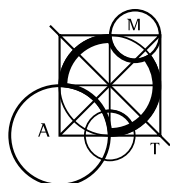


# NEWTON, DIRICHLET, EULER, GAUSS, NOETHER AND PÓLYA DIRECTORS HANDBOOK

2010 ENRICHMENT STAGE

April - September

Mathematics Challenge for Young Australians





**Australian Government**  

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**Department of Innovation  
Industry, Science and Research**

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# SCHOOL MATHS ENRICHMENT DIRECTORS HANDBOOK

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## Chapter One

# HOW MUCH HELP CAN BE GIVEN TO MATHS ENRICHMENT STAGE PARTICIPANTS?

### GENERAL GUIDELINES

Unlike the student problems in the Maths Challenge Stage, the problems in the Maths Enrichment Stage are generally based on topics studied in their texts, whether they are participating in the Newton, Dirichlet, Euler, Gauss, Noether or Pólya Series. In the Student Notes there are a number of examples and exercises with solutions for most topics so that students have an opportunity to study similar questions to the given problems.

Make sure that the students understand the advice given inside the covers of the various texts as well as the instructions inside the Student Problem books; namely

### *STUDENT INSTRUCTIONS*

1. Before attempting the problems in this booklet, work through the appropriate sections of the Student Notes. (First read the “Advice to Students” page at the beginning of the Student Notes in each Series.)
2. Solutions to the problems must be completely your own work. You may use resources such as text books or library books but not seek help from other people. A calculator or a computer may be used, but be sure that any programs used are fully and carefully explained.
3. Submit careful solutions to these problems according to the schedule provided by your School Maths Enrichment Director.
4. Each problem will be scored out of four marks. Marks will be awarded for clearly expressed arguments and careful reasoning. It is important to submit partial solutions to problems you have not completed as these may be worth some marks.

If there are circumstances when students cannot proceed, perhaps because of language or terminology, then teachers may give some guidance. Further general problem solving strategies may be discussed.

### Some Further Guidelines

The following general guidelines are designed to assist teachers in deciding what they may tell students.

- Emphasise the importance of reading the relevant parts of the text and solving the related problems.
- Help if asked, but only give as much as will get the student thinking in the right direction.

- Give hints very sparingly and never in such a way that a solution is directly revealed.
- General problem solving hints could include:
  - Direct the student to consider a similar problem on a different scale.
  - Suggest where appropriate that the student make a table, list, diagram etc.
  - Remind the student “There are more options than you think. Can you look at it another way?” Don’t show the other way(s) but rather help them to take a broader view and consider alternatives.
- Help the student to clarify their thinking by asking questions such as:
  - Do you understand the question?
  - What are you told in the question?
  - What are you required to find?
  - Are you using all the information?
  - Do you understand the terminology?
  - What have you found so far?
  - Simplify the problem?
  - Write something down.
- Teachers may assist with the terminology, particularly with students from years five to eight, and with students whose first language is not English. For example, words such as “random” may need to be explained as may the means by which scientific notation is displayed on the calculator. A general discussion of exponents and scientific notation may be necessary.
- Encourage students to look for meanings of words and lead them to suitable references and resources in the library if necessary. Don’t ignore the potential of a mathematical dictionary.
- Emphasize that marks will be awarded for reasoning and that arguments need to be written out fully and carefully.

### Student Schedules and Regular Reporting

Consider the time available in your school from the commencement in April of the Maths Enrichment Stage Program through to its finish in late September. There will be school examinations, holidays, excursions and so on. There are eight problems for the Newton and Dirichlet series, twelve problems for the Euler and Gauss series and sixteen problems for the Noether and Pólya series that the students will have to attempt during this period. Thus realistically divide the time available to the student (and yourself) into a reasonable schedule. It is not necessary to use the entire six months.

In designing the schedule, organise the deadlines for submission of Enrichment problems so that you can correct them quickly e.g. you may wish to set aside two free periods on say, Tuesday afternoon for marking the problems – and so make the deadline 9am Tuesday for the students.

