

# Mathematics



## CS HSC support strategy

### Overview

The establishment, training and resourcing of school-based professional learning teams (PLTs) is central to the Department's HSC support strategy. PLTs will plan, implement and monitor their schools' projects to meet the learning needs of both staff and students.

Each school has received a grant to assist two or more team members to attend the district training day and school representatives to attend Local Interest Group events.

Local Interest Group (LIG) events scheduled for 1999 are as follows:

Local interest group events	Who will go	When
<p><i>LIG event 1: School structures and organisation</i></p> <p>This one-day event provides a Board of Studies/VET update as well as solutions to whole-school implementation, including flexible structures, local solutions, and model timetables.</p>	Executive teachers with responsibilities in curriculum planning	Term 2 2-25 June
<p><i>LIG event 2: Syllabus implementation</i></p> <p>These one-day events will identify syllabus implementation as well as learning and teaching issues in:</p> <ul style="list-style-type: none"> <li>• English</li> <li>• mathematics</li> <li>• sciences</li> <li>• biology.</li> </ul>	Head teachers in <ul style="list-style-type: none"> <li>• English</li> <li>• mathematics</li> <li>• sciences.</li> </ul>	Term 3 16 August - 2 September
<p><i>LIG event 3: Assessment</i></p> <p>A one-day event to provide a Board of Studies update on school assessment for the new HSC.</p>	Senior executive and head teachers	Term 4 2-26 November

*The exact dates of these local group events will be advertised in newsletters, on the web site and via invitations to schools.*

Further information about LIG events is available from Frances Plummer, telephone (02) 9886 7189.

#### Curriculum support

Curriculum support is provided through the new HSC professional development web site, as well as through newsletters, workshops in a range of subjects and State conferences. **CURRICULUM SUPPORT** will include an HSC supplement offering advice on programming, teaching and assessing.

Contact officer:

Janet Davy

Telephone: (02) 9561 8312

#### Assessment and reporting

Assessment and reporting issues for the new HSC will be the focus of a series of bulletins.

Contact officer:

Peter Lorking

Telephone: (02) 9886 7683

#### Vocational education

Vocational education conferences for teachers of curriculum industry frameworks will be held in each of the 34 districts with a VET-In-Schools Committee. District-based events for industry-specific teachers are also planned.

Contact officer:

Cathy Gerloff

Telephone: (02) 9607 1326



# Mathematics

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## Stage 6 Mathematical Measurement and Modelling

The creation of any new syllabus brings with it a range of issues. How “new” is it? How long will it take before I am sure of what is meant by the syllabus? What support is available? What do I need to learn to implement the syllabus properly? What is going to be in the test?

The consultation on the Stage 6 Mathematical Measurement and Modelling course has brought all of these issues to the fore.

The design of the draft syllabus is a change from the model of core and options. The need to replace the outdated 2 Unit Mathematics in Society course has long been acknowledged. No longer is there a section on “Hand Calculators” and how to use the “Clear” keys. Instead, the use of electronic technology permeates the draft syllabus.

A new focus is the use of spreadsheet software. This will clearly create some challenges for teachers, both in mastering the content area and in organising for learning. Several teachers have noted: “They don’t like chalk dust in the computer room and you can never get in there anyway”.

Yet the timing looks good. We have never had higher levels of access to computers in school. One mathematics head teacher stated that his school had recently increased the number of computers within the school by one hundred! To have them used as part of a new mathematics course could be a good idea. The greater use of computer technology in teaching the course will require creating local solutions to computer access. Peer tutoring could also play a useful role in students learning to work with spreadsheet software.

Spreadsheets can be used as organising software, to create tables of values that can then be graphed, or as operational software. The operational use of spreadsheets requires the creation of “formulae” which draw upon arithmetical, logical or financial functions.

Those schools currently using Windows platforms might find the following Internet address useful: [www.pine-grove.com/pi03000.htm](http://www.pine-grove.com/pi03000.htm). This site offers Loan\*Calculator! Plus v2.1 as freeware which can be down-loaded. This software includes five easy-to-use calculators in one program: Loan, Interest Due/Calendar Month, Remaining Balance, Accelerated Payment and Balloon Payment. In addition, the program has the ability to produce amortisation schedules. The Refinance Advisor [sic] included with the program compares the costs associated with an existing loan with those associated with possible refinancing and prepares a suggested course of action, based upon whether or not the refinancing will save the borrower money.

The user can run multiple copies of a calculator for fast side-by-side comparisons. You just fill in the blanks and press the CALC button. The results can be copied to the Window’s clipboard for inclusion in another program or printed to any printer that Windows supports.

Although the process of amortisation is familiar to many mathematics teachers, the term itself is not. Amortisation refers to discharging a loan by periodic payments.

**Amortization Schedule**

File Calc Options Help

Amount of Loan?: \$128,000.00 Initial Periods (#): 360  
 Origination Date?: 12/01/96 1st Payment Date?: 01/01/97  
 Payment Period?: Monthly Compounding Period?: Monthly  
 Points (%): 2.5000 Initial Rate (%): 8.7500

#/YR	Date	Payment	Principal	Interest	Balance
13/02	01/01/98	1,006.98	80.36	926.62	126,999.57
14/02	02/01/98	1,006.98	80.94	926.04	126,918.63
15/02	03/01/98	1,006.98	81.53	925.45	126,837.10
16/02	04/01/98	1,006.98	82.13	924.85	126,754.97
17/02	05/01/98	1,006.98	82.73	924.25	126,672.24
18/02	06/01/98	1,006.98	83.33	923.65	126,588.91
19/02	07/01/98	1,006.98	83.94	923.04	126,504.97
20/02	08/01/98	1,006.98	84.55	922.43	126,420.42
21/02	09/01/98	1,006.98	85.16	921.82	126,335.26
22/02	10/01/98	1,006.98	85.79	921.19	126,249.47
23/02	11/01/98	1,006.98	86.41	920.57	126,163.06
24/02	12/01/98	1,006.98	87.04	919.94	126,076.02
<b>Annual Totals:</b>		\$12,083.76	\$1,003.91	\$11,079.85	
<b>Running Totals:</b>		\$27,367.52	\$1,923.98	\$25,443.54	

