



## A level Maths Reading List – Mathematics

### Recommended Books

#### 1. "Fermat's Last Theorem" by Simon Singh

- **Overview:** This book tells the story of the centuries-long quest to solve one of the most famous problems in mathematics.
- **Independent Tasks:**
  - Research the history and significance of Fermat's Last Theorem.
  - Summarize the key milestones in the proof's history.
  - Present a report on Andrew Wiles' proof, highlighting the main mathematical concepts involved.

#### 2. "How to Solve It" by George Pólya

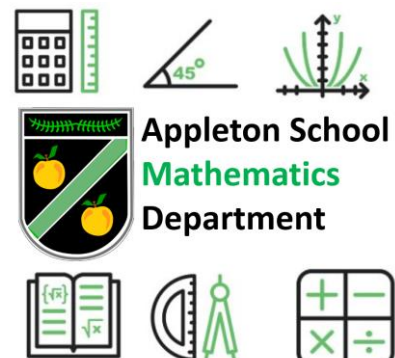
- **Overview:** A classic book that introduces students to problem-solving techniques in mathematics.
- **Independent Tasks:**
  - Apply Pólya's problem-solving strategies to a set of challenging problems from past A-Level papers.
  - Create a detailed problem-solving journal documenting the strategies used and the solutions found.
  - Share the journal with a study group and discuss alternative strategies.

#### 3. "The Code Book: The Science of Secrecy from Ancient Egypt to Quantum Cryptography" by Simon Singh

- **Overview:** This book explores the history of codes and cryptography.
- **Independent Tasks:**
  - Research the mathematics behind different cryptographic methods mentioned in the book.
  - Implement a simple encryption algorithm in a programming language of your choice.
  - Write a report on the role of number theory in modern cryptography.

#### 4. "Godel, Escher, Bach: An Eternal Golden Braid" by Douglas Hofstadter

- **Overview:** This interdisciplinary work explores connections between the works of mathematician Gödel, artist Escher, and composer Bach.

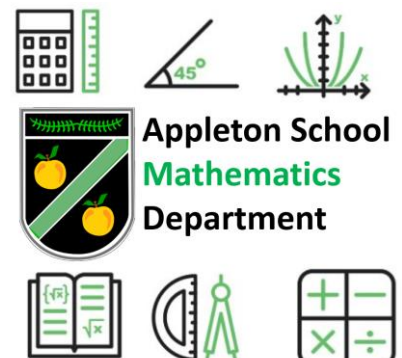




- **Independent Tasks:**
  - Create a presentation that explains Gödel's Incompleteness Theorems in the context of formal systems.
  - Analyze a piece of Escher's artwork to identify mathematical concepts such as symmetry and tessellation.
  - Compose a short essay on the interplay between mathematics, art, and music as presented in the book.
  
- 5. **"The Man Who Knew Infinity: A Life of the Genius Ramanujan" by Robert Kanigel**
  - **Overview:** A biography of the Indian mathematician Srinivasa Ramanujan, detailing his contributions to mathematics.
  - **Independent Tasks:**
    - Research and explain one of Ramanujan's key contributions to mathematics (e.g., his work on infinite series or partitions).
    - Solve a set of problems inspired by Ramanujan's discoveries.
    - Create a biographical timeline of Ramanujan's life and mathematical achievements.
  
- 6. **"Flatland: A Romance of Many Dimensions" by Edwin A. Abbott**
  - **Overview:** A novella that explores dimensions through the experiences of a two-dimensional being.
  - **Independent Tasks:**
    - Write an essay on the concept of dimensions and how the book's narrative helps to understand higher-dimensional spaces.
    - Create a visual project (e.g., a model or digital art) that represents different dimensions as described in the book.
    - Discuss the implications of higher dimensions in modern physics and mathematics.

#### Additional Resources and Activities

- **Join Online Mathematics Communities:**
  - Participate in forums like Art of Problem Solving (AoPS) or Stack Exchange to discuss problems and solutions with other math enthusiasts.
  
- **Math Competitions:**
  - Prepare for and participate in mathematics competitions such as the UKMT Senior Mathematical Challenge or the British Mathematical Olympiad.
  
- **University Lectures and MOOCs:**





○ Enroll in free online courses from platforms like Coursera, edX, or Khan Academy to explore university-level topics in mathematics.

• **Research Projects:**

- Undertake a small research project on a mathematical topic of interest, culminating in a written report or presentation.

### Summary

This reading list and the accompanying tasks are designed to not only deepen a student's understanding of mathematics but also to cultivate skills in independent learning, research, and problem-solving, which are crucial for success in university-level mathematics.

### Further Reading

A Level, in order to get a deep, meaningful and comprehensive understanding of Advanced Level Mathematics, reading around the subject is advised. There are some books available to help students make the transition from school mathematics to university mathematics.

These include:

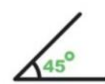
- Lara Alcock, *How to Study for a Mathematics Degree* (Oxford University Press)
- Kevin Houston, *How to Think Like a Mathematician* (Cambridge University Press)
- Why do buses come in threes? – Rob Easterway
- Fermat's Last Theorem – Simon Singh
- Alex's Adventures in Numberland – Alex Bellos
- The Simpsons and their Mathematical Secrets – Simon Singh

Some suggested books relevant to the topics common to Mathematics, Mathematics and Philosophy, and Mathematics and Computer Science are:

For some more academic reading please see the following below:

- C. Plumpton, E. Shipton & R.L. Perry, *Proof* (Macmillan)
- J. Rotman, *Journey into Mathematics: An Introduction to Proofs* (Prentice Hall)
- G. Smith, *Introductory Mathematics: Algebra and Analysis* (Springer)
- J. Baylis, *What is Mathematical Analysis?* (Macmillan)
- T.S. Blyth & E.F. Robertson, *Basic Linear Algebra* (Springer)
- Some books relevant to the Applied Mathematics topics are:
- D. Stirzaker, *Probability and Random Variables: A beginner's guide* (Cambridge)
- G. Grimmett & Welsh, *Probability, an introduction* (Oxford)
- D. Acheson, *From Calculus to Chaos: An introduction to dynamics* (Oxford)
- M. Lunn, *A First Course in Mechanics* (Oxford) chapters 1–4
- D.W. Jordan & P. Smith, *Mathematical Techniques* (Oxford)

One of the best ways you stand out during your Sixth Form studies is through the amount of independent study you undertake outside of the classroom. Regardless of your future plans, the ability to extend yourself and research independently into your interests is an invaluable skill – this will support your university applications and/or





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future job applications and interviews. All universities expect more than just classroom knowledge, which is where super curricular activities come in; these are academic enrichment tasks that show you are interested in your studies beyond what is on the school syllabus.