Note such a schedule will mean that some students complete all the exercises and then attempt the Enrichment problems, while other students only do a few exercises before attempting the Enrichment problems.

We recommend that you organise regular classes once or twice a week in order to discuss topics and exercises in the student Notes and, later, the students' submitted solutions to the Enrichment problems and their extensions.

### Marking and Scoring Procedures

We suggest that you mark papers on a regular basis – see page 10 of this book. Please ensure that the students' computer answer sheets and the School Details Form/ Questionnaire are mailed to AMT by 11 October 2010.

### Student Success

For some students the Maths Enrichment may be the first time they have encountered mathematical ideas they do not immediately understand. Explain that not all students are expected to complete all the work in the scheduled time, and not to be concerned if they cannot meet their expectations. The most important thing is that students understand clearly all the work they have studied, and extend their mathematical knowledge as far as possible.

## THE ENRICHMENT SERIES

Each of the series (Newton, Dirichlet, Euler, Gauss, Noether and Pólya) have the following:

- Student Problems Book
- Student Notes
- Teacher Reference Notes

### Advice to Students

Each Student Notes book provides advice to students on how to approach the topics covered in that particular book. The following general advice may also be helpful.

- The chapters are independent of each other and so can be read in any order.
- While there will be some problems where the only technique available is the 'worry-it-to-death' approach – testing an exhaustive (in both senses of the word!) number of cases – you should be on the look-out for neat short solutions. This will require the use of the mathematical ideas presented and some ingenuity.
- If you need additional help ask your teacher or School Maths Enrichment Director for suitable resources or texts.
- Your School Maths Enrichment Director will advise you on the time to spend on each chapter, when to attempt the Problems and when to submit these. Don't be worried or frustrated if you cannot solve every Problem; it is not necessary to submit all the Problems – leave out some and do the later ones.
- We recommend that you compile an ongoing summary of the facts and techniques learnt in the Enrichment Series. This will help with further studies in mathematics.
- The Student Notes will be useful to you in future secondary school and tertiary studies in mathematics and will be a valuable addition to your library.

## NEWTON SERIES

The Newton Stage has eight chapters and is designed for good Year 5 and 6 students. It is also most appropriate for use with Years 7 and 8 students. The topics looked at are:

- Polyominoes
- Fast arithmetic
- Polyhedra
- Pre-algebra concepts
- Divisibility
- Problem solving

The student problem book has eight problems, each one covering the work given in a particular chapter of the student notes. There are also exercises for students to work through, they can then check and compare their solutions with the given solutions.

## DIRICHLET SERIES

This series is designed for students in Years 6 or 7. Three of the eight chapters revolve around a story which illustrates some problem-solving techniques – use logic, solve a simpler problem, work backwards. The other five chapters are:

- Tessellations – some simple geometry through tessellations.
- One-handed Arithmetic – an introduction to arithmetic in other bases through base 5.
- Time, Distance, Speed – solving problems involving rates.
- Working with Patterns – recognition and description of patterns using algebra.
- Recurring Decimals – looking at patterns and making predictions about recurring decimals.

Almost all of the material presented is mathematics not usually taught in school at any level and so is appropriate for enrichment purposes. It is not necessary to have taken the Newton Series before taking the Dirichlet Series – they are independent of each other.

## EULER SERIES

The Euler Stage is designed for interested and talented students in Years 7 and 8. The topics considered in this Enrichment Stage are:

- Primes and Composites
- Least Common Multiples
- Highest Common Factors
- Arithmetic Sequences
- Figurate Numbers
- Congruences
- Properties of Angles

- Counting Techniques
- The Pigeon-hole Principle

Chapters one to four involve very little algebra. The remaining chapters do contain some algebra and the reader is encouraged to seek direction from the teacher or School Maths Enrichment Director to a suitable textbook which deals with the algebra concerned.

It is to be hoped that as students work through this material they will add to their set of mathematical tools and improve their problem-solving skills. Many of the exercises require a non-standard use of the tools while some simply reinforce a concept which has been introduced. The student is encouraged to look for 'neat' solutions rather than achieve the result through a lengthy or awkward approach. At the same time, persistence is often required to solve the problems and is a quality to be fostered in every young problem-solver.

