Wonder about, Do and Explore Mathematics: Preparing for A Level Mathematics

Before you commence the A Level Mathematics course in **September**, we really encourage you to engage with **some or all** of the following resources included here, which aim to give you a **flavour of mathematics outside of the school curriculum**. As a group of teachers, we wish that we had been pointed in this direction before we started our A level journey.

Our hope for you is that as you start this key year of your studies, you have a joy for learning about mathematics and that these resources guide you to realising that there is more to mathematics than doing times tables and solving equations.

The resources are split into different categories:

WONDER:

these resources that take you well outside the school curriculum where you learn because you enjoy learning about the subject that is mathematics, rather than because you enjoy doing mathematics.

These resources are mainly ones to read or watch, but won't involve much doing.

Perfect for when you're bored and want to do something other than scroll through social media…

DO:

these resources will take ideas that you should be familiar with from the school GCSE curriculum and allow you a chance to do some mathematics in a somewhat different setting.

Perfect if you want to do some maths and get your teeth into some problems that won't necessarily be solved with one solution or won't be solved in two minutes.

EXPLORE:

these resources will explore areas of mathematics that won't be considered in the A level mathematics curriculum but might be independently picked up at university level. This doesn't mean that they can't be explored now.

Perfect if you want to explore where mathematics can take you beyond Year 13…

WONDER	DO	EXPLORE
WATCH: TED talk: was maths invented or discovered? (5 minutes) https://www.ted.com/talks/jeff_dekofsky_is_math_discovered_or_invented	**LCM Sudoku** https://undergroundmathematics.org/divisibility-and-induction/lcm-sudoku	**READ Game Theory** https://www.investopedia.com/articles/investing/111113/advanced-game-theory-strategies-decisionmaking.asp
WATCH: TED talk: How big is infinity? (7 minutes) https://www.ted.com/talks/dennis_wildfogel_how_big_is_infinity	**Buckets and Ponds** https://undergroundmathematics.org/divisibility-and-induction/buckets-and-ponds	**WATCH (5 minutes)** https://www.ted.com/talks/lucas_husted_game_theory_challenge_can_you_predict_human_behavior
WATCH: TED talk: The Infinite Hotel Paradox (6 minute) https://www.ted.com/talks/jeff_dekofsky_the_infinite_hotel_paradox	**A Sequences Problem** https://undergroundmathematics.org/sequences/change-one-thing	**WATCH Introduction to Graph Theory (6 minutes)** https://www.youtube.com/watch?v=C7YrMRdLkqo
TED talk: Mysteries of Zero (2 minutes) https://ed.ted.com/lessons/mysteries-of-vernacular-zero-jessica-oreck-and-rachael-teel	**Staircase sequences** https://undergroundmathematics.org/thinking-about-numbers/staircase-sequences	**WATCH Euler Paths in Graph Theory (6-7 minutes)** https://www.youtube.com/watch?v=dSK5jTEe-AM
Inventing Zero as a number **READ** https://www.livescience.com/27853-who-invented-zero.html **WATCH (4 minutes)** https://www.youtube.com/watch?v=D-oxsEknllc	**Prime Triangles** https://undergroundmathematics.org/thinking-about-numbers/prime-triangles	**WATCH: The Origins and Uses of Trigonometry** https://www.youtube.com/watch?v=RxsdDkgJRAY **READ and DO:** https://undergroundmathematics.org/trigonometry-triangles-to-functions/from-stars-to-waves
WATCH: TED talk: why can't you divide by zero? (5 minutes) https://www.youtube.com/watch?v=NKmGVE85GUU		**WATCH: Intro to Critical Path Analysis (5 minutes)** https://www.youtube.com/watch?v=y2Wx8DQfFII
WATCH: The fatal flaw in the Enigma machine used in World War 2 (11 minutes) **https://www.youtube.com/watch?v=V4V2bpZlqx8**		**WATCH: (12 minutes)** https://www.ted.com/talks/alan_smith_why_you_should_love_statistics
READ: pi, what's in a number? **https://undergroundmathematics.org/thinking-about-numbers/pi-whats-in-a-number**		**WATCH: Misleading statistics (4 minute)** https://www.ted.com/talks/mark_liddell_how_statistics_can_be_misleading
READ: death by number…the historical dangers of being a mathematician! **https://undergroundmathematics.org/thinking-about-numbers/death-by-number**		**WATCH: False Positives in Covid-19 testing (13 minutes)** https://www.youtube.com/watch?v=VuskwsIW02M (really current affairs and worth a watch but persevere through the descriptive bit and the maths bit!)
READ and WATCH: Zeno's paradox https://undergroundmathematics.org/sequences/achilles-and-the-tortoise		**WATCH: Chaos Theory (6 minutes)** https://www.youtube.com/watch?v=r_5shyQGIeA
WATCH: TED talk (16 minutes) Fractals at the heart of African designs https://www.ted.com/talks/ron_eglash_the_fractals_at_the_heart_of_african_designs		