

## Discovery list – Maths and Further Maths

**Nrich website** – this is a fantastic web site for puzzles and deeper thinking but there is also support to help you prepare for the STEP paper (if you are required to do this for your university course) and to also help you prepare to study Maths at university.

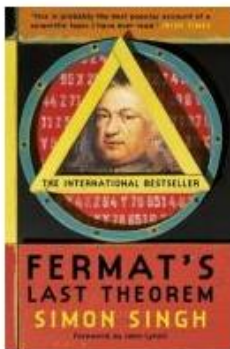
<http://nrich.maths.org/secondary-upper>

<http://nrich.maths.org/6300> (Information about 'rich' tasks)

<http://nrich.maths.org/9091> (Developing as Mathematicians)

<http://nrich.maths.org/10213> (NRICH STEP Prep)

<http://nrich.maths.org/6783> (Prepare for university)

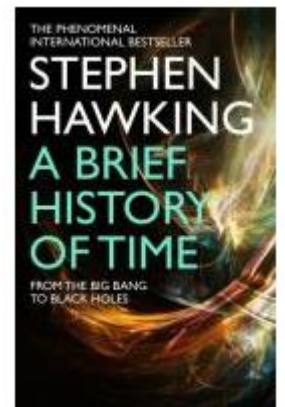


**Cut the knot website** – another great web site for puzzles

<http://www.cut-the-knot.org/>

**Reading Bank, Oxford University** – Recommended reading from Oxford University. Includes A Brief History of Time and Fermat's Last Theorem.

<http://staircase12.univ.ox.ac.uk/content/mathematics-0>



**AQA website** – access to the A Level specification and specimen exam papers and mark schemes. Vital for exam preparation!

<http://www.aqa.org.uk/subjects/mathematics/as-and-a-level/mathematics-7357>

## **Advanced Problems in Mathematics S.T.C. Siklos (1996 and 2003)**

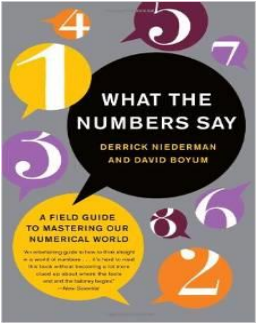
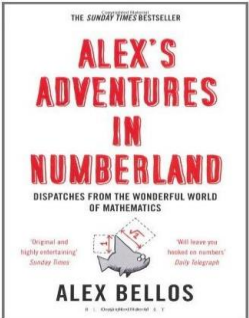
These are selections of STEP-like problems complete with discussion and full solutions. (STEP is the examination normally used as a basis for conditional offers to Cambridge.) The problems are different from most A-level questions, being much longer ('multi-step' is the current terminology) and sometimes covering material from apparently unconnected areas of mathematics. They are more like the sort of problems that you encounter in a university mathematics course, although they are based on the syllabuses of school mathematics. Working through one or both of these booklets would be an excellent way of getting your mathematics up to speed again after the summer break. The 2003 booklet (Advanced Problems in Core Mathematics) is in a sense a prequel, since it is based on a less advanced syllabus (basically the A-level core plus some mechanics and probability). Both these booklets can be downloaded by clicking on "STEP documents at:

<http://admissionstesting.service.org/for-test-takers/step/about-step/>

<http://www.imperial.ac.uk/mathematics/undergraduate/degree-courses-and-admissions/faqs/>



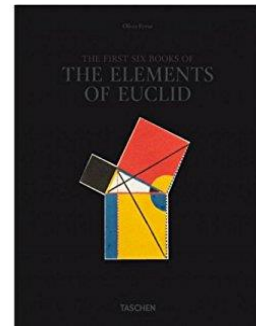
Below are some books recommended by MEI and are general interest (not exam specific) to broaden your knowledge and interest of Maths in general.

