

# Enrichment Programmes 1996

— a report by Dr Peter Pang

In 1996, in addition to its regular Enrichment Programme held at the NUS, the Singapore Mathematical Society was invited to conduct in-house enrichment programmes for Secondary 2 and 3 students at several secondary schools. In all, 383 students from 24 secondary schools participated in these programmes. I would like to briefly report on them, and to give a short description of each of the modules covered.

## The Programmes

### 1. Enrichment Programme at NUS

Six identical three-day programmes were held during 27–30 May, participated by altogether 140 students from 19 secondary schools. Twenty-two instructors, all mathematicians from NUS or NTU, were involved. The following modules were covered: Symbolic Computation, Combinatorial Games, Cryptology, Problem Solving, and Logical Puzzles.



*Bingo! 'V' for victory!*

### 2. Anderson Secondary School

A three-day programme covering Combinatorial Games, Cryptology, Logical Puzzles, and Problem Solving, was held during 3–5 June for 25 students.

### 3. Cedar Girls' Secondary School

A one-day programme on Combinatorial Games and Problem Solving was held on 18 June for 25 students.

### 4. River Valley High School

Altogether 117 students attended the two-and-a-half-day programme on Combinatorial Games, Cryptology, Logical Puzzles, and Problem Solving conducted by 13 instructors.

### 5. CHIJ St Joseph's Convent

In two groups, a total of fifty students attended a half-day programme on Problem Solving on 23 November.

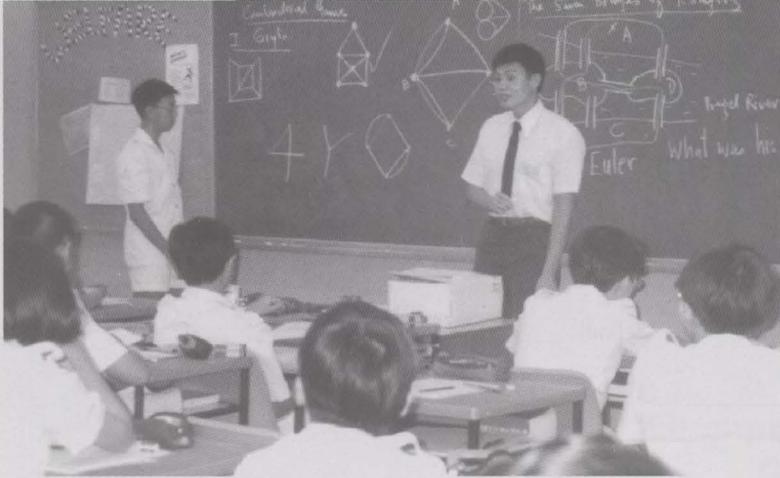
### 6. Pasir Ris Secondary School

Twenty-six students attended the two-day programme on Combinatorial Games, Logical Puzzles, and Problem Solving.

## The Modules

### 1. Combinatorial Games

Consisting of a series of hands-on games and puzzles, this is one of our most successful modules. While the students have fun with these games, they learn how certain ideas from combinatorial mathematics — graph theory, tiling, and symmetry — provide the underlying principles of their solutions.



*A perfect lecture: an animated lecturer, an interesting topic, an attentive class, and even a volunteer at the board!*

*A computer lab session at the Department of Mathematics, NUS.*



## 2. Cryptology

This module introduces the students to the art and science of secret codes. Beginning with the mathematical background (modular arithmetic), the students are taught how to encrypt and decrypt messages using various ciphers. The module concludes with a *Treasure Hunt* or *Cryptology Tour of Singapore* in which the students must decrypt the secret messages which lead them to the destinations.

## 3. Logical Puzzles

This module gives the students the chance to work in groups to crack some of our mind-boggling logical puzzles. These logical puzzles also serve to illustrate some problem-solving techniques.

## 4. Problem Solving

Using many examples, this module introduces the students to a few useful problem-solving heuristics. They also get to practise these methods.

## 5. Symbolic Computation

One of the major recent advances of the application of computers to mathematics is the advent of symbolic computation. In the past, computers have only been delegated the task of performing numerical calculations. However, recently, there are available very powerful programmes which can manipulate also symbols, such as algebraic expressions. This module introduces the students to some simple aspects of such a programme called *Maple*.

For more information on enrichment programmes, please contact

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*Don't laugh lah! This puzzle is more difficult than I thought, but I will solve it.*



*A group photo at the River Valley High School.*