1.

Note:
Several St Ives High students from Year 12, 2012 were accepted into Macquarie University to do engineering with 'only' General Mathematics in their HSC. Ken Lu from Year 12, 2013 was accepted into UNSW for medicine, with General Mathematics. He was also the school dux, one of the two who tied on an ATAR of 98.35. In 2014, Dasha Kartashova was the school dux with an ATAR of 99.3 having studied Mathematics General.

Mathematics General 1 *cannot be used towards an ATAR but it does appear on the HSC certificate.*

- *There is no final Board of Studies examination; all assessments are written and marked by the school.*
- *The syllabus contains less abstract material, such as Algebra, and more Focus Study applications:*
  - *Maths & Design*
  - *Maths & the Human Body*
  - *Maths & Personal Resource Usage*
  - *Maths & Household Finance*

Mathematics General 1 is designed for students who either:

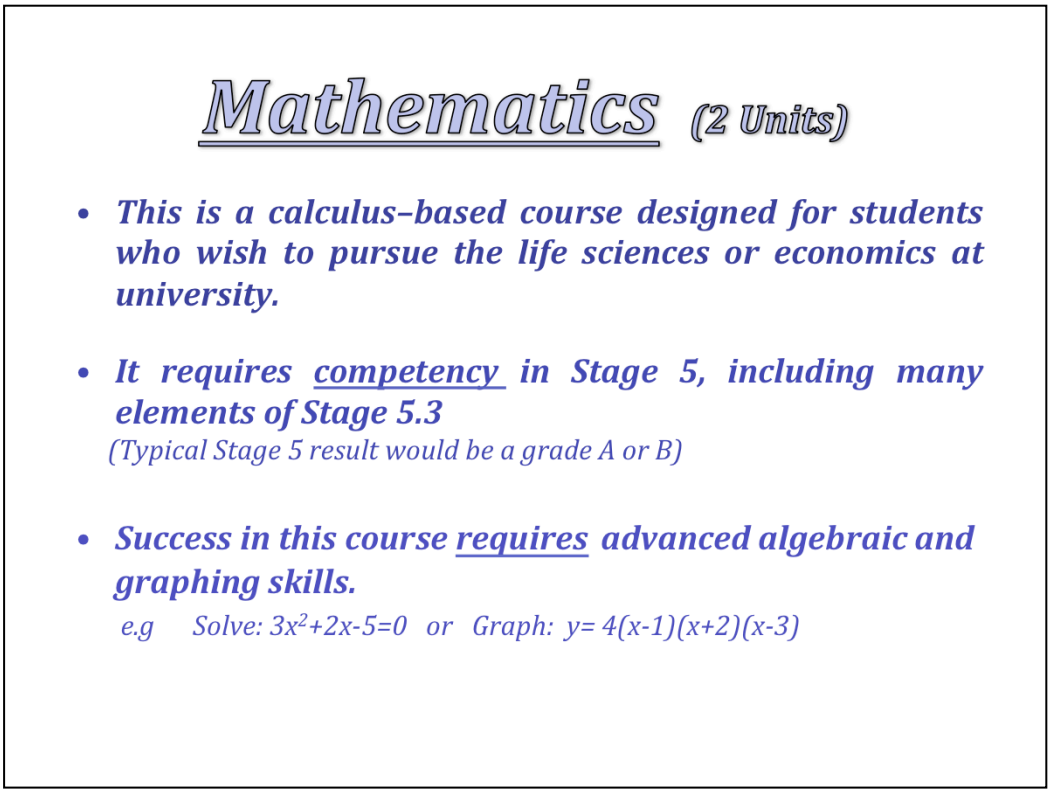
1) DO intend to go to university, but have 10 other units of study that count for the ATAR but want to include mathematics in their HSC, or
2) DO NOT intend to go to university, but want to include mathematics in their HSC.

It is a Content Endorsed Course (CEC) and so is not examined by BOSTES and cannot be used for the calculation of an ATAR. The course focuses on those mathematical skills and techniques that have direct application to everyday activities.

For the past three years, several students at St Ives High School have elected to study Mathematics General 1 as they start Year 11. They are not intending going to university but following other pathways, mainly TAFE and trade options.

They are placed in a separate group where they study the entire Preliminary Mathematics General course, but with less rigour than other classes, in order to make to make the content more accessible.

Other students choose Mathematics General 1 at the start of Year 12.



Mathematics

This is a calculus-based course where students are given an understanding of important mathematical ideas such as function and limit. It is highly algebraic. Students are introduced to mathematical techniques which are relevant to university courses such as economics and the biological sciences. **Note: From 2019, Sydney University will require students choosing science, economics, IT, engineering to have at least a Band 4 in Mathematics.** Other universities may well follow suit.

Board of Studies recommended Stage 5 content for Mathematics:

All substrands of Stage 5.1 and Stage 5.2 **and** the following Stage 5.3 substrands:

Algebraic Techniques
Surds and Indices
Equations
Linear Relationships

and at least some of the content of the following Stage 5.3 substrands:

Non-Linear Relationships
Trigonometry and Pythagoras' Theorem
Properties of Geometrical Figures

St Ives High School interpretation:

Students need to be in 10MMA3 (2016) or higher and achieve at least a B7 grade.

Students wishing to study this course will be assessed in an extra examination during the first week of Term 4. To display their readiness for this course, students need to achieve a mark of 50%. Details and sample

Mathematics Extension 1 (1 Unit)

- *This course can only be studied in addition to the 'Mathematics' course.*
- *It is a demanding course designed for students who wish to pursue the physical sciences or engineering at university.*
- *It requires mastery of Stage 5 Mathematics, including all of Stage 5.3*
  (Typical Stage 5 result would be a grade A10, A9 or B8)
- *Success in this course demands a very high level of competency in Algebra and Graphing.*

Mathematics Extension 1 (Note: Maths Ext 2 is only available by invitation, in Year 12)

This course offers a rigorous, highly abstract study of mathematics that focuses upon functions, calculus and geometry. It is designed for highly capable students who aim to pursue mathematics as a major discipline at tertiary level or to study the physical or engineering sciences.

Board of Studies recommended Stage 5 content for Mathematics Extension 1:

All substrands of Stage 5.1, Stage 5.2 and Stage 5.3, including the optional Stage 5.3 substrands:

Polynomials
Logarithms
Functions and Other Graphs
Circle Geometry

St Ives High School interpretation:

Students need to be in 10MMA1 or 10MMA2 and achieve at least a B8 grade, but most students have a grade A9 or A10. They need to achieve a mark of 70% on the test described in the Mathematics course information, above.