The three miscellaneous problem sets (Chapters 1, 8 and 12) are designed to reinforce the knowledge and skills of students and to broaden the students' experience of solving mathematical problems.

It is recommended that the students work through the material of each chapter attempting solutions to the exercises as they go, initially without recourse to the solution provided in the Notes. The students' answers may agree but the solutions may differ. Students should check and compare their solutions with the given solution. If a solution is not achieved, the student should refer to the given solution as the techniques presented may be able to be applied to another problem.

While calculators may help with some problems, they are not necessary.

## GAUSS AND NOETHER SERIES

1. These books provide information and exercises on a range of topics, little of which is usually taught in secondary school. Some chapters contain only a set of interesting problems whilst other chapters introduce a section of mathematics without assuming previous knowledge beyond Year 8 level (Gauss series) or Year 9 (Noether series).
2. Each chapter which introduces new mathematics, presents some key mathematical ideas followed by some illustrative examples with suggested approaches and sets of exercises for which there are fully worked solutions.
3. The Gauss Series introduces the use of computer spreadsheets such as Lotus 1-2-3, Excel or Clarisworks. Spreadsheets may also be useful for some problems in the Noether Series.
4. You should read the material presented, working through the examples and exercises as you go. When you get stuck on an exercise, read the solution, but only go as far as you think you need to. Then try to complete the solution for yourself. If you cannot, go back to the solution. Even if you need to read through the whole solution, this may be worthwhile, as you will learn ideas that may apply to later exercises and problems.
5. These books will be useful to you in future secondary school and tertiary studies in Mathematics and will be a valuable addition to your library.

## PÓLYA SERIES

1. This book consists of ten chapters, solutions to the exercises and the supplement.
2. The first four chapters offer an introduction to some selected topics in Algebra. Each topic evolves through the development of the key mathematical ideas followed by some illustrative examples with suggested approaches and sets of exercises for which there are fully worked solutions.
3. You should look for neat short solutions rather than solutions that involve lengthy and awkward manipulations. This will require the use of the mathematical ideas and some ingenuity.
4. The last six chapters are a commentary on the use of the Supplement which contains a selection of geometric topics. The exercises are based on the same facts; their solutions may well require ingenuity and are never a repetition of one of the worked examples.
5. You should coordinate your reading of the material presented in these chapters and the supplement; compile an ongoing summary of the facts and techniques; try to obtain your own solutions to the examples and exercises; only consult the solution when you have been unable to solve the problem for yourself.
6. The Supplement contains extracts from the textbook *Euclidean Geometry* by Frank Zorzitto. Topics have been selected to provide an introduction to some of the properties of triangles, quadrilaterals and circles.
7. The School Maths Enrichment Director will advise you on the time that might be spent on the different sections and when to attempt the problems.
8. This book will be useful to you in future secondary school and tertiary studies in Mathematics and will be a valuable addition to your library.

## Chapter Two

# ADMINISTRATIVE PROCEDURES AND GUIDELINES

### MATHS ENRICHMENT STAGE PACKAGE

1. In the Maths Enrichment Stage Package there should be the following:

(i) Letter to the School Maths Enrichment Director.

(ii) Return Address Envelope (unsealed) containing;

- Answer Sheets, one for each participating student plus 1 extra
- School Details Form (Comments & Suggestions Questionnaire) - (yellow)
- AMOC High School Mathematics Problem Solving Program Brochure
- Australian Mathematics Trust Publications Order Form

(iii) Maths Enrichment Series Materials

Each registered student will receive (for the series they are attempting)

- 1 x Student Notes book
- 1 x Student Problems book

The Maths Enrichment Director will receive a Teacher Set which consists of:

- 1 x Student Notes book
- 1 x Student Problems book
- 1 x Teacher Reference Notes book

Note: (1 x Teacher Set for every 20 student entries or multiples thereof) for each series students are participating in.

