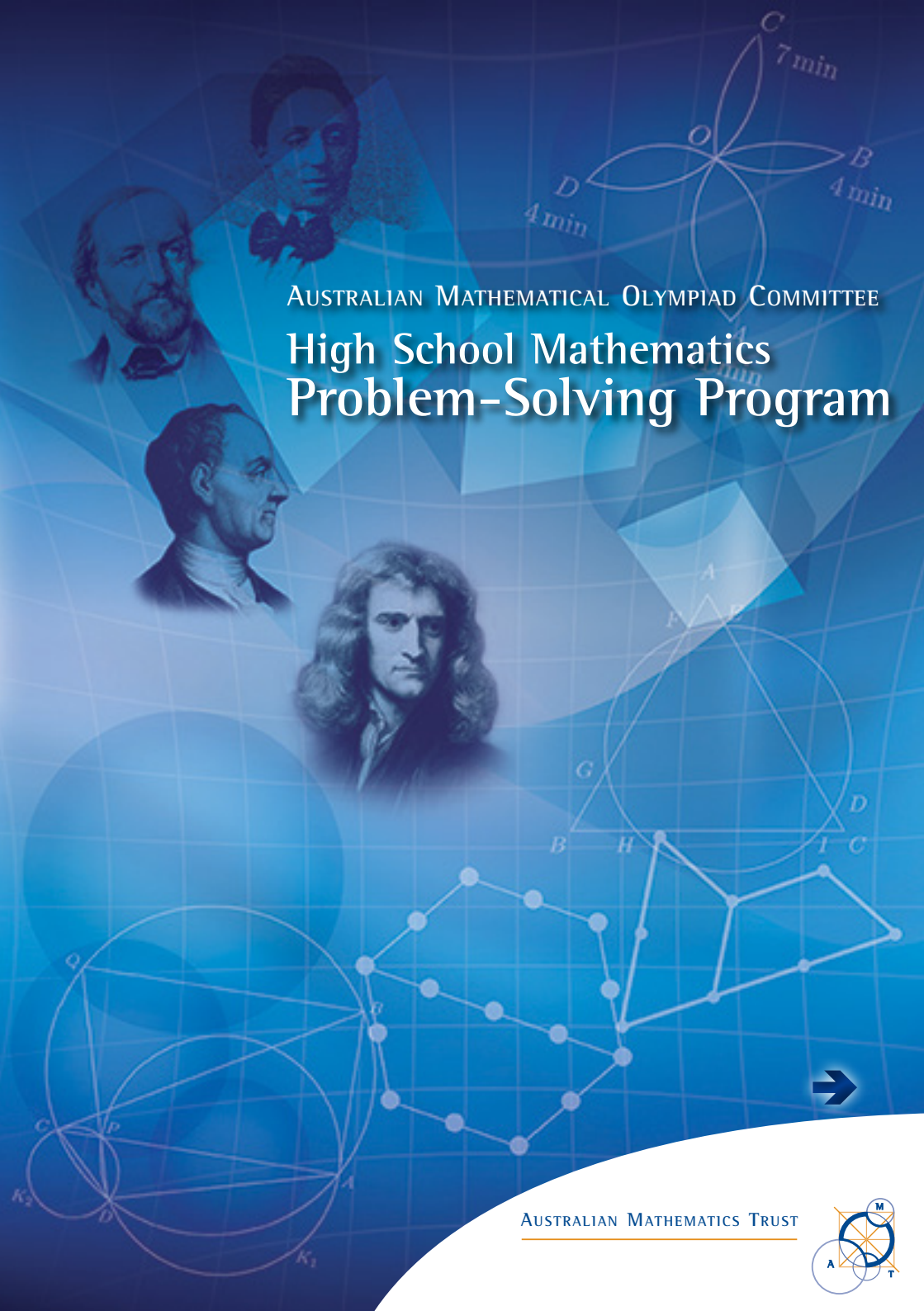

Australian Mathematical Olympiad Committee

High School Mathematics Problem-Solving Program

Australian Mathematics Trust

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Australian Mathematical Olympiad Committee

High School Mathematics Problem-Solving Program

CONTENTS

What is the AMOC?

The Australian Mathematical Olympiad Committee (AMOC) is a department of the Australian Mathematics Trust.

Its aims include the identification, challenge, encouragement and motivation of young Australian school students who are interested or talented in mathematics, while simultaneously providing problem-solving materials for teachers. In order to satisfy this and its other aims, the AMOC conducts a number of different activities for secondary students nationally and at the state/territory level.

These activities are aimed at encouraging the students to strive for excellence and reach their full potential in mathematics. They also provide training for possible selection in the six-member Australian team for the annual International Mathematical Olympiad (IMO). The IMO is held in a different country each year.