Mathematics Extension 2 (1 Unit)

- ***This course can only be studied (by invitation) in addition to the 'Mathematics Extension 1' course in Year 12.***
- ***It requires mastery of the Preliminary Extension 1 course in Year 11.***
- ***It is an extremely demanding course designed for students with a 'special interest in' and 'special aptitude for' mathematics, and for those who wish to pursue mathematics as a major discipline at university.***
- ***Students who take this course do not sit for the 'Mathematics' examination in the HSC although all the course content is included in the extension courses and students must complete all school assessment tasks for the 'Mathematics' course, including the Trial HSC.***

Mathematics Extension 2

Board of Studies statement:

This syllabus is designed for students with a special interest in mathematics who have shown that they possess special aptitude for the subject.

It represents a distinctly high level in school mathematics involving the development of considerable manipulative skill and a high degree of understanding of the fundamental ideas of algebra and calculus. These topics are treated in some depth.

St Ives High School interpretation:

Students must have maintained a very high level of achievement in both the Preliminary Mathematics and Preliminary Mathematics Extension 1 courses in Year 11.

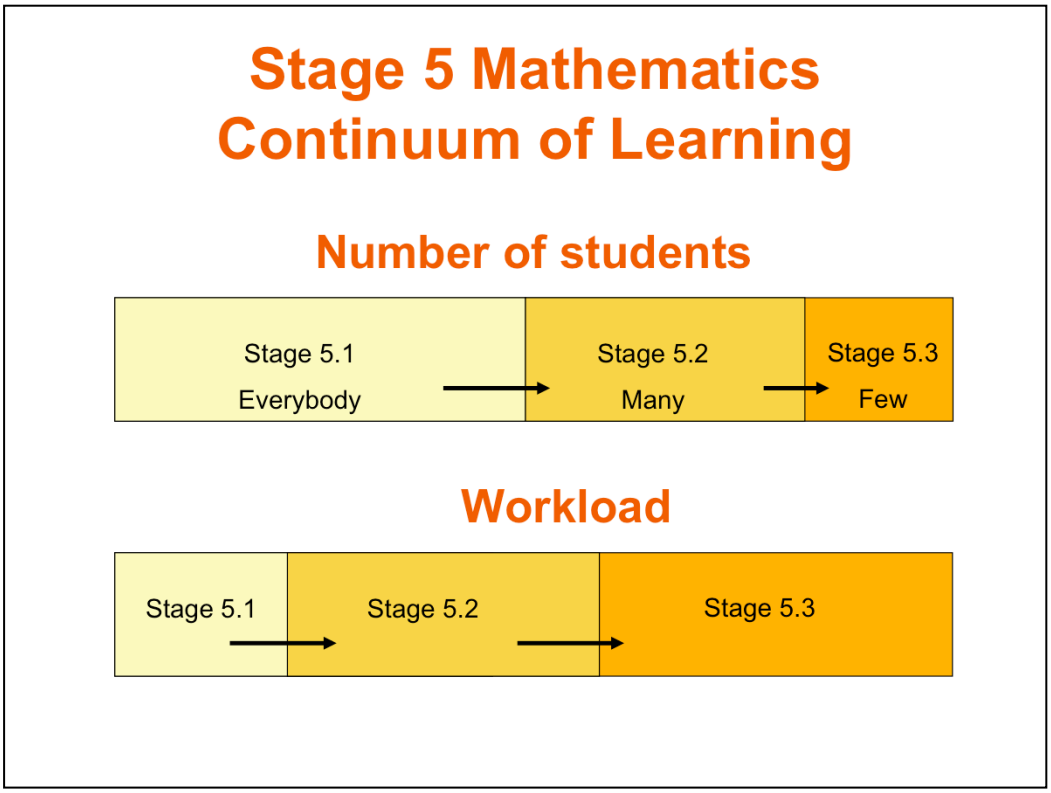
Students are required to maintain at least 11 units of study until after the Trial HSC examinations, unless given permission to drop to only 10 units by the Head Teacher, Mathematics.

Students must complete all assessment tasks for the 'Mathematics', 'Mathematics Extension 1' and 'Mathematics Extension 2' courses up to and including the Trial HSC examinations.

Stage 5 Maths

Years 9 and 10

To make the most appropriate choice of mathematical study for the HSC, it is important to understand the level of Mathematics being studied in Years 9 and 10.



Stage 5, covering Years 9 and 10, is split into three levels: Stage 5.1, Stage 5.2 and Stage 5.3. However, students are not restricted to a single level (as they used to be with Advanced, Intermediate and Standard) but can follow various pathways through the work as appropriate.

All students must study all of Stage 5.1 satisfactorily if they are to achieve Stage 5 in Mathematics and be eligible to proceed to Stage 6 in Year 11.

However, the syllabus contains a lot more material for those who are able to go further. This is divided into Stages 5.2 and 5.3, but is regarded as a continuum of progressively more complex ideas. Students are expected to progress as far as possible through the continuum. The most able students are expected to complete all the work contained in all three levels, including optional extension material.

Each of our graded classes at St Ives High School covers a slightly different amount of the continuum. Only the top class will attempt to cover all of the syllabus content, including some of the optional topics.

Geometry Content by Stage:

Stage 5.1
MA5.1-11MG describes and applies the properties of similar figures and scale drawings

Stage 5.2
MA5.2-14MG calculates the angle sum of any polygon and uses minimum conditions to prove triangles are congruent or similar

Stage 5.3
MA5.3-16MG proves triangles are similar, and uses formal geometric reasoning to establish properties of triangles and quadrilaterals

Stage 5.3#
MA5.3-17MG applies deductive reasoning to prove circle theorems and to solve related problems

Algebra Content by Stage in Australian Curriculum:

Stage 5.1
MA5.1-5NA operates with algebraic expressions involving positive-integer and zero indices, and establishes the meaning of negative indices for numerical bases
MA5.1-6NA determines the midpoint, gradient and length of an interval, and graphs linear relationships
MA5.1-7NA graphs simple non-linear relationships

Stage 5.2
MA5.2-5NA recognises direct and indirect proportion, and solves problems involving direct proportion
MA5.2-6NA simplifies algebraic fractions, and expands and factorises quadratic expressions
MA5.2-7NA applies index laws to operate with algebraic expressions involving integer indices
MA5.2-8NA solves linear and simple quadratic equations, linear inequalities and linear simultaneous equations, using analytical and graphical techniques
MA5.2-9NA uses the gradient-intercept form to interpret and graph linear relationships
MA5.2-10NA connects algebraic and graphical representations of simple non-linear relationships

Stage 5.3
MA5.3-4NA draws, interprets and analyses graphs of physical phenomena
MA5.3-5NA selects and applies appropriate algebraic techniques to operate with algebraic expressions
MA5.3-7NA solves complex linear, quadratic, simple cubic and simultaneous equations, and rearranges literal equations
MA5.3-8NA uses formulas to find midpoint, gradient and distance on the Cartesian plane, and applies standard forms of the equation of a straight line
MA5.3-9NA sketches and interprets a variety of non-linear relationships

Stage 5.3 #
MA5.3-10NA recognises, describes and sketches polynomials, and applies the factor and remainder theorems to solve problems
MA5.3-11NA uses the definition of a logarithm to establish and apply the laws of logarithms
MA5.3-12NA uses function notation to describe and sketch functions

This list gives an example of the wide difference in the amount of content studied between the levels.