Book, Author and Synopsis	Book Cover
<p><a href="#"><u>What the Numbers Say: A Field Guide to Mastering Our Numerical World</u></a> (Derrick Niederman and David Boyum)</p> <p>This book looks at situations where it's important to be able to understand and analyse numerical information. Although many of the contexts are American, it is very readable and will be of particular interest to teachers and students of Core Maths.</p>	
<p><a href="#"><u>Alex's Adventures in Numberland</u></a> (Alex Bellos)</p> <p>A very accessible and well-written introduction to mathematics written in the style of a travelogue that demonstrates how useful, universal, interesting and beautiful mathematics is.</p>	

### [Six Books of Euclid](#)

(Oliver Byrne & Werner Oechslin)

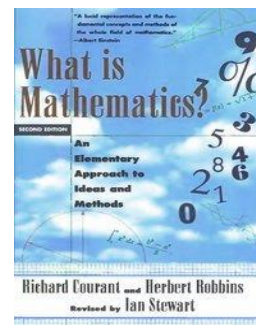
Created in 1847 by Oliver Byrne, a surveyor on the Falkland Island, this book takes the first six books of Euclid and uses colour to help explain the propositions. The resulting diagrams have the appearance of the abstract art of Mondrian and can be appreciated as much for their aesthetic qualities as for their mathematical ones. A facsimile of the original edition has recently been reprinted.



### [What is Mathematics?: An Elementary Approach to Ideas and Methods \(Oxford paperbacks\)](#)

(Richard Courant, Herbert Robbins, Ian Stewart)

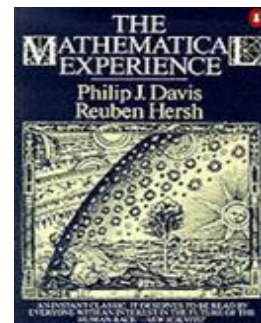
In recent years there has been an explosion in the number of books published on popular maths. This book, now over 70 years old, is as good as any of them.



### [The Mathematical Experience](#)

(Philip J. Davis & Reuben Hersh)

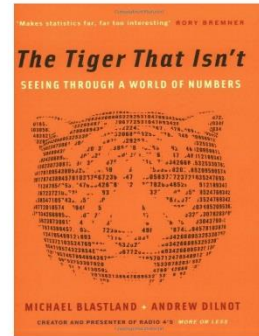
A detailed analysis of 'what mathematics is' and what it means to 'do mathematics'. This book is ideal for a mathematically confident A level student who is considering studying the subject at degree level.



[The Tiger That Isn't: Seeing Through a World of Numbers](#)

(Andrew Dilnot and Michael Blastland)

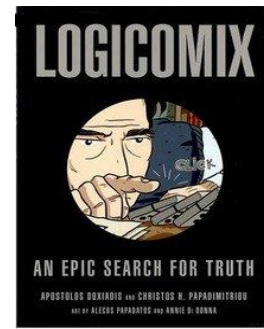
The creator of radio 4's More or Less programme uses stories from the news and encourages critical thinking about statistical stories. Good for the general reader – no mathematics is needed.



[Logicomix: An Epic Search for Truth](#)

(Apostolos Doxiadis & Christos H. Papadimitriou)

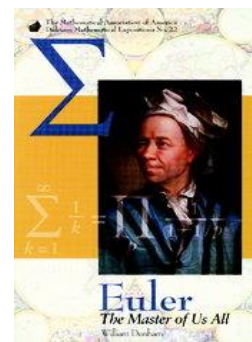
Logicomix is a graphic novel from the Author of 'Uncle Petros and Godbach's Conjecture' that tells the story of Bertrand Russell and his attempts to establish a logical foundation for mathematics. The result is a highly original and engaging way of communicating some complex ideas.



[Euler : The Master of Us All](#)

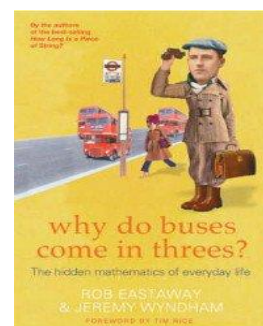
(William Dunham)

Arguably Leonhard Euler used ideas from A level Mathematics and Further Mathematics more creatively than anybody else in history. This books explains in detail the ways in which he solved a variety of problems and helps the reader to appreciate what a mathematical genius is.



