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An Introduction to A-Level Further Mathematics

What is A-level Mathematics?

This pack contains a programme of activities and resources to prepare you to start an A-level in Further Mathematics in September. It is aimed to be used now and throughout the remainder of the summer term and over the summer holidays to ensure you are ready to start your course in September.

NOTE: A-level Further Mathematics must be taken alongside A-level Mathematics as it uses what you have learned in A-level Mathematics and takes it further.

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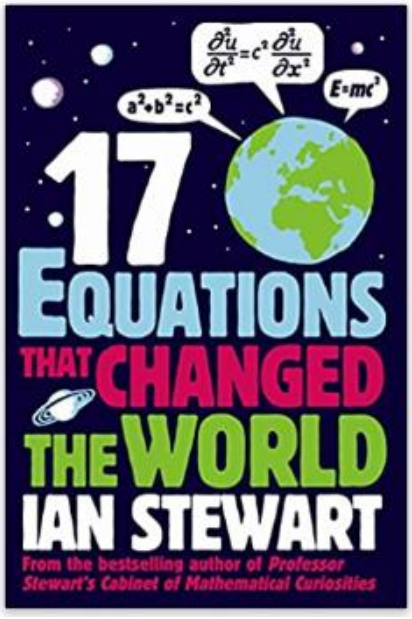
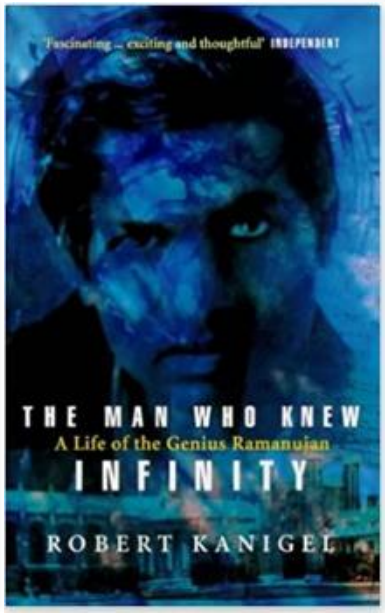
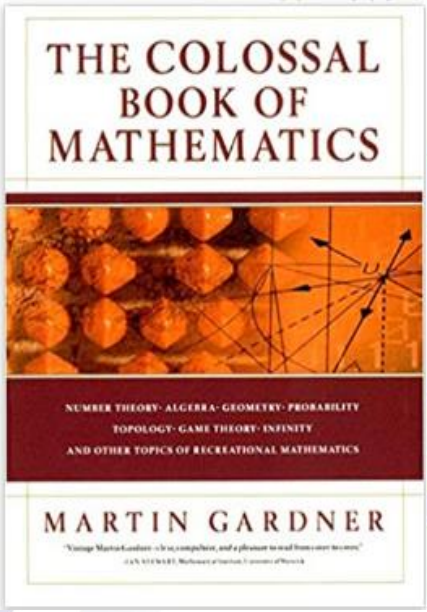
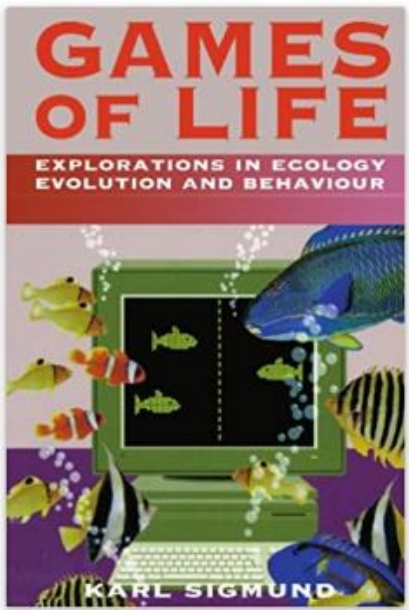
Read Maths Based Books

These books are all popular books about Mathematics and great for extending your knowledge and understanding.









https://www.theguardian.com/books/2012/jan/18/ian-stewart-top-10-popular-mathematics

These are numerous books you could read. There are great books available on audible, kindle too. Choose anyone that takes your fancy! Write a book review on it and hand this to your teacher in September.

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TED Talks

Download the TED talk app to your device. It's brilliant!!!

https://www.ted.com/playlists/189/math_talks_to_blow_your_mind

If these links don't work, you will find these easily with a google search using TED talk and the name of the speaker.

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Effective Practice

Effective practice in lessons is an essential skill for A-level Further Maths.

Independent learning and problem solving are the key skills for effective practice in Further Maths. That means doing your reading of textbooks ahead of time, trying to solve the hardest questions and talking with others to try to see new ways of approaching a problem.

While you are in class it is important to discuss difficult concepts, to ask questions you want answered and to embrace the fact that this class will push you past where getting Maths is easy. This class will get difficult!

We start learning Mathematical Proofs and this is the style examiners want to see in all of your work.

There are few examples at Study Well

https://studywell.com/maths/pure-maths/proof/proof-by-deduction/

Below is an example from the above website.