Programs for students in Years 3–10

MATHEMATICS CHALLENGE FOR YOUNG AUSTRALIANS (MCYA)

CHALLENGE STAGE

MARCH–JUNE (OR TERM 1 & 2)

MCYA Challenge Stage consists of four divisions: Middle Primary (Years 3 and 4), Upper Primary (Years 5, 6 and 7), Junior (Years 7 and 8) and Intermediate (Years 9 and 10).

Middle Primary and Upper Primary consist of four problems each, while Junior and Intermediate consist of six problems each.

Teachers can select a consecutive three-week period between March and June for students at their school to participate. The Challenge is an open event and may interest students who enjoyed the AMC or other mathematics activities. Practice problems are available on the AMT website and give students and teachers helpful hints in preparation.

ENRICHMENT STAGE

APRIL–SEPTEMBER

MCYA Enrichment Stage consists of six different parallel programs with comprehensive student and teacher support materials. Students are provided with two books, Student Notes and Student Problems which are used in conjunction. Teachers are provided with a Teacher Guide which provides solutions to the problems and marking scheme.

The six programs are designed to be a systematic structured course over a flexible 12–16 week period between April and September and so enable schools to timetable the program at convenient times during the school year. Note that the MCYA Enrichment Stage is completely independent of the earlier MCYA Challenge Stage.

The six programs include:

Newton introduces polyominoes, fast arithmetic, polyhedra, pre-algebra concepts, divisibility and specific problem-solving techniques. Written for advanced Years 5 and 6 students, Newton is also most appropriate for use with Years 7 and 8. View a sample of Newton Student Notes.

Dirichlet has chapters on some problem-solving techniques, tessellations, arithmetic in other bases, patterns and time/distance/speed. It is designed for students in Years 6 or 7. View a sample of Dirichlet Student Notes and.

Euler includes elementary number theory, arithmetic sequences, figurate numbers, congruence, angles, pigeonhole principle and miscellaneous challenge problems. It is designed generally for students in high school Years 7 and 8. View a sample of Euler Student Notes.

Gauss consists of material independent of Euler and includes elementary geometry, using spreadsheets, Diophantine equations, counting techniques, congruence and miscellaneous challenge problems. It is designed generally for students in Years 8 and 9. View a sample of Gauss Student Notes.

Noether consists of material on algebra, sequences and series, number bases, methods of proof, congruence and geometry. It is designed for students in the top 5–10% of Year 9 or 10 who have undertaken Gauss in another year and are not ready for the Polya series. View a sample of Noether Student Notes.

Polya includes topics in algebra and geometry with a supplement on Euclidean geometry and circle properties. It is specifically designed for the top 5% of Year 10 students and outstanding students in lower years. Schools have found that Polya gives a sound base for students who wish to specialise in Years 11 and 12 mathematics. View a sample of Polya Student Notes.

AUSTRALIAN INTERMEDIATE MATHEMATICS OLYMPIAD (AIMO)

SEPTEMBER

This is an important competition for students who hope to become involved in the various state-based enrichment programs or to be selected for Olympiad training. Students who perform well in the MCYA programs or in the Australian Mathematics Competition (AMC) sponsored by the Commonwealth Bank should be encouraged to enter. It is a 4-hour examination sat in September. Students who are AMC prize winners will receive free entry for the AIMO. A sample paper is available on the AMT website.

AMOC INTERMEDIATE EXTENSION PROGRAM

Each AMOC State Director runs a mathematics extension program for students who are invited on the basis of their performance in competitions such as the AMC and the AIMO. See from page 10 for relevant state details.

Programs for invited students

AMOC SENIOR EXTENSION PROGRAM

MARCH–JUNE

Each AMOC State Director runs a mathematics extension program for students who are invited on the basis on their performance in competitions such as the AMC, AIMO, AMO and APMO. See from page 10 relevant state details.

AMOC SENIOR CONTEST

MID-AUGUST

This contest consists of five questions to be answered in four hours. Students are invited to participate by their relevant State Directors.

AMOC SCHOOL OF EXCELLENCE

DECEMBER

This is a ten-day invitational residential school for 25 potential International Mathematical Olympiad (IMO) team members. Students have directed group discussion and evaluation sessions on olympiad-type topics and mathematics problem-solving strategies are discussed and developed. Students are chosen on the basis of their achievements in the AMOC Senior Contest, AIMO and/or the AMC.

Potential IMO team members

AUSTRALIAN MATHEMATICAL OLYMPIAD (AMO)

FEBRUARY

This is a two-day examination for students selected by AMOC State Directors based on performance in both national and local programs.

