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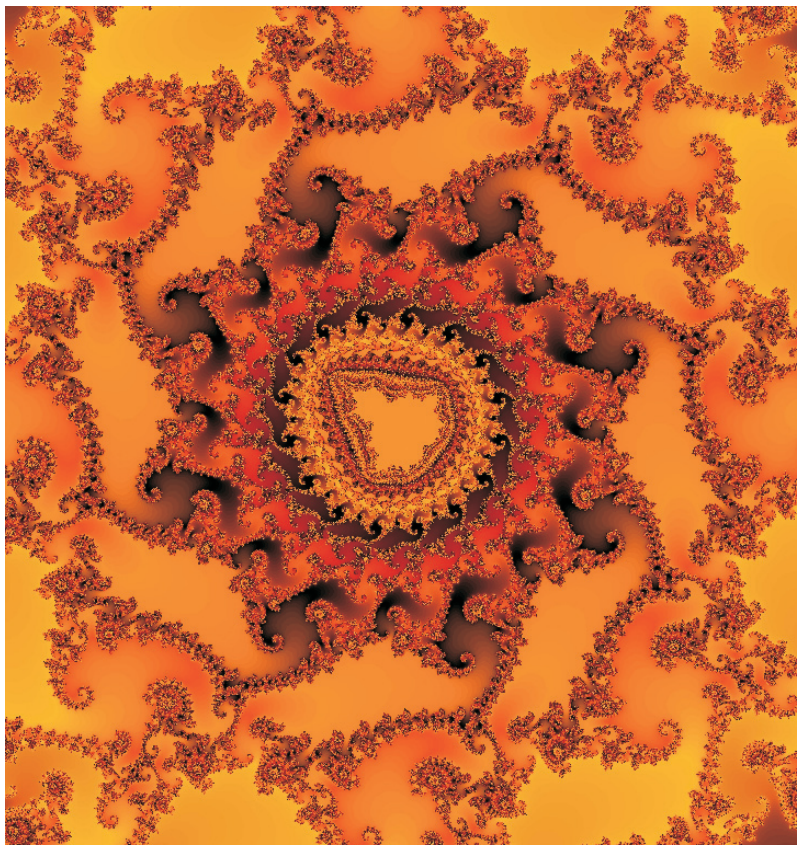
Cambridge Additional Mathematics



IGCSE® (0606)

O Level (4037)

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CAMBRIDGE ADDITIONAL MATHEMATICS (0606) (4037)

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FOREWORD

This book has been written to cover the '*Cambridge O Level Additional Mathematics (4037)*' and the '*Cambridge IGCSE® Additional Mathematics (0606)*' courses over a one-year period.

These syllabuses enable learners to extend the mathematics skills, knowledge, and understanding developed in the Cambridge IGCSE or O Level Mathematics courses, and use skills in the context of more advanced techniques.

The syllabuses have a Pure Mathematics only content which enables learners to acquire a suitable foundation in mathematics for further study in the subject. Knowledge of the content of the Cambridge IGCSE or O Level Mathematics syllabus (or an equivalent syllabus) is assumed.

Learners who successfully complete these courses gain lifelong skills, including:

- the further development of mathematical concepts and principles
- an ability to solve problems, present solutions logically, and interpret results.

This book is an attempt to cover, in one volume, the content outlined in the Cambridge O Level Additional Mathematics (4037) and Cambridge IGCSE Additional Mathematics (0606) syllabuses. The book can be used as a preparation for GCE Advanced Level Mathematics. The book has been endorsed by Cambridge.

To reflect the principles on which the course is based, we have attempted to produce a book and CD package that embraces understanding and problem solving in order to give students different learning experiences. Review exercises appear at the end of each chapter. Answers are given at the end of the book, followed by an index.

The interactive CD contains **Self Tutor** software (see p. 5), geometry and graphics software, demonstrations and simulations. The CD also contains the text of the book so that students can load it on a home computer and keep the textbook at school.

The examinations for Cambridge Additional Mathematics are in the form of two papers. Many of the problems in this textbook have been written to reflect the style of the examination questions. The questions, worked solutions and comments that appear in the book and CD were written by the authors.

The book can be used as a scheme of work but it is expected that the teacher will choose the order of topics. Exercises in the book range from routine practice and consolidation of basic skills, to problem solving exercises that are quite demanding.

In this changing world of mathematics education, we believe that the contextual approach shown in this book will enhance the students' understanding, knowledge and appreciation of mathematics, and its universal application.

We welcome your feedback.