2. Please check that there are sufficient answer sheets for all the participating students in your school. If there are any problems contact:

Australian Mathematics Trust  
University of Canberra ACT 2601  
Telephone: (02) 6201 5173  
Fax: (02) 6201 5052

3. It is suggested that the Maths Enrichment Stage package be placed in a secure place.

#### Directors Handbook Label

31942 ASHWOOD COLLEGE

**Answer Sheets: 17**

**Student Bks:**

NTS: 0, DS: 12, ES: 0, GS: 0, NS: 0, PS: 0

**Teacher Sets:**

NTT: 0, DT: 1, ET: 0, GT: 0, NT: 0, PT: 0

## Explanation of Coding

31942 = AMT school identification number

Answer Sheets: = number of answer sheets for each registered student plus one extra.

Student Bks: = number of Student Problem Books and Student Notes for registered students; where NTS# = Newton; DS# = Dirichlet; ES# = Euler; GS# = Gauss; NS# = Noether; PS# = Pólya;

Teacher Sets = 1 x Complimentary Teacher Set for every 20 students (or part thereof) entered in a series; where NTT# = Newton; DT# = number of Dirichlet; ET# = Euler; GT# = Gauss; NT# = Noether; PT# = Pólya.

## THE DAY THAT STUDENTS WILL BE GIVEN THEIR ENRICHMENT MATERIALS

1. Collect the Maths Enrichment Stage package from the secure place.
2. Remove the answer sheets from the unsealed Return Address envelope.
3. Ask each participant to carefully write and code their details (using a soft pencil e.g. 2B) onto the front side of their answer sheet (see sample on page 9); namely
  - (i) Their surname and first name;
  - (ii) School year, sex, date of birth;
  - (iii) Name and address of school;
  - (iv) Two questions asked at the bottom of the sheet;Collect the completed answer sheets and return them to the Return Address envelope for safe keeping.
4. Distribute to each participating student the appropriate set of two books, 1 x Student Notes and 1 x Student Problems.  
Please note that these books should be retained as the property of the student.
5. Make sure that the Maths Enrichment Stage participants understand the advice noted in their books.
6. Prepare students' schedule for work on the Maths Enrichment Stage (see chapter 1 in this Handbook).
  - (a) Consider the time available in your school for the Maths Enrichment Stage Program. There are up to sixteen problems that the students can attempt.
  - (b) Give the students reasonable short-term goals to complete various sections of work in the Notes. Students with differing abilities or other demands may be given different schedules. Thus schedule the time realistically by setting reasonable deadlines for the submission of each problem for each student.
  - (c) Be sure that corrected work is not returned to any student until all students have submitted their attempts.
  - (d) Explain to the students that it is expected many of them may not complete the set work in the scheduled time and so they should not be concerned if they haven't completed the set tasks.



## REGULAR MARKING OF STUDENTS' ATTEMPTS AT PROBLEMS

Marking and scoring procedures are given in the Teachers Reference Book.

*Sample from Teacher Reference Book*

### **SCHOOL MATHS ENRICHMENT STAGE DIRECTOR INSTRUCTIONS**

#### **Mark Papers on a Regular Basis**

(a) Award marks as shown in the marking scheme in this book.

[In general, the working necessary for a particular mark is indicated on the right hand side of the page.]

(b) If an incomplete attempt is presented which is different from the solution supplied, award marks for comparable work. To assist you to do this we have identified several alternative solutions for most problems and summarized the work for which each mark is awarded. If you are not sure what mark to award, again give the student the benefit of the doubt.

#### **Record Results on a Regular Basis**

(a) For each student's attempt at each problem, complete their answer sheet using a 2B (or softer) pencil.

(b) Rub out mistakes completely using a plastic eraser and re-code.

#### **Discuss Corrected Work and Extensions on a Regular Basis**

It is important to discuss the solutions with the students as soon as possible after the questions have been attempted by all participating students and marked. In general further relevant problems and their solutions are included in this book to help teachers to challenge and motivate their students further.