96/97 98/99 00/01 02/03 04/05 06/07 08/09 10/11 12/13 14/15 16/17 18/19 20/21

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The draft syllabus highlights other new topics as well as providing a different emphasis for several familiar topics. For example, under correlation in Data Analysis, recognition is given to the need to distinguish between causality and a high degree of correlation. Although the size of your right foot would correlate highly with the size of your left foot, the size of your right foot does not cause the size of your left foot.

Non-right-angle trigonometry and spherical geometry are more familiar topics within the Measurement strand of the draft syllabus.

Another significantly new emphasis in the draft syllabus is the use of mathematical modelling. We often remember courses with this title from our university studies and think that mathematical modelling has to be difficult. Yet descriptions of mathematical methods can be quite deceptive. I recall an academic with a background in English teaching being horrified at the idea of introducing “basic counting techniques” into an HSC mathematics course. Basic counting techniques clearly sounds more difficult if it refers to combinations and permutations!

A mathematical model is a mathematical representation of a situation. Driving on a freeway and using the measurement information provided allows you to create a mathematical model. If the speed limit is 80 km/h and the sign indicates that it is 123 km to your destination, can you determine if you are likely to be late for your meeting? What additional information do you need? Can you make the mathematical model you are using to answer this problem explicitly?

We use mathematical models every day. In a car, we may deal with the problem mentally. The process, though, is much the same. We make assumptions, we simplify, we estimate and we use the results of the modelling process to influence our actions.

Mathematical modelling emphasises the practical applications of mathematical learning and the refining of skills needed in the workplace. Indeed, all applications of mathematics are based on mathematical models. This new syllabus places emphasis on the processes of measurement used to collect data and the creation, testing and interpretation of simple mathematical models. In exploring the link between measurement and modelling, the syllabus draws on topic areas, such as probability (measurement of chance) and algebra (to make the models explicit), as well as conjecturing, reasoning and communicating.

Mathematical models can be thought of as applications of mathematics in life. Many educators have argued that the unique characteristic of mathematics is its ability to model the world. At the Fifth International Congress on Mathematical Education, Lee stated:

The ultimate reason for teaching mathematics to pupils, at all educational levels, is that mathematics is useful in practical and scientific enterprises in society. But experience shows that the potential of mathematics is difficult to realise for persons who have not had access to a broad set of experiences applying mathematics and building and analysing mathematical models....

Incorporating applications and modelling in the curriculum substantially assists the acquisition and understanding of mathematical ideas, concepts, methods and theories, and provides illustrations and interpretations of them.

(Lee et. al. 1986, p. 198)

Whilst not all teachers would agree with Lee’s sole emphasis on the utilitarian nature of mathematics, the final statement provides a clear rationale for the place of modelling within this syllabus.

The consultation on the draft syllabus has emphasised the need for coordinated support to assist with implementation of the final version. There is a need to provide advice on how to access appropriate software, whether that is freeware, shareware or commercially available software. Related to this is the professional development need for teachers addressing new topics. The task of programming the syllabus will also need support.

A coordinating committee is overseeing the development and provision of support for implementation. This committee has representatives from the professional association, the Board of Studies and mathematics teachers from all sectors. Part of the support provided for the new course will be a one-day workshop held at fifty locations across the state in mid-August.

Consultation on the draft syllabus closed on Friday 30 April. The Board of Studies plans to have the new syllabus in schools by July. The syllabus package will include assessment advice, a draft performance scale, as well as a specimen examination paper and marking guidelines for the course.



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## CS The new HSC web site

<http://www.newhsc.edu.au>

### Helpful hint for PLTs ...

Bookmark this address: Why not build in regular access to this site so your team can keep abreast of the latest information? Maybe your school librarian or Internet contact person can assist.

The new HSC web site supports secondary teachers across NSW in their professional development. It is a "one-stop shop" for the latest information about initiatives, activities and resources for the new HSC. You can also share your issues, questions and ideas on-line with others in the learning community.

### Check out the calendar of events

... to look at the timing of the year's major initiatives.

Locate those events which meet your needs and interests. The calendar allows you to pinpoint events and dates quickly.

### Register for discussion

... to join in a real on-line community, or just visit the site and observe discussions between teachers.

Express your opinions, converse with others, ask questions.

### Visit the newsroom

... to find out the latest on professional development...

Keep up-to-date with the latest news about the new HSC and find out what's happening in schools.

### Access hot links to other sites

... to the Board of Studies, the Department of Education and Training, the Catholic Education Commission, the Association of Independent Schools, NSW HSC On-line, and more.

Stay connected with the big picture in secondary education.

### Find out about resources

... to help you and your school to implement the new HSC.

Find out about valuable contact people who can help you.

### Participate in professional development initiatives

... to support you and your school with specific elements of implementing the new HSC.

Develop your understanding of PLTs and other aspects of the HSC support strategy.

### Read Frequently Asked Questions (FAQs)

... or ask a question of your own.

Discover relevant details about issues great and small.

### Provide your feedback

... on the site and related professional issues, using the form provided.

The site is designed for you, so have your say!