Algebra is perhaps the most important topic prerequisite for success in the calculus-based HSC courses. However, note that Algebra includes co-ordinate geometry and graph sketching and interpretation, not just algebraic manipulation. It is also true that being good at Algebra is not sufficient for success in those courses.

The list indicates clearly why students who have only studied Stage 5.1 or 5.2 Mathematics in Year 10 are not in a position to proceed to the higher levels of Mathematics in the HSC. Their limited knowledge of Algebra is simply not sufficient for success.

Examples of Algebra at different levels in Stage 5:

Stage 5.1: $x^3 \times x^5 = x^8$

Stage 5.2: $\frac{3x}{8} + \frac{2x}{5} = \frac{31x}{40}$ $\quad 4x^{-2} = \frac{4}{x^2}$

Stage 5.3: $(3x-2)(5x+3) = 15x^2 - x - 6$

$$\frac{3x+6}{x^2-4} \times \frac{x^2-x-2}{7x-21} = \frac{3(x+1)}{7(x-3)(x+2)}$$

$$5\sqrt[3]{x} \div (16x)^{-\frac{3}{4}} = 40\sqrt[12]{x^{13}}$$

A sample of the varying level of difficulty expected in simplifying algebraic expressions.

Current Year 10 Classes:

10MMA1	Stage 5.3 and some option topics
10MMA2	Stage 5.3
10MMA3	Stage 5.2 and some of Stage 5.3
10MMA4	Stage 5.2
10MMA5	Stage 5.1 and much of Stage 5.2
10MMA6	Stage 5.1

Our graded classes are designed to allow each student to cover as much of the content continuum as possible, based on their prior knowledge and performance.

Common assessments are used across each of Stage 5.1, 5.2 and 5.3. Overlapping tasks help to allow each student to show what they can do.

Usually, our top two classes aim to cover the whole of Stage 5.3.

Mrs Wigmore will be gauging how well the students of 10MMA3 are understanding each topic in order to decide how much content and depth of the Stage 5.3 course to include. She will strive to push students as far as possible, while not confusing them with work that is too fast or complex for them at that time. It is hoped that some of them will be in a position to tackle Mathematics for the HSC, but the majority should choose Mathematics General.

Record of School Achievement

- Since 2012, there has not been a School Certificate and hence no external Board of Studies examination in Year 10 Mathematics.
- Students must still complete Stage 5 Mathematics satisfactorily in order to proceed to Stage 6.
- Students are still graded on their Stage 5 work according to the grade descriptors and are awarded a Maths grade between E2 and A10.
- If students leave school before they complete Year 12 they will receive a Record of School Achievement (RoSA) which will show the Stage 5 grades and grades from Year 11, if completed. They may also choose to do the optional online Numeracy test and have that result recorded on their RoSA.
- Students who complete Year 12 receive these grades with their HSC documentation.

Stage 5 Mathematics Grade Descriptors

Grade E2	Grade D3	Grade D4	Grade C5	Grade C6
A student A student performing at this grade uses some mathematical terminology in mathematical contexts; uses, with guidance, standard strategies to solve simple familiar problems; provides some reasoning in identifying a simple mathematical relationship.	A student performing at this grade uses mathematical terminology, diagrams and symbols in mathematical contexts; uses appropriate standard strategies to solve simple familiar problems; provides some reasoning to support conclusions.	A student performing at this grade uses appropriate mathematical terminology, diagrams and symbols in mathematical contexts; selects and uses appropriate standard strategies to solve simple familiar problems; provides some reasoning to support conclusions that are appropriate to the context.	A student performing at this grade uses mathematical language, notations and diagrams to communicate mathematical ideas; applies appropriate strategies, often with the assistance of given diagrams and formulae, to solve simple familiar problems; constructs some mathematical arguments to obtain results.	A student performing at this grade uses appropriate mathematical language, notations and diagrams to communicate mathematical ideas and solutions; applies appropriate strategies to solve familiar multi-step problems; constructs some appropriate mathematical arguments to obtain and justify results.

Grade B7	Grade B8	Grade A9	Grade A10
A student performing at this grade selects and uses appropriate mathematical language, notations and conventions to communicate mathematical ideas and solutions; systematically applies appropriate strategies to solve familiar multi-step problems; constructs appropriate mathematical arguments to prove and justify results; often requires guidance to determine the most efficient methods.	A student performing at this grade uses formal definitions when explaining solutions; selects and uses efficient strategies to solve familiar and some unfamiliar multi-step problems; uses some deductive reasoning in presenting mathematical arguments; may require some guidance to determine the most efficient methods.	A student performing at this grade uses formal definitions and generalisations when explaining solutions; generalises mathematical ideas and techniques and selects and uses efficient strategies to solve unfamiliar multi-step problems; uses deductive reasoning in presenting mathematical arguments and formal proofs.	A student performing at this grade uses and interprets formal definitions and generalisations when explaining solutions; generalises mathematical ideas and techniques and selects and uses efficient strategies consistently and accurately to solve unfamiliar multi-step problems; uses deductive reasoning in presenting clear and concise mathematical arguments and formal proofs; synthesises mathematical techniques, results and ideas across the course.