1. On completion of marking, record each student's score in the appropriate place on the back of their answer sheet making sure that the code for the Newton, Dirichlet, Euler, Gauss, Noether or Pólya Series has been marked.
2. Give out the solutions to the relevant problems and discuss the scores with the students. Perhaps where appropriate, they could be challenged with the similar problems given in the Teacher Reference Book.
3. Return the completed answer sheets in the return addressed envelope.

# MATHEMATICS CHALLENGE FOR YOUNG AUSTRALIANS

## Maths Challenge Stage

SCORE FOR PROBLEM	PROBLEM NUMBER					
	1	2	3	4	5	6
Not Attempted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Challenge Paper Attempted

Primary Division

Junior Division

Intermediate Division

### Problems Attempted Individually

Problem Five Yes  No

Problem Six Yes  No

For each problem, only fill in the total score for the problem.

## Maths Enrichment Stage Series

Newton  Dirichlet  Euler  Gauss  Noether  Polya

SCORE FOR PROBLEM	PROBLEM NUMBER																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Not Attempted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

For each problem, only fill in the total score for the problem.

Code in appropriate Newton, Dirichlet, Euler, Gauss, Noether or Pólya series.

Complete only the score for the appropriate problem number at each stage.

## AUSTRALIAN INTERMEDIATE MATHEMATICS OLYMPIAD (AIMO) (Thursday 12 August 2010)

Year 7 to 10 students who do well or show commitment in the Challenge, and/or Enrichment Stage should be encouraged to enter the Australian Intermediate Mathematics Olympiad (AIMO) which will be held 12 August 2010. Question papers will be sent to schools in July (included with Challenge Stage results, if applicable). AIMO is a four hour closed book contest, consisting of twelve questions based on broad mathematical ideas. Students sit the AIMO within their own schools, and papers are sent to AMOC State Directors for marking.

## AMOC SENIOR MATHS CONTEST (Tuesday 10 August 2010)

Entry for the AMOC Senior Maths Contest, (generally students in Year 11), is only by invitation of the AMOC State Directors. If there is any problem here, please contact your AMOC State Director. (See below.)

AMOC Senior Maths Contest materials will be sent separately to those schools which have been invited to enter students by the AMOC State Directors.

## AMOC STATE DIRECTORS' CONTACT DETAILS

- |       |  |  |
|-------|--|--|
| ACT   | Mr John Carty<br>Board of Senior Secondary Studies<br>GPO Box 158<br>CANBERRA ACT 2601<br>Email: cartyjohn@bigpond.com                                   | Tel: (02) 6205 9167 (w)<br>Tel: (02) 6248 0314 (h)   |
| VIC   | Dr Philip Swedosh<br>Head of Maths<br>St Leonards College<br>163 South Road<br>BRIGHTON EAST VIC 3187<br>Email: pswedosh@stleonards.vic.edu.au           | Tel: (03) 9909 9523 (w)<br>Tel: (03) 9568 7612 (h)<br>Fax: (03) 9592 3439 (w)                      |
| NSW   | Dr Bill Palmer<br>School of Mathematics and Statistics<br>Carslaw Building (Room 526)<br>UNIVERSITY OF SYDNEY NSW 2006<br>Email: billp@maths.usyd.edu.au | Tel: (02) 9351 3048 (w)<br>Tel: (02) 9621 3910 (h)<br>Fax: (02) 9351 4534 (w)<br>Mob: 040 791 5034 |
| SA/NT | Dr Michael Peake<br>Unit 2<br>5 Osborn Avenue<br>BEULAH PARK SA 5067<br>Email: michaelp.glenside@bigpond.com.au  | Tel: (08) 8332 5517 (h)<br>Mob: 040 231 0667   |

TAS	Dr Kumudini Dharmadasa School of Mathematics and Physics University of Tasmania Private Bag 37 HOBART TAS 7001 Email: kumudin@hilbert.maths.utas.edu.au	Tel: (03) 6226 2491 (w) Tel: (03) 6224 0054 (h) Mob: 041 954 3782
QLD	Dr Gary Carter School of Mathematic Sciences, Garden Point Queensland University of Technology GPO Box 2434 BRISBANE QLD 4001 Email: g.carter@qut.edu.au	Tel: (07) 3138 5090 (w) Tel: (07) 3843 3823 (h) Fax: (07) 3138 2310 (w)
WA	Dr Greg Gamble 41 Essex Street WEMBLEY WA 6014 Email: gregg@maths.uwa.edu.au	Tel: (08) 9266 3482 (w) Tel: (08) 9387 6676 (h) Fax: (08) 9266 3197 (w)