[Why Do Buses Come in Threes?: The Hidden Mathematics of Everyday Life](#)

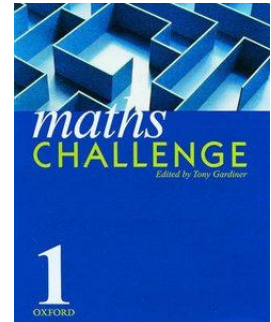
(Rob Eastaway & Jeremy Wyndham)



[Maths Challenge: Book 1](#)

(Tony Gardiner)

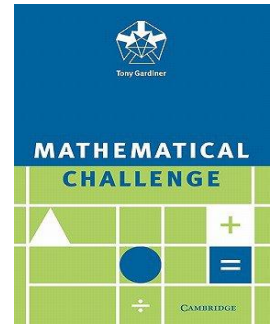
Perfect enrichment for Key Stage 3 pupils, developing mathematical understanding and reasoning skills.



[Mathematical Challenge](#)

(Tony Gardiner)

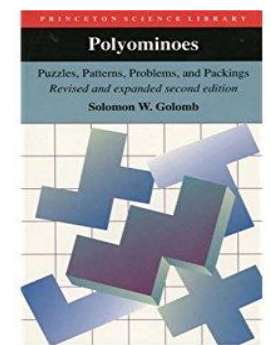
Brilliant problems that require only basic school maths and help develop mathematical problem solving skills.



[Polyominoes: Puzzles, Patterns, Problems, and Packings](#)  
[\(Princeton Science Library\)](#)

(Solomon W. Golomb)

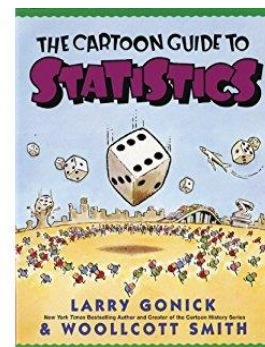
There are five 2D shapes, called tetrominoes, that can be made by joining four congruent squares edge to edge. Can you prove that using one of each you can never tile a 5 by 4 rectangle? This is the classic text on problems of this type.



[The Cartoon Guide to Statistics](#)

(Larry Gonick & Woolcott Smith)

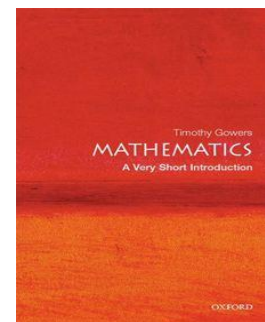
An illustrated easy to read introduction to statistical concepts, with some real applications.



[Mathematics: A Very Short Introduction](#)

(Timothy Gowers)

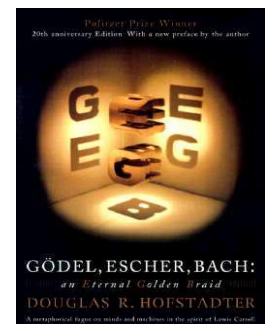
This book introduces abstract thinking and higher-level mathematical ideas in a remarkably clear and engaging way. It assumes no mathematics beyond GCSE level, yet provides clear introductions to mathematical modelling, proof, limits and infinity, fractals and non-euclidean geometry, including some excellent examples.



[Gödel, Escher, Bach: An Eternal Golden Braid](#)

(Douglas R Hofstadter)

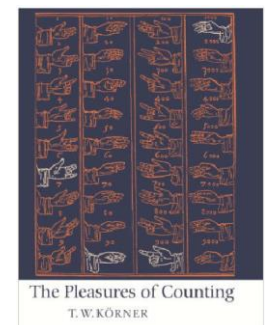
The mathematics of Gödel, the art of Escher and the music of Bach are linked together in way that demonstrates common themes of recursion and sameness that occur in other fields such as nature and language. A challenging but ultimately rewarding read.



[The Pleasures of Counting](#)

(T. W. Körner)

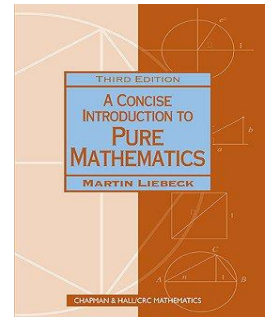
How is mathematics used to analyse and solve real problems? This book includes examples of problems that mathematicians have tackled, and how they have addressed them. The historical contexts, as well as the mathematics, are fascinating. It's not always an easy book, but it's well worth the effort.