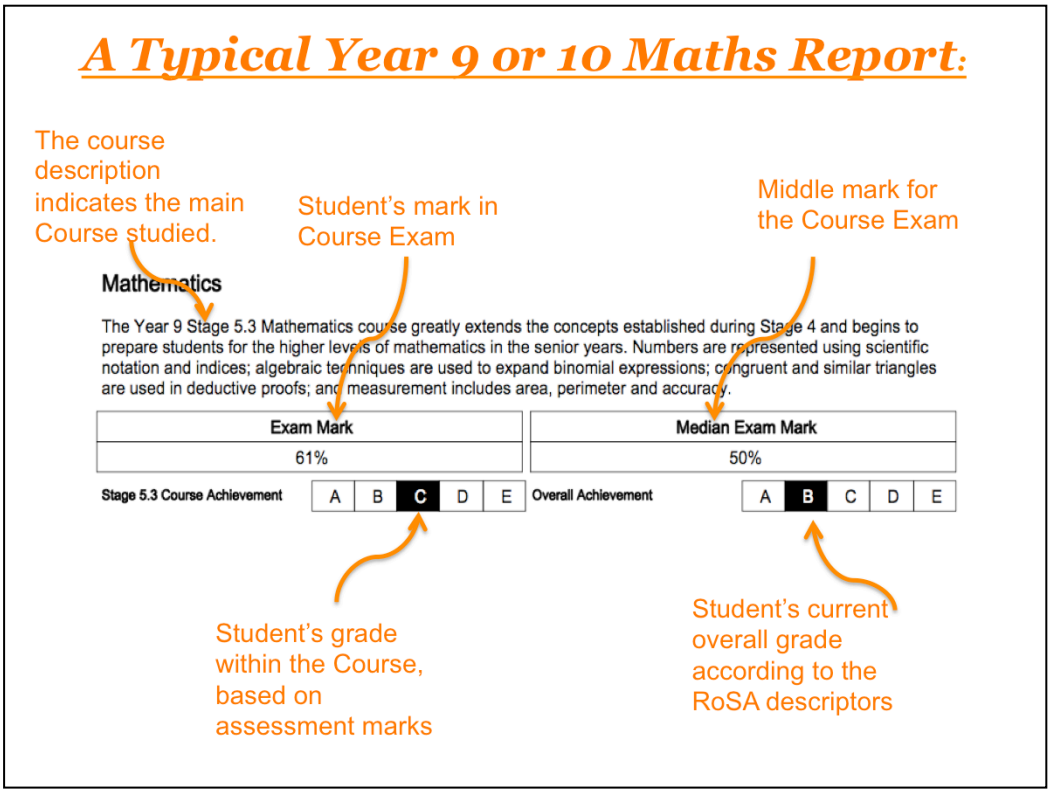
The course performance descriptors indicate what is needed to gain each grade. Note the focus on problem solving and communication and the increase in sophistication needed to achieve the higher grades.

High marks on a test do not necessarily correlate to the highest grades since simple, familiar, routine questions will not grade as highly as complex, unfamiliar, multi-step problem solving accompanied by sophisticated explanations, interpretations and analysis.

Student performance is graded after each test but teachers can also modify grades based upon students' comments and answers given in class

To achieve a grade A10 students must be successfully understanding and applying the Stage 5.3 material, including some of the extension topics, in a highly sophisticated manner.

A Typical Year 9 or 10 Maths Report:



The school report attempts to convey to parents the level of Mathematics studied and the student's degree of success.

The report shows what main Stage of Mathematics is being studied (Stage 5.1, 5.2 or 5.3), the exam mark and the course mark achieved in that course. The median (or middle) mark is displayed to allow comparison with other students following the same course.

The 'Course Achievement' grade relates only to that Stage of study, so an "A" in Stage 5.2 may equate to a "C" or "D" at Stage 5.3.

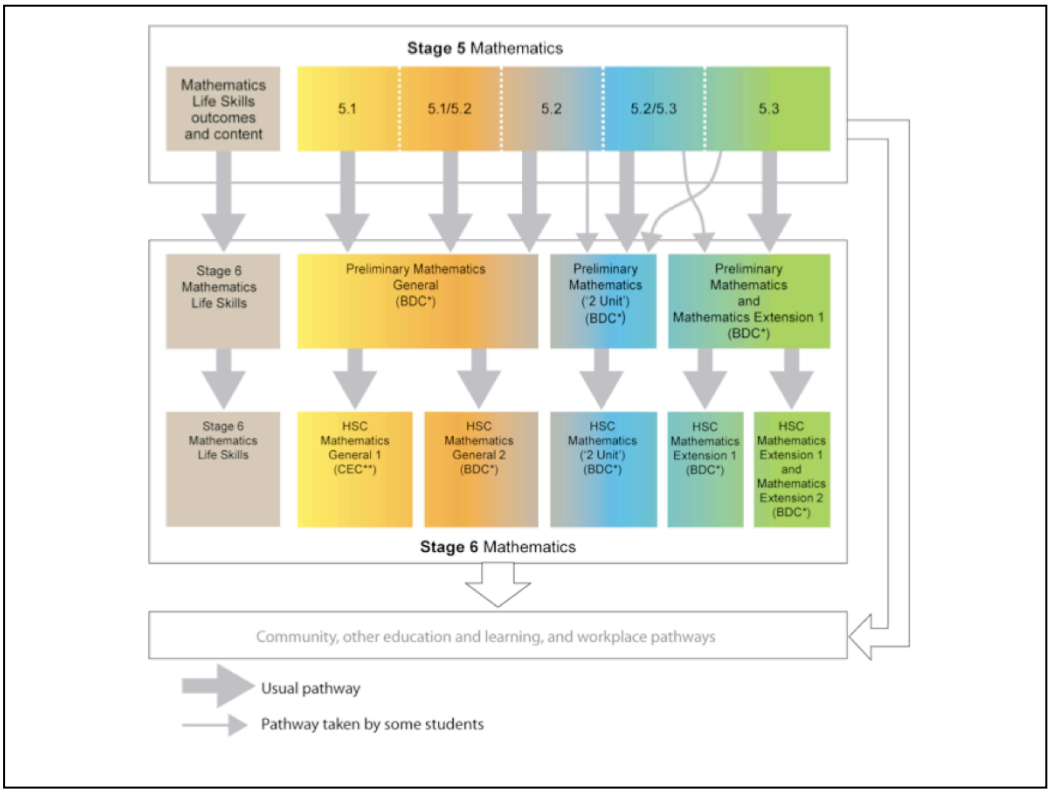
The 'Overall Achievement' grade indicates the student's current standard of achievement according to the RoSA course descriptors. A single range of grades applies across all students, so it is unlikely that a student studying Stage 5.1 Mathematics would achieve beyond a grade D. The majority of students in NSW achieve a grade C.

How to Choose your HSC Maths Course

The BOSTES (Board of Studies, Teaching and Educational Standards, NSW, who run the HSC) and the University Admissions Centre (UAC, who calculate the ATAR and process university applications) both stress that students should select subjects they ‘enjoy and are good at’.

This applies equally when selecting the level of Mathematics to study.

Students should listen carefully to their teacher, or speak to Mrs Wigmore. They will be given a personalised recommendation after the half-yearly examinations, based on their results.