Email: info@haesemathematics.com.au
Web: www.haesemathematics.com.au

PMH, SHH, MH, CS

ABOUT THE AUTHORS

Michael Haese completed a BSc at the University of Adelaide, majoring in Infection and Immunity, and Applied Mathematics. He then completed Honours in Applied Mathematics, and a PhD in high speed fluid flows. He has a keen interest in education and a desire to see mathematics come alive in the classroom through its history and relationship with other subject areas. Michael has been the principal editor for Haese Mathematics since 2008.

Sandra Haese completed a BSc at the University of Adelaide, majoring in Pure Mathematics and Statistics. She taught mathematics at Underdale High School and later at Westminster School in Adelaide. In 1979, Sandra's husband Bob Haese began to write textbooks for mathematics students at high schools, and Sandra assumed the role of proof reader. She continues to work for Haese Mathematics as an editor and proof reader, and she produces much of the audio work for the Self Tutor software. In 2007 she was awarded Life Membership of the Mathematics Association of South Australia.

Mark Humphries completed an honours degree in Pure Mathematics and an Economics degree at the University of Adelaide. His mathematical interests include public key cryptography and number theory. He has been working at Haese Mathematics since 2006.

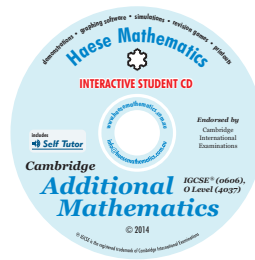
Chris Sangwin completed a BA in Mathematics at the University of Oxford, and an MSc and PhD in Mathematics at the University of Bath. He spent thirteen years in the Mathematics Department at the University of Birmingham, and from 2000 - 2011 was seconded half time to the UK Higher Education Academy "Maths Stats and OR Network" to promote learning and teaching of university mathematics. He was awarded a National Teaching Fellowship in 2006, and is now a Senior Lecturer in Mathematics Education in the Mathematics Education Centre at Loughborough University. His learning and teaching interests include automatic assessment of mathematics using computer algebra, and problem solving using the Moore method and similar student-centred approaches.

USING THE INTERACTIVE CD

The interactive Student CD that comes with this book is designed for those who want to utilise technology in teaching and learning Mathematics.

The CD icon that appears throughout the book denotes an active link on the CD. Simply click on the icon when running the CD to access a large range of interactive features that includes:

- printable worksheets
- graphing packages
- demonstrations
- simulations
- revision games
- SELF TUTOR



INTERACTIVE LINK

SELF TUTOR is an exciting feature of this book.

The *Self Tutor* icon on each worked example denotes an active link on the CD.

Simply 'click' on the *Self Tutor* (or anywhere in the example box) to access the worked example, with a teacher's voice explaining each step necessary to reach the answer.

Play any line as often as you like. See how the basic processes come alive using movement and colour on the screen.

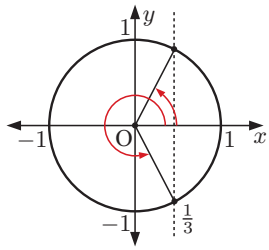
Ideal for students who have missed lessons or need extra help.

Example 10 — Self Tutor

Find the two angles θ on the unit circle, with $0 \leqslant \theta \leqslant 2\pi$, such that:

a $\cos\theta = \frac{1}{3}$ **b** $\sin\theta = \frac{3}{4}$ **c** $\tan\theta = 2$

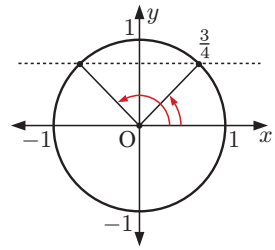
a $\cos^{-1}(\frac{1}{3}) \approx 1.23$



$\therefore\ \theta \approx 1.23$ or $2\pi - 1.23$

$\therefore\ \theta \approx 1.23$ or 5.05

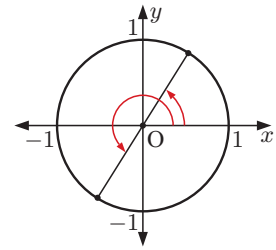
b $\sin^{-1}(\frac{3}{4}) \approx 0.848$



$\therefore\ \theta \approx 0.848$ or $\pi - 0.848$

$\therefore\ \theta \approx 0.848$ or 2.29

c $\tan^{-1}(2) \approx 1.11$



$\therefore\ \theta \approx 1.11$ or $\pi + 1.11$

$\therefore\ \theta \approx 1.11$ or 4.25

See **Chapter 8**, **The unit circle and radian measure**, page 209