ASIAN PACIFIC MATHEMATICS OLYMPIAD (APMO)

MARCH

The top 25+ students in the AMO are invited to represent Australia in the APMO. This contest involves competing by correspondence against students from over 20 Pacific Region countries and consists of five problem-solving questions to be attempted in four hours.

AMOC SELECTION SCHOOL

APRIL

Some 25 outstanding students identified by the earlier series of contests are invited to attend the ten-day residential AMOC Selection School. It is at this school that Australia's team of six will be selected for the IMO.

Australian IMO team members

AMOC MENTOR PROGRAM

MAY-JUNE

The six members of the Australian IMO team (plus one reserve) are each paired with a tutor on a 1:1 basis in the lead-up to the IMO. It also consists of a special series of weekly correspondence notes and testing.

AMOC IMO TEAM TRAINING SCHOOL AND IMO

JULY

This seven-day school involves last minute training strategies for the Australian IMO Team immediately prior to attending the IMO. This is the premier international competition in mathematics for secondary students. This event commenced in 1959 and Australia has participated since 1981.

State and territory AMOC activities

Each Australian state and territory conducts its own program to identify and encourage mathematically talented students. Details and/or contacts for the various states/territories are as follows:

AUSTRALIAN CAPITAL TERRITORY

Mathematicians from the Australian National University (ANU) and the Defence Science and Technology Organisation (DSTO) currently run a Canberra Mathematics Enrichment Program that is a formalisation of Friday night enrichment classes, which have been held since 1965.

This is an invitational group which operates throughout the year, concentrating on the Tournament of Towns in Terms 1 and 4, and discussing advanced syllabus topics useful for Olympiad-type competitions during terms 2 and 3. This group meets at the ANU on Friday nights, commencing at 5 pm for 1 to 1.5 hours.

For further information contact the AMOC State Director, or the AMT:

Dr Chris Wetherell
Tel (02) 6162 6274
Email: chris.wetherell@radford.act.edu.au

Australian Mathematics Trust
University of Canberra ACT 2601
Tel: (02) 6201 5137
Fax: (02) 6201 5052
Email: mail@amt.edu.au

NEW SOUTH WALES

In NSW a sequence of correspondence extension programs generally determined by the school year of the participants is conducted.

For new students in Years 8 and 9, a program is run in the period September-November, with entry through high-level performance in the AMC. For Years 10 and 11, a program is also run in the period September-November, with entry through high-level performance in the AIMO or AMOC Senior Contest.

For students who have already participated in one of our programs, the sequence of correspondence extension programs continues twice each year: that is, a program runs in the period April-July, followed by the AIMO or AMOC Senior Contest; and a program runs in the period September-November, which is followed by a possible invitation to sit for the AMO.

Generally the major instruments for identifying the talented Year 11 or lower mathematics students to be invited to sit the August AMOC Senior Contest are the AMC, MANSW Mathsearch and the UNSW IBM Competition.

Any student wishing to participate in the AMOC program should ensure that they enter the above contests. For further information please contact the AMOC State Director:

Dr W Palmer
School of Mathematics & Statistics
University of Sydney NSW 2006

Tel: (02) 9351 3048

Fax: (02) 9351 4534

Email: billp@maths.usyd.edu.au

NORTHERN TERRITORY

In Northern Territory, sessions are offered to support students and teachers participating in the MCYA programs. The sessions are suitable for any student or teacher involved with maths from years 5–11 and are held in Darwin and Alice Springs. Weekend enrichment camps are also conducted for students in cities and remote communities. Parents are also welcome to attend and can volunteer as support at the sessions or camps.

Students interested in the AIMO and the AMOC invitational program are encouraged to contact the AMOC State Director, preferably by email first:

Dr Ian Roberts
PO Box 40611
Casuarina NT 0811
Tel: (08) 8927 4801 or 0403406999
Email: ian.roberts@cdu.edu.au

QUEENSLAND

A special Queensland correspondence problem-solving program runs from March to August (leading up to the AIMO and AMOC Senior Contest) for about thirty Year 10 and 11 students. Participation is by invitation, with selection based on performance in the previous year's AIMO, Senior Contest, AMC and the QAMT Problem Solving Competition. However, teachers are invited to bring to the attention of the AMOC State Director any gifted students who may have been identified by their competition performances or otherwise. For further information contact the AMOC State Director:

Dr Alan Offer
Cannon Hill Anglican College
PO Box 3366
TINGALPA DC QLD 4173
Email: alan@silviamanzanero.com

SOUTH AUSTRALIA

Under the auspices of the Mathematical Association of South Australia, problem-solving workshops and correspondence programs run throughout the year.

Students are invited to take part in these programs on the basis of performance in various mathematics competitions but all interested and motivated students are encouraged to participate. Problems are sent to students prior to the workshops. Schools and teachers are invited to bring to the attention of the State Director any students who show outstanding interest and ability in mathematics.