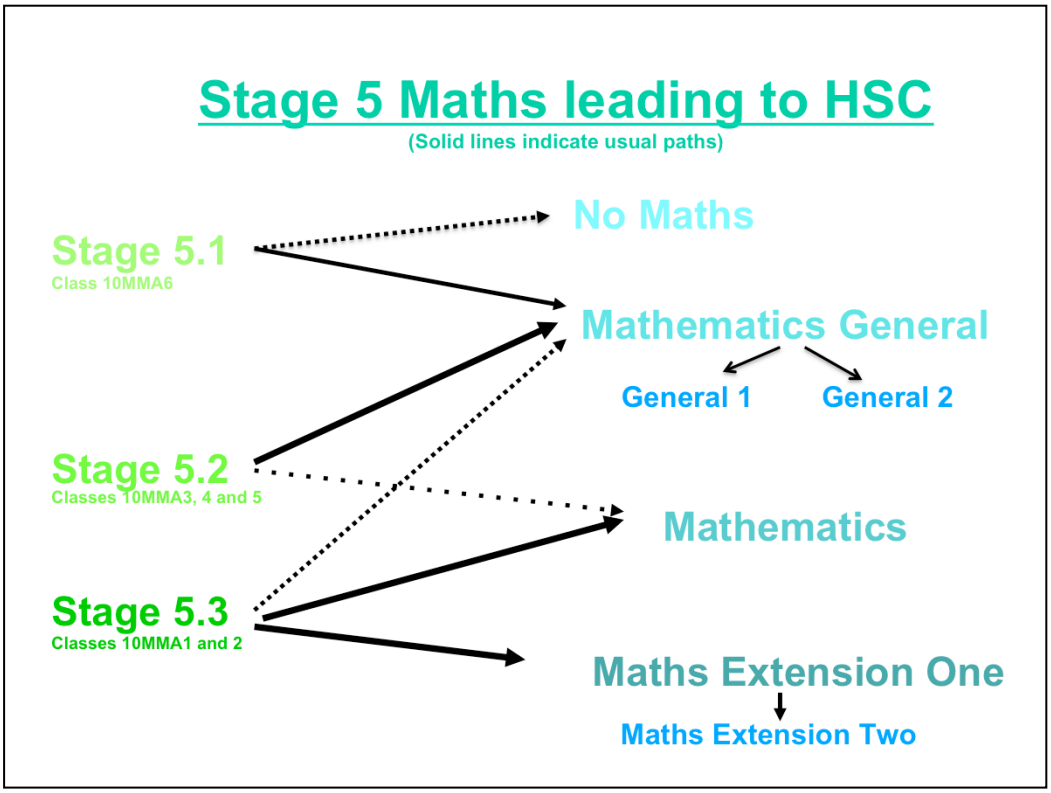
This diagram is produced by the Board of Studies and shows typical patterns of study, based on the prerequisites listed earlier.

If students do not study any Stage 5.3 Mathematics in Years 9 and 10 they will not be able to cope with the higher levels of Mathematics in the HSC. It is not a case of 'not allowing' access, they simply do not have the prerequisite knowledge and skills. Mathematics is cumulative: each step of understanding builds on those concepts already grasped. It is impossible to 'jump' stages of development.

To cope with the Stage 5.3 material in Years 9 and 10, students need to be highly proficient in the skills taught in Years 7 and 8. Consequently, to be placed into the higher Mathematics classes in Year 9, students need to demonstrate that proficiency in Year 8.

Classes in Year 8 are graded and students in the higher classes are significantly extended. This is in keeping with the expectation from the Board of Studies that students aiming to complete the Stage 5.3 material by the end of Year 10 need to have commenced Stage 5 in Year 8. Students are placed in the Year 8 classes according to their performance in Year 7.

So, right from Year 7, students need to be working hard in class, doing their homework, using Mathletics and generally learning as much Mathematics as they can. Students who have not developed their skills sufficiently over the years cannot suddenly jump up to the higher levels of Maths for the HSC.



This diagram shows how this usually works out in practice at St Ives High School. Solid lines indicate the usual, recommended pathway. Dotted lines indicate less common pathways.

Students may freely choose to study Mathematics at a lower level than recommended, but are advised to talk first to the careers advisor (Mr Holmes) to ensure they are not 'closing doors' on future career options. All students are encouraged to take the highest level of Mathematics they can, in order to maximise future options.

However, more often at St Ives students aspire to a level of Mathematics beyond our recommendation.

Students in 10MMA3 class may wish to study 'Mathematics' although they are not following the Stage 5.3 course. To assist them, this class does study the most relevant Stage 5.3 topics, as well as Stage 5.2. However, to be fully prepared for the 'Mathematics' HSC course, **these students (and any from lower classes) will need to complete extra study outside of school.**

"HSC Readiness Test"

- *At St Ives, students who wish to take Mathematics or Maths Extension 1 in Year 11 must sit the "HSC Readiness Test" in Term 4.*
- *This assesses whether they have the prerequisite knowledge and skills for success in these higher courses.*
- *Students need to achieve a minimum of 50% for Mathematics and 70% for Extension 1 to take these courses at St Ives High School.*

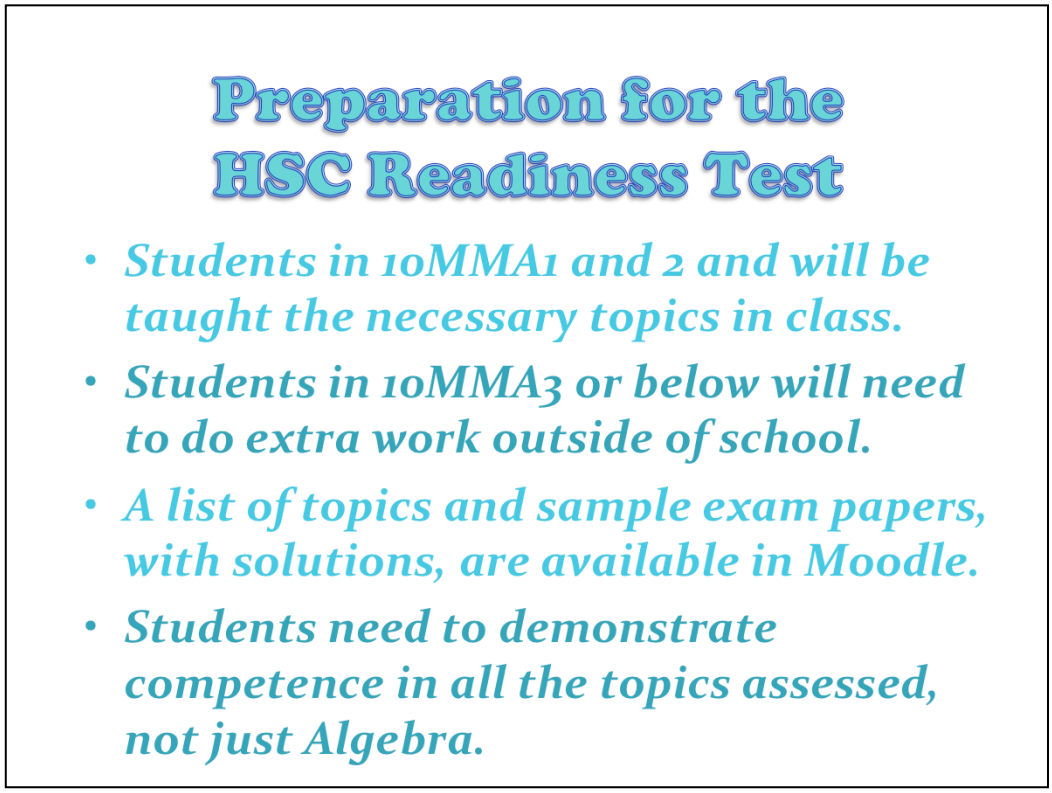
All students who wish to take Mathematics or Mathematics Extension 1 in Year 11 need to demonstrate during Term 4 of Year 10 that they have the prerequisite knowledge and skills. At St Ives High School, they are required to achieve at least a B7 RoSA grade for Mathematics and at least B8 for Maths Extension 1.

