

Maths

What should I do this summer?

With less time out of the house, reading becomes increasingly attractive, and you might be wondering if there is anything useful you could be reading to prepare you for university mathematics. There are some good books out there, and here are two that we particularly recommend as being both interesting and useful:

[How to think like a mathematician: a companion to undergraduate mathematics*](#)

Kevin Houston

'Looking for a head start in your undergraduate degree in mathematics? Maybe you've already started your degree and feel bewildered by the subject you previously loved? Don't panic! This friendly companion will ease your transition to real mathematical thinking. Working through the book you will develop an arsenal of techniques to help you unlock the meaning of definitions, theorems and proofs, solve problems, and write mathematics effectively. All the major methods of proof - direct method, cases, induction, contradiction and contrapositive - are featured. Concrete examples are used throughout, and you'll get plenty of practice on topics common to many courses such as divisors, Euclidean algorithms, modular arithmetic, equivalence relations, and injectivity and surjectivity of functions. The material has been tested by real students over many years so all the essentials are covered. With over 300 exercises to help you test your progress, you'll soon learn how to think like a mathematician.' (Copied from Amazon.co.uk)

[How to study for a mathematics degree*](#)

Lara Alcock

'Every year, thousands of students go to university to study mathematics (single honours or combined with another subject). Many of these students are extremely intelligent and hardworking, but even the best will, at some point, struggle with the demands of making the transition to advanced mathematics. Some have difficulty adjusting to independent study and to learning from lectures. Other struggles, however, are more fundamental: the mathematics shifts in focus from calculation to proof, so students are expected to interact with it in different ways. These changes need not be mysterious - mathematics education research has revealed many insights into the adjustments that are necessary - but they are not obvious and they do need explaining.' (Copied from Amazon.co.uk)

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There are also many interesting books about mathematics that might just keep you entertained. For example:

[How not to be wrong \(Jordan Ellenberg\)*](#)

[The man who loved only numbers \(a biography of Paul Erdos, by Paul Hoffman\)*](#)

[The music of the primes \(Marcus du Sautoy\)*](#)

[The code book \(Simon Singh\)*](#)

[Fermat's last theorem \(Simon Singh\)*](#)

The author of these last two, Simon Singh, has longstanding connections with Royal Holloway, including delivering one of our annual departmental lectures and speaking at our Exploring Mathematics event for schools; he was awarded an honorary doctorate in 2008.

If you enjoy numbers, you will probably enjoy Numberphile on YouTube: <https://www.youtube.com/channel/UCoxcjg-8xIDTYp3uz647V5A>.

For a sample, see

<https://www.youtube.com/watch?v=fQQ8liTWHhg&list=LLZooGkU3U5-rS3sQ2hmxKKA&index=315>

(The "mysterious JF McKee" is one of our lecturers!)

The Math Explorers' Club is an excellent resource "directed towards teachers, who are welcome to adapt and copy the materials in any way they see fit, as well as towards more advanced students, who may wish to learn independently".

<http://pi.math.cornell.edu/~mec/>

The material is split into self-contained "modules", and the modules include puzzles to help the learning, so that if you enjoy the challenge of maths puzzles then this gives a wonderful supply.

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