The Mathematical Association of SA runs various other activities aimed at developing problem solving skills, through the year. Please refer to the MASA masanet.com.au website for further details.

For further information contact the AMOC State Director:

Mr David Martin
Tel: 0413 190 507
email: martindc@ozemail.com.au

TASMANIA

A mathematics group meets weekly on Friday evenings at the Hobart campus of the University of Tasmania. Attending students are mostly in Years 9-12, although younger students do participate. This group deals with problem-solving activities and all members are encouraged to participate in events such as the AIMO, Senior Contest and the Tournament of Towns. Selected students from all regions of the state are invited to participate in the solution of AMOC correspondence problems.

For further information contact the AMOC State Director:

Dr K Dharmadasa
School of Mathematics & Physics Private Bag 37
University of Tasmania Hobart TAS 7001
Tel: (03) 6226 2491
Email: kumudin@hilbert.maths.utas.edu.au

VICTORIA

Generally, the AMC and the University of Melbourne School Mathematics Competition are the identifyers of talented Year 11 or younger students who are invited to sit the August AMOC Senior Contest.

Any student wishing to participate in the AMOC program should ensure that they enter the above contests.

There are a number of enrichment activities which occur during the year. Participation in these is generally by invitation. Victorian students also take part in the MCYA Challenge Stage, the MCYA Enrichment Stage and other AMOC contests.

For further information contact the AMOC State Director:

Dr Philip Swedosh
The King David School
373 Dandenong Road
Armadale, Victoria 3143
Tel: (03) 8508 9600
Fax: (03) 8508 9625
Email: philip.swedosh@kds.vic.edu.au

WESTERN AUSTRALIA

CURTIN UNIVERSITY

The Department of Mathematics and Statistics runs Mathematics Enrichment Programs for Years 5-11 students. For more information contact:

Prof. Lou Caccetta

Dept of Maths & Statistics

Curtin University of Technology

GPO Box U1987 Perth WA 6845

Tel: (08) 9266 7624

Fax: (08) 9266 3197

Email: L.Caccetta@curtin.edu.au

UNIVERSITY OF WESTERN AUSTRALIA

The UWA Academy of Young Mathematicians is a year-long enrichment program in mathematics for high school students who are currently in Years 10 or 11. Students identified from a strong performance in the previous year's Western Australian Junior Mathematics Olympiad (WAJO) are invited to apply. Advanced Year 9 students are also encouraged to participate. The Academy runs on a regular basis during school terms. All sessions are held on Saturday mornings from 10:00 to 11:45. Students who wish to participate should visit the website www.maths.uwa.edu.au/community/academy or contact the Director of the Academy:

Prof. L Stoyanov

Department of Mathematics

University of Western Australia WA 6009

Tel (08) 6488 3393

Fax (08) 6488 1028

Email: luchezar.stoyanov@uwa.edu.au

At a higher level, students identified by a strong performance in the AIMO or the WAJO are invited to participate in training sessions for the Tournament of Towns, which is used as practice for the AMOC Senior Contest and AMO. However, teachers are invited to bring to the attention of the State Director any gifted students who may have been identified from their school or competition performances.

Please note that participation in these training sessions is by invitation only, and the director will usually organise for a gifted student to sit the AIMO during September, if they have not yet sat it, before extending an invitation to a student.

For additional information see the site enrichedmaths.maths.uwa.edu.au which provides a general overview of mathematics enrichment activities in WA, and the various mathematics competitions that run throughout a year or contact the AMOC State Director:

Dr Greg Gamble
41 Essex Street Wembley WA 6014
Tel: (08) 9387 6676 (h)
Email: Greg.Gamble@uwa.edu.au

WA MATHEMATICS PROBLEM-SOLVING PROGRAM (WAMPSP)

This mathematics problem-solving program has been in operation since 1992 and now operates at Perth Modern School in Subiaco. It offers five distinct year-long programs for mathematically able students aged 10 to 15. Exceptional students of a younger age can also be involved.

Students in Years 8 to 10 participate in the MCYA Challenge and Enrichment Stages. The younger students engage in stimulating and challenging programs designed specifically for them. These programs foster systematic approaches to mathematics problem solving and effective presentation of solutions.

Participation is by application and invitation. The application questions are available from July onwards on the website given below. Invitations are based on performance in the AMC. Teachers and principals are also invited to bring to the attention of the director any gifted students who might benefit from involvement in the program.

For more details see the website www.wampsp.com or contact the co-directors Dr N Hoffman & Ms N Reynolds:

Email: nhoffman@iinet.net.au
Noemi.Reynolds@gmail.com