They must also "pass" the 'HSC Readiness Test'.

In reality, for success in the HSC, students need to have ALL the skills and knowledge tested in the 'HSC Readiness Test'. The rather arbitrary marks of 50% and 70% are very much a minimum requirement for students to be permitted to start the courses. Students should aim to achieve far higher marks.

Students who do not achieve the minimum standard for their chosen course will be placed in a lower level course if they choose to continue studying at St Ives High School.

It is vital, therefore, that students prepare themselves carefully for the 'HSC Readiness Test'and also for their regular Yearly Examination.



The HSC Readiness Test mainly assesses a student's ability to apply routine mathematical procedures. Very little English language is required, in order to not disadvantage ESL students, especially those who only recently arrived in Australia

Students who achieve the 50% standard by obtaining most of their marks in just one topic area (eg Algebra) often do not succeed later in the course. Students must study **all** topics thoroughly as they prepare for the examination.

A list of topics that will be tested is available to all students via the school intranet (Moodle). Several sample papers, along with the solutions, are also available. Students should practise these papers during their preparation.

RoSA Grades

- *Success in the 'HSC Readiness Test' is not on its own a sufficient predictor of success in HSC Mathematics or Maths Extension 1.*
- *A sophisticated level of mathematical thinking is also required. This is indicated by achieving a high RoSA grade based on the ordinary school assessments.*
- *Minimum RoSA grades:*
  - *B7 for Mathematics*
  - *B8 for Mathematics Extension 1*

Students also need to demonstrate their ability to reason, interpret, explain and communicate mathematically. They must be able to apply their knowledge to solve multi-step, unfamiliar problems and should generally demonstrate a sophisticated level of mathematical thinking.

These abilities are best measured via the regular school assessments and a student's level of development is indicated by the RoSA grade attained. Thus, students must study carefully for these assessments throughout Years 9 and 10, and particularly for their Yearly Examination in Year 10.

In order to adequately demonstrate that these abilities are sufficiently well developed, students wishing to study the 'Mathematics' course must achieve at least a B7 grade for the RoSA.

A student who wishes to study the 'Mathematics Extension 1' course must achieve at least a B8 grade, preferably A9 or A10.

Why are you stopping me?

- Experience shows that students without the prerequisite skills at the end of Year 10 do not succeed in HSC Mathematics.
- University subjects that require 'Mathematics' need students to have the knowledge, not just the 'label'.
- Time wasted in the wrong course often leads to a lower HSC result.
- Capable students are disadvantaged by having misplaced students in their class.
- Students must demonstrate they are ready at the end of Year 10.

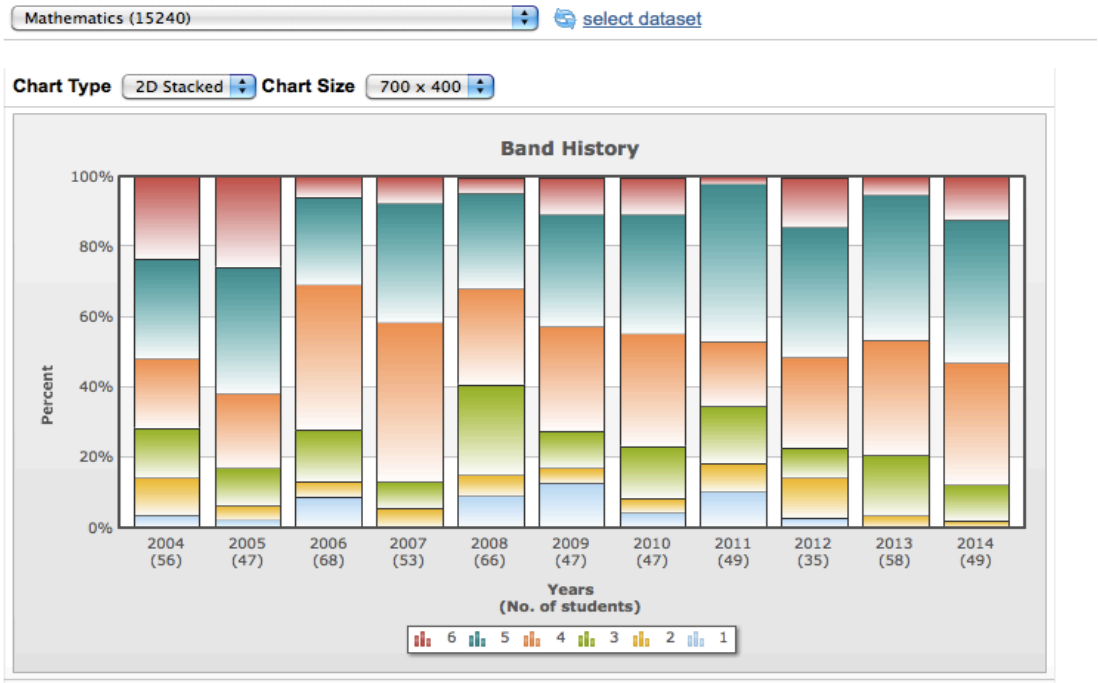
Universities are not interested in what subjects are taken at school per se, but in what knowledge and skills the students have acquired. If a university course requires Mathematics or Mathematics Extension 1, they will assume students know the relevant concepts and can use all the techniques from the HSC course.

The average HSC result in all Mathematics courses is around the borderline between Band 4 and Band 5 (around 80%) and most universities really expect students to have that level of knowledge, although they offer bridging courses to those who don't.

It is essentially a waste of time to study a higher level of mathematics and achieve only a Band 1 or 2. A Band 1 student is regarded as knowing NONE of the course!