[A Concise Introduction to Pure Mathematics](#)

(Martin Liebeck)

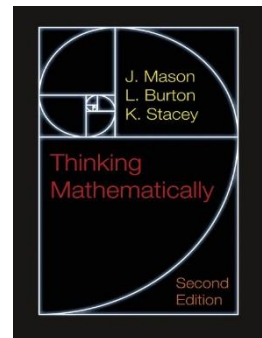
This is an ideal book for a sixth form mathematics teacher, a student considering studying mathematics at university, or a first year undergraduate. It introduces a more rigorous approach to mathematics in a friendly way, helping to bridge the gap between school mathematics and undergraduate mathematics.



[Thinking Mathematically](#)

(J.Mason, L.Burton, K.Stacey)

This has been around for about 20 years but still provides a source of interesting problems and strategies for tackling them. Suitable for secondary school students and beyond.



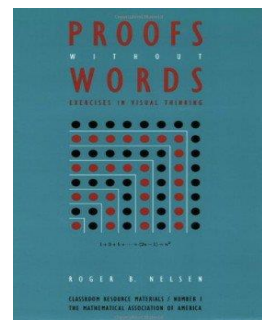
[Proofs without Words: Exercises in Visual Thinking: v. 1 \(Classroom Resource Materials\)](#)

(Roger B.Nelsen)

[Proofs without Words II: v. 2 \(Classroom Resource Materials\)](#)

(Roger B.Nelsen)

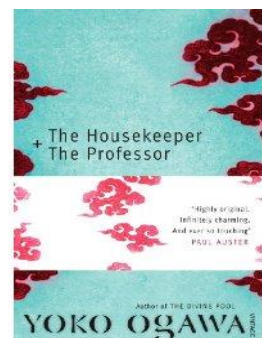
Why is the sum of the first  $n$  cubes equal to the square of the sum of the first  $n$  integers? An algebraic proof might confirm this fact but the diagrams in these books explain why this and dozens of other identities are true –and all without words!



[The Housekeeper and the Professor](#)

(Yoko Ogawa)

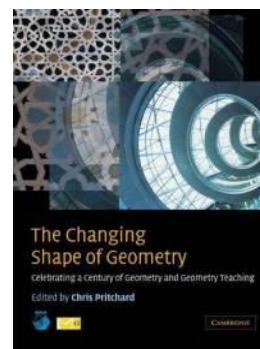
A charming novel about a housekeeper who starts working for a Mathematics Professor with only 80 minutes short term memory (due to an accident). Throughout the novel the housekeeper and her son develop a love of mathematics as a result of their friendship with the Professor. A wonderful story for mathematicians and non-mathematicians.



[The Changing Shape of Geometry: Celebrating a Century of Geometry and Geometry Teaching](#)

(Chris Pritchard)

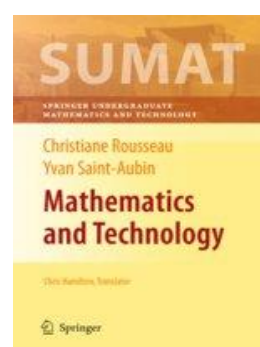
A great book to dip into. It includes 'Desert Island Theorems', where mathematicians and mathematics teachers wax lyrical about their favourite geometrical results, and brings together a superb collection of geometrical articles from across the 20th Century, mainly from the Mathematical Gazette.



[Mathematics and Technology \(Springer Undergraduate Texts in Mathematics and Technology\)](#)

(Christiane Rousseau & Yvan St-Aubin)

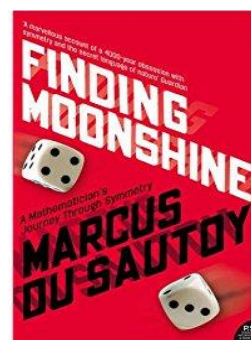
With chapters on internet search engines, error-correcting codes in mobile phones, global positioning systems and image compression in this book, you'll need no more convincing about the relevance of mathematics in the digital age after reading this.



