

Maths & Joint Schools: reading list and warmup exercises 2023

This is an excellent time to be studying Mathematics. New applications are constantly being discovered and our understanding within the older and more established branches grows rapidly. Some of this activity will be clearly seen during the third year of the course, where some of the options feature very recent work. Those who continue to the fourth year will, in some areas, be coming up to the forefront of modern research.

Career opportunities have never been better or more varied. The courses are recognized by employers as giving first-rate training in rigorous, analytical thinking. As well as providing opportunities for openings in mathematical and scientific research, and work with machine learning in industry, the course is now also recognized as a sound training for general and financial management and its related support services.

The time prior to coming up in October may be profitably spent in two ways. Firstly, try to **browse general books** that tackle the more serious aspects of the subject, but are still very readable. The books listed below should be borrowed from libraries, rather than purchased, and it is most unlikely that you will succeed in gaining access to all or indeed enjoy the style of them all. For this reason, a generous list is provided.

* D. Acheson, *1089 and all that*, OUP 2002, *The wonder book of geometry, a mathematical story*, OUP 2020.
* R.P. Courant and H. Robbins, *What is Mathematics?*, OUP 1975/1996.
* D. Hilbert and S. Cohn-Vossen, *Geometry and the Imagination,* AMS 1957.
* R.P. Feynman, *QED: The Strange Theory of Light and Matter*, Prince- ton 1985; *The Feynman Lectures in Physics*, Vols. I-III, Addison and Wesley 1963.
* R. Penrose, *The Road to Reality*, Random House 2004; *The Emperors New Mind*, OUP 1989/Vintage 1990; *Shadows of the Mind*, OUP 1994.
* P.C.W. Davies, *The Forces of Nature*, CUP 1979; *The Accidental Uni­verse*, CUP 1982.
* G. Polya, *How to Solve it*, Penguin 1990.
* *Significance*, <https://www.significancemagazine.com/> this is a popular British statistics journal, some articles are available online.
* *Chance,* <https://chance.amstat.org/> (you may need to copy and paste this link) popular US stats journal.
* I.N. Stewart, *Concepts of Modem Mathematics*, Penguin 1995; *Does God Play Dice?*, Penguin 1989; *The Problems of Mathematics*, OUP 1987.

Secondly, the time between now and coming up should be treated as an important opportunity to **prepare for the course**. The first year work is not easy, and time spent preparing will pay off well. Remember that not all A-level courses are the same, and so most of you will have some gaps. A set of 11 problem sheets is enclosed on topics with which you will be expected to be familiar in the courses you will be taking next term. Read through them and attempt those that do not appear obvious. The questions can also be found at

<https://www.maths.ox.ac.uk/study-here/undergraduate-study/practice-problems>

At the same address, a further 11 problem sheets on Induction, Algebra and

Calculus, and 2 on dynamics can be found that stretch you further.

It is also worthwhile to read the Study Guide that can be found at

<https://www.maths.ox.ac.uk/system/files/attachments/study_public_0.pdf>

Finally, if you wish to start reading ahead, the following books are particularly suitable for self-study:

* M. Hart: *Guide to Analysis*, MacMillan 1988.
* A.G. Hamilton: *Linear Algebra*, CUP 1989.
* D. Acheson: *From Calculus to Chaos*, OUP 1997. (Omit Ch. 4 and more advanced parts of chapters at a first reading.)

If you have difficulty in obtaining copies of these texts, do let us know as the College may be able to help.

All that remains is to wish you well in the meantime and to say that we look forward to welcoming you in October.

Best wishes,

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