Swapping late to Mathematics General rarely produces as good a result as would have been achieved if the student had commenced Mathematics General at the start of Year 11. The two courses teach completely different material and the student needs to catch up the entire (2 year) course content. (Note that both Year 11 and Year 12 content is tested in all levels of mathematics HSC examinations)

Students who are not prepared for their chosen course will slow the class due to the cumulative nature of mathematics. The teacher needs to move at a slower pace to accommodate students who do not have the prerequisite knowledge. This disadvantages other students.



This slide shows the HSC Mathematics course Band distribution at St Ives High School each year since 2005.

Most years there has been a high proportion of Band 1 and Band 2 results which indicates that a large number of students have been selecting an inappropriate course of study.

In 2014 we got no Band 1 and very few Band 2 results. In 2015 we got no Band 1, just one Band 2 and one Band 3.

The vast majority of Mathematics students got Band 4 or higher. They are ready to study mathematics-based courses at university.

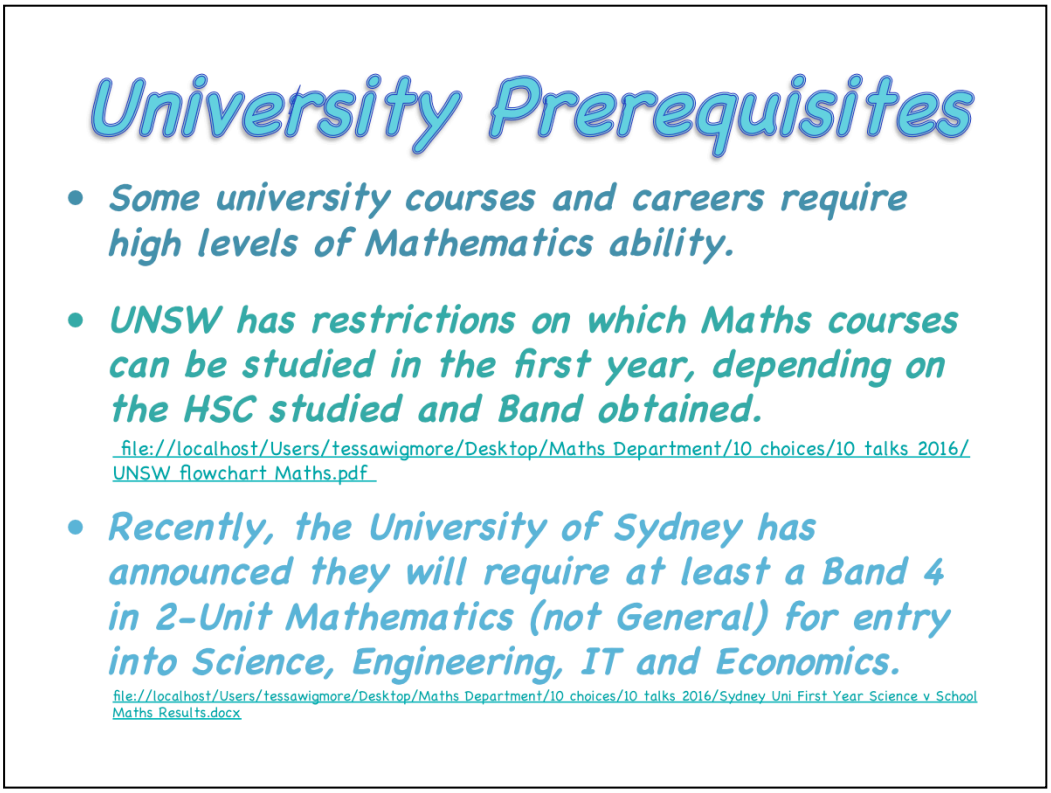
For the HSC, students need to select the highest level of maths they are ready for at the end of Year 10, so that they can **succeed**.

Note that the BOSTES released a comment in March 2014 on student choice of Mathematics HSC course. See:

http://news.boardofstudies.nsw.edu.au/index.cfm/2014/2/28/Choosing-the-most-appropriate-level-of-mathematics-in-Years-11-and-12

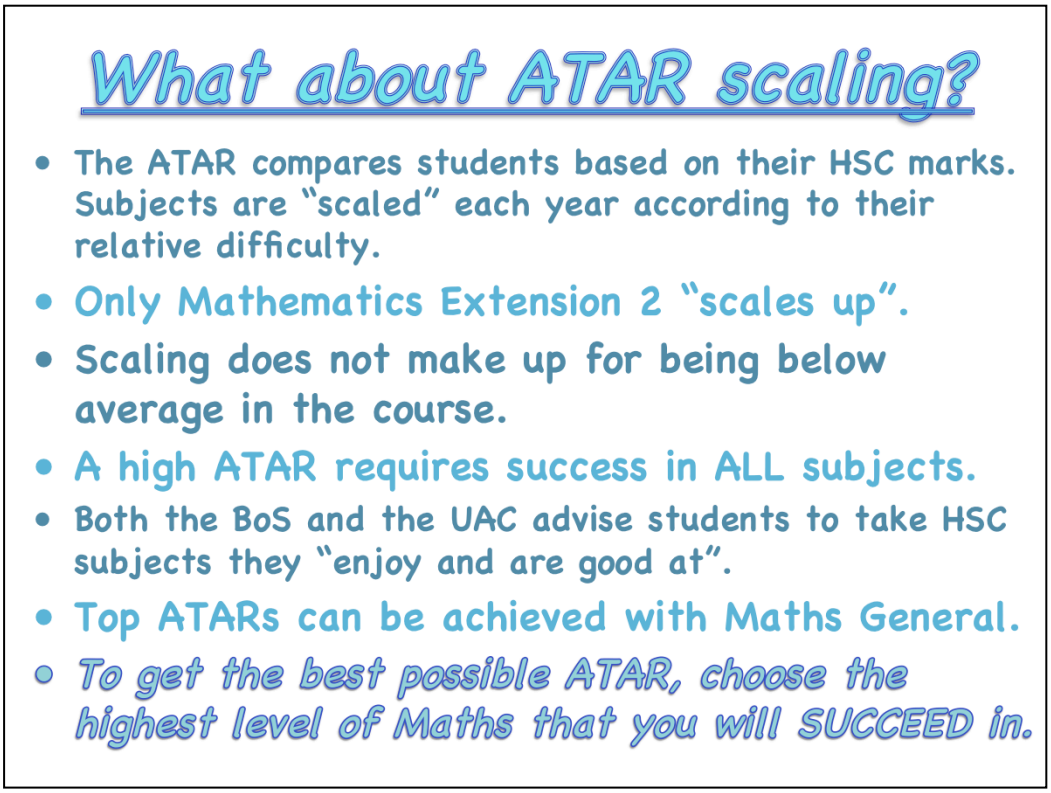
They reiterate that:

“Choices should be based on “interests, demonstrated abilities and the value of courses for future career plans”.