*If unable to contact the above please try:*

Australian Mathematics Trust  
 University of Canberra ACT 2601  
 Telephone: (02) 6201 5173  
 Fax: (02) 6201 5052

## BY THE 11 OCTOBER 2010

*(Schools send their coded Maths Enrichment Stage answer sheets to the AMT in Canberra.)*

1. Collect the answer sheets, the School Details Form/Questionnaire (yellow) from the return addressed envelope.
2. Ensure (by asking the participants to confirm) the correctness of the coded Series (Newton, Dirichlet, Euler, Gauss, Noether and Pólya) and the scores coded on their answer sheets.
3. Complete the School Details Form (yellow)

Mathematics Challenge for Young Australians

**MATHS ENRICHMENT STAGE**  
**April–September 2010**

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**School Details Form**  
**(Comments & Suggestions Questionnaire)**

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- Please return this form with the computer answer sheets to reach the Australian Mathematics Trust (AMT) by Monday 11 October 2010.
- Our file details for your school are given below. Please correct if necessary.

Telephone: (    )

Fax: (    )

Email:

Name of School Maths Enrichment Director

.....

Number of completed Maths Enrichment Stage computer answer sheets enclosed for:

Newton Series	<input type="text"/>	Gauss Series	<input type="text"/>
Dirichlet Series	<input type="text"/>	Noether Series	<input type="text"/>
Euler Series	<input type="text"/>	Pólya Series	<input type="text"/>
		TOTAL	<input type="text"/>

4. Please indicate on the Questionnaire any comments, suggestions, guidance etc about the Maths Enrichment Stage Program. We need your help in order to improve procedures and concepts of this important initiative of the Australian Mathematical Olympiad Committee.

# Maths Enrichment Stage Questionnaire

## April–September 2010

We need your reactions, guidance and suggestions.

The Maths Enrichment Stage Committee has found your comments and suggestions from last year extremely helpful and consequently responded to them. Your comments for this year would be greatly appreciated.

### 1. Weekly support sessions for students

From the experience of schools in the past it was found that weekly support and encouragement sessions were most beneficial. The Committee believes it is important that school authorities acknowledge and formally support teacher period allocation for such activities. Some record of the level of support generally may be useful politically in future years.

Did your school provide periodic support sessions for the participating Maths Enrichment students?

Yes  No

If Yes, what was the nature of the support sessions? Any suggestions?

### 2. Reactions to the Maths Enrichment Series Materials

For example, we would appreciate students' and teachers' reactions to the materials as well as comments on specific aspects, ie – was the standard at an appropriate level? Were there too many exercises in each chapter? Which chapters? Did the students complete all the exercises before attempting the Enrichment problems or did they attempt the Enrichment problems early?

#### a) NEWTON SERIES MATERIALS

Student Notes Book

Student Problems Book

Teacher Reference Book

5. Collect all the completed answer sheets and the School Details Form/Questionnaire (yellow). Place them into the Maths Enrichment Stage return-addressed envelope with the supporting cardboard sheet (for protection of the computer answer sheets).

6. Mail the above envelope to:

Australian Mathematics Trust  
University of Canberra  
Canberra ACT 2601  
by 11 October 2010 (or sooner if possible)

Phone: (02) 6201 5173

Fax: (02) 6201 5052

7. Schools can expect to receive results and certificates for the Maths Enrichment Stage by mid-November.

## **OCTOBER–DECEMBER 2010**

*(Follow-up support to students)*

It is expected that some of the topics in the various books of the Newton, Dirichlet, Euler, Gauss, Noether and Pólya Series and possibly some of the extra problems given in the Teacher Reference Books may not have been completed by many students. Why not encourage them to work on the material during the last couple of months of the year?