Prove that $x^2 - 4x + 9$ is always positive.

Hide Solution

By completing the square $x^2 - 4x + 9$ can be written as $(x - 2)^2 + 5$. Note that $(x - 2)^2$ is positive for any x as it is a square number . Subsequently, adding 5 will retain its positivity.

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Mastery in Maths is about Making Mistakes

Part of effective practice is pushing yourself into the difficult quesitons, and for some students this level is going to be the first time they are really challenged by Maths.

A-level Maths really pushes problem solving ability and that's really difficult for many people. Part of your job is to be OK with messing up. Below is a Ted Talk about the right type of mindset for A-level Maths.

https://www.youtube.com/watch?v=3icoSeGqQtY

Making mistakes forces your brain to become mentally tough while also making you think about a question holistically rather than just as right or wrong.

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Topics to Research

Further Pure Mathematics - 66% of the course

This is most of the course and covers a very wide array of topics. All your methods will take what you learn in A-Level Maths and expand on them.

Below is the list of TED talks for "Math talks to blow your mind"

https://www.ted.com/playlists/189/math_talks_to_blow_your_mind

You will then need to choose 2 out of the 3 options to study. We will attempt to cover all 3 options for you to choose the best one for yourself. Each option is worth 1/6 of your overall mark or roughly 17%

Further Statistics – 17%

One of the fastest growing sectors in the job market is that of Data Science. Further Statistics takes you a lot closer to what you would need at university and will cover material similar to that you see at University if you are not majoring in Mathematics.

https://www.prospects.ac.uk/job-profiles/data-scientist

Statistics is used in almost every professional job you can think of and if you're good at it you will make yourself a very valuable part of any team.

Being trained in Statistics is one of the most highly sought worker skills today.

Further Mechanics - 17%

This takes Mechanics in A-level Maths to a much higher level. Useful for people thinking of getting into Engineering, Physics and Science.

Below is a link explaining why:

https://www.youtube.com/watch?time_continue=10&v=-uCwgZUz51o&feature=emb_logo

Here is a free course you can sign up to if you're interested in this topic.

https://www.edx.org/course/mathematical-modelling-basics

Discrete Mathematics - 17%

Discrete Mathematics is one of the fastest growing sectors in Mathematics and relates heavily with computer learning and systems analysis. This is an excellent choice for those majoring in Business, Economics, Computer Science, Coding, and any scientific discipline that studies networks, connectivity, webs, and complex interrelated systems.

Why study Discrete Maths?

https://ivyleaguecenter.org/2015/03/17/why-discrete-math-is-very-important/

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Online Learning Courses

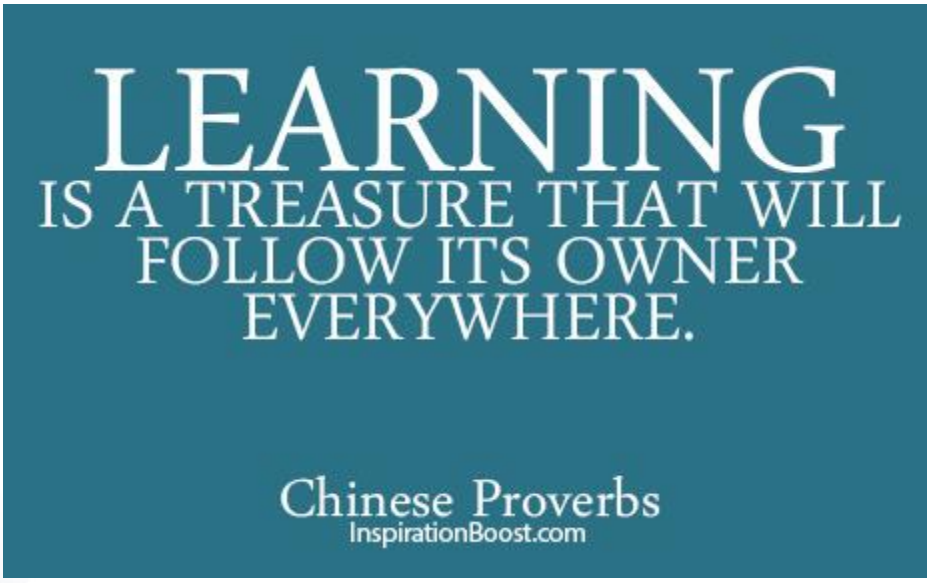
A Massive Open Online Course (MOOC) is an interactive step-by-step course aimed at reaching an unlimited number of participants worldwide to create a community of lifelong learners. There are many different MOOC providers that cover a huge variety of different subject and topic interests.

Typically, a MOOC will involve 2-3 hours study per week for 6 weeks or so. MOOCs are free of charge. All required course materials will be provided for you online, which is also 100% free! Each course is open to anyone with internet access across the world and all you need is your wonderful brain!

Here is a site that you may wish to try:

https://www.edx.org/course/subject/math

Follow the course learning instructions & complete all tasks, keep a record of what you do and save all work as evidence of your learning.



Good luck!