The UNSW website contains flowcharts showing students which Maths courses they can enrol in depending on their HSC results. For the highest level courses, students need a Band E4 in Maths Extension 2, for the next level they require a Band E3 in Maths Extension 1. Students with just Mathematics in HSC are required to pass a bridging course before enrolling in the standard first year maths course.

Sydney University have been studying the results at the end of first year courses, especially Science, compared to those students' HSC results. It is very clear to them that, for Mathematics, it is the level of achievement in the HSC that best predicts the outcome at university. Students achieving low Bands in the HSC, even in the Extension courses, perform badly at university.



Many people believe that doing a higher level of mathematics will improve their ATAR because of scaling. This is wrong. Students need to be **successful** in **ALL** their HSC subjects to gain a high ATAR. Getting a low mark in any subject will adversely affect the ATAR.

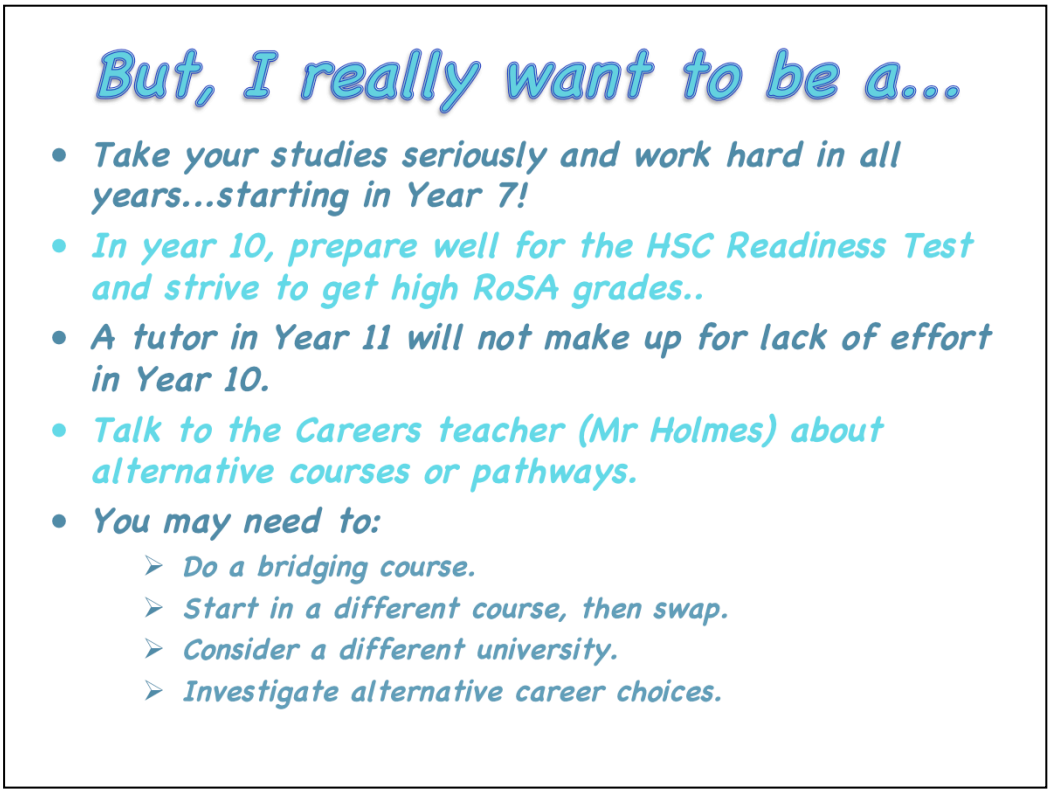
It is possible for a student to achieve the highest ATAR (99.95) with any combination of subjects. Statewide, the highest ATAR awarded in 2015 to a student who included Mathematics General in the calculation of their ATAR was 99.85.

In 2013, St Ives High had a tie for the position of dux, both with an ATAR of 98.35. One student (Helena McGeorge) had taken Mathematics Extension 2, the other (Ken Lu) had studied General Mathematics. The dux of 2014 (Dasha Kartoshova) had an ATAR of 99.3, having studied Mathematics General. The dux of 2015 (Claire Doutreband) studied Maths Extension 1 and got an ATAR of 99.7. They all did the level of Maths where they could best achieve.

In 2015, a student who was at the 90th percentile in Mathematics General (ie they beat 90% of the state) gained an ATAR contribution of 36 per unit while a student at the 75th percentile gained an ATAR contribution of 29.8 per unit. In comparison, an "average" 'Mathematics' student, at the 50th percentile, gained an an ATAR contribution of 32.8 per unit. At the 99th percentile, Mathematics General contributed 42.1 per unit to the ATAR, whereas a student at the 90th percentile in 'Mathematics' got an ATAR contribution of 42.9.

Remember though, that university courses that require 'Mathematics' or higher will require students to be competent in that work. It is not sufficient to have just "sat through" the course.

The best advice is to study the highest level of Mathematics you will succeed in. (ie where you can be above average)



Parents need to be aware that students need to work hard from Year 7 in order to be placed in the higher Maths classes, as the course content diverges more each year.

Many students only begin to think about their future career in the latter half of Year 10. A very common aspiration is to be an engineer. Looking at the UAC website, the engineering courses at many universities require, or at least recommend, Mathematics Extension 1. What should they do if they are in 10MMA3 or below?

Students who have been working hard throughout Years 7 to 9 are encouraged to speak to the careers teacher, Mr Holmes. Often there are related careers which involve the aspects of engineering that interest them... or alternative routes into the same career. Also, many universities do accept students with lower mathematical qualifications than expected, as long as they have a high ATAR. They do need to do bridging courses, but with well developed work habits, increased maturity and sufficient motivation, they can succeed.

Students in 10MMA3 or below who know they have not worked to their potential should immediately start to study the topics on the “HSC Readiness Test” outside of school. With sufficient determination, some capable students in this position have managed to catch up the work and been able to demonstrate their ‘readiness’ in Term 4 of Year 10. Often they go on to be very successful. However, starting late in Term 3 of Year 10 is too late!

Some students may benefit from the assistance of a tutor. However, a tutor cannot make up for non-completion of school work or lack of study for examinations. Nor can a tutor transform a student who is being pushed into something that does not interest them, or who simply does not have a mathematical mind!

Summary

- *Be realistic about your ability.*
- ***Base your choice of HSC Maths course upon your interest, enjoyment and success in Maths to date.***
- *Listen to the advice from your class teacher and from Mrs Wigmore.*
- ***Talk to Mr Holmes about the requirements of tertiary courses and careers. Discuss alternatives.***
- *If choosing Mathematics or Maths Extension 1, prepare well for all school assessments and for the 'HSC Readiness Test'.*
- ***Note: If taking Maths Extension 1, it must be your 13th unit.***