[Finding Moonshine: A Mathematician's Journey Through Symmetry](#)

(Marcus Du Sautoy)

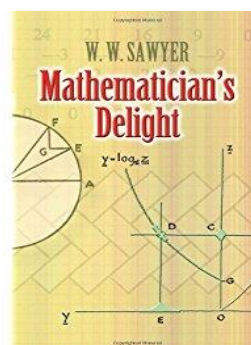
A year in the life of an eminent mathematician that combines descriptions of what he is actually doing in each month with insights into his interest in and working on symmetry. It highlights some interesting and accessible maths and also talks about the history and personalities that developed these ideas.



[Mathematician's Delight \(Dover Science Books\)](#)

(W.W. Sawyer)

Written in the style of a novel, this book starts from simple arithmetic and builds to calculus, providing insight and understanding throughout. The sections on logarithms and trigonometry are especially good.

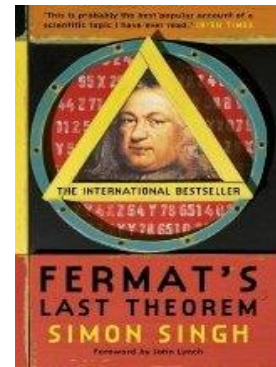




[Fermat's Last Theorem: The story of a riddle that confounded the world's greatest minds for 358 years](#)

(Simon Singh)

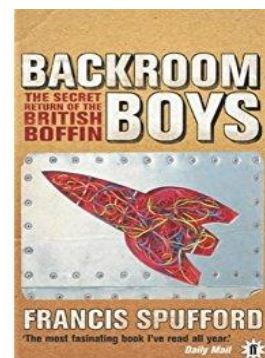
The story of how an English Mathematician, Andrew Wiles, proved one of the most famous problems in mathematics. There is also lots of interesting information on the associated [website](#).



[Backroom Boys: The Secret Return of the British Boffin](#)

(Francis Spufford)

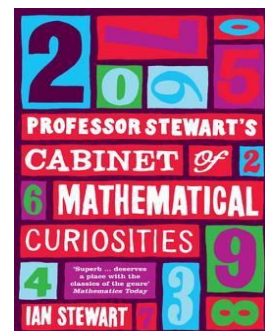
This books celebrates the work of technologists who kept Concorde flying, created the first 3D exploration computer game and conquered the mobile-phone business. It provides inspiration about what can be achieved with a great technical idea from small beginnings.



[Professor Stewart's Cabinet of Mathematical Curiosities](#)

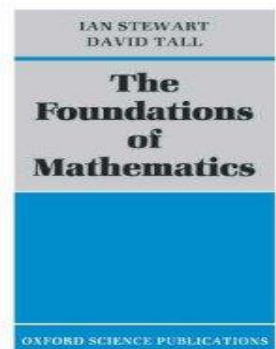
(Ian Stewart)

A book of mathematical games, puzzles and facts. Ian Stewart has collected some interesting and entertaining puzzles in logic, geometry and probability. This is a great book for occupying idle moments.



[The Foundations of Mathematics](#)

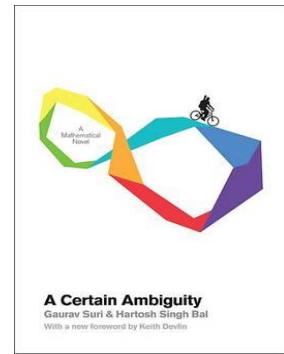
(Ian Stewart & David Tall)



[A Certain Ambiguity: A Mathematical Novel](#)

(Gaurav Suri & Hartosh Singh Bal)

An intriguing plot that combines mathematics, philosophy and history, and communicates a real passion for understanding mathematics.



[Essential Mathematics for Games and Interactive Applications: A Programmer's Guide](#)

(James M. Van Verth & Lars M. Bishop)

This book is the place to start if you want to know more about how maths is used in graphics and video games. The book is technical but accessible and it's packed with techniques using vectors, matrices and geometry.



[Mathematical Puzzles: A Connoisseur's Collection](#)

(Peter Winkler)

'Connoisseur' is certainly the right word; however well-versed you are you'll find new intriguing puzzles here.

