Issue 7 - April 2025

Maths Matters

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FORTITUDINE CRESCAMUS

Welcome to the April issue of the Newstead monthly maths newsletter!

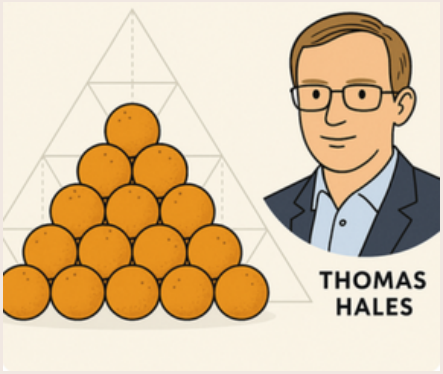
Each issue covers various maths matters: we will highlight some new or interesting maths **(Maths in the Moment)**, take you back in time for a snippet of historical maths fact **(Mathematical Time Machine)**, explain how maths is applied in the real world and how it links with other subjects **(Maths Meets the World),** show maths in unexpected places **(Maths in the Unexpected)** and give 5 recommendations **(Reasons to Love Maths).**

All this to prove that Maths does Matter! No doubt maths also matters to you so please get in touch and contribute to the next issue of this newsletter with your recommendations.
If you would like to contribute please contact **Elleanore P in 12F or Dr. Neman.**

MATHS Time Machine

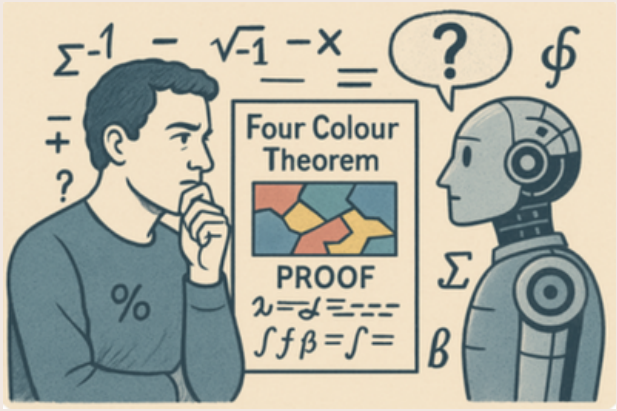
Cracking a 400-Year-Old Puzzle

In April 1998 Thomas **Hales** submitted his first version of the **computer-assisted proof** for **the Kepler Conjecture**, which deals with the most efficient way to pack spheres — like oranges or cannonballs (yes, it is a pyramid-like formation).



The proof submitted by Hales was a massive effort combining classical **geometry** and **extensive computer calculations**. It was so complex that it took **over a decade** to checked and confirmed. It is also one of the first major proofs to **rely heavily on computer-assisted calculations**, sparking **debate about the nature of proof in mathematics**.

MATHS In The Moment



Proof in the Age of AI: Rethinking What It Means *to Know* in Maths

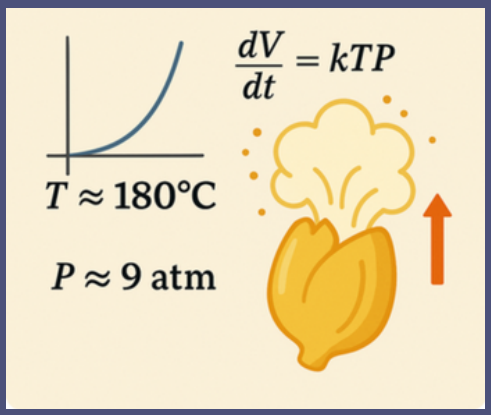
In a recent interview, mathematician and epidemiologist Adam **Kucharski** reflected on how our understanding of **mathematical proof** is evolving. Traditionally, proofs have been about **clarity and logic** — a sequence of steps we can follow and **verify** ourselves. But with the rise of **complex problems** and **computer-assisted solutions**, like the famous Four Colour Theorem, the nature of proof is becoming more collaborative and less hands-on. Kucharski points out that even basic concepts like negative numbers were once controversial, reminding us that what we consider "**obvious**" in maths often **depends on time, culture, and technology**. With **artificial intelligence** generating new theorems and checking proofs new debates are sparking not just among mathematicians, but also in philosophy, computer science, and education. We are facing fresh questions: Can we trust a proof we don't fully understand? **Does certainty look different in the 21st century?**

See the recommendation section for the link to the full interview.

"To doubt everything or to believe everything are two equally convenient solutions; both dispense with the necessity of reflection."
Jules Poincare

MATHS in the unexpected

The Popcorn Equation



When a **popcorn** kernel heats up, the water inside turns to steam, building pressure until the hull bursts. Scientists have **modelled** this process using **thermodynamics** and **calculus** — even deriving an equation that links temperature, pressure, and expansion rate. Research shows that **popcorn pops** best at around 180°C, and the ideal internal pressure when it bursts is about 9 atmospheres! **Calculus** is used in popcorn modelling to track how pressure, temperature, and volume change over time, helping predict the precise moment a kernel will pop and optimise popping conditions.

Understanding these numbers helps food engineers design machines that reduce waste and maximise fluffy kernels — **all thanks to maths**.

MATHS Meets The World

A Sip of Significance:
How One Tea Test Changed Statistics

Can **statistics** settle a debate over how to make the perfect cup of tea? In 1935, famed **statistician** Ronald A. Fisher devised an experiment to test a seemingly simple claim: a lady insisted she could tell whether milk was poured into a cup before or after the tea.

Rather than dismissing it, Fisher designed a **controlled experiment** to test her ability using the principles of **hypothesis testing** — laying the foundation for modern experimental design. The test involved 8 cups of tea: 4 with milk added first, and 4 with tea added first. The lady had to identify which was which. The probability of getting all 8 correct by chance alone was just 1 in 70 — a fact Fisher used to determine if her success was statistically significant.

The **"Lady Tasting Tea" experiment** became a **key moment** in statistics. It wasn't about tea — it was about how we **use maths to test claims objectively, with real-world applications today in medicine, psychology, and science.**

The **Tea Lady Experiment** is also discussed in this Numberphile video.

FIVE REASONS THIS MONTH TO LOVE MATHS

1. Interview with Mathematician Adam Kucharski: 'Our concepts of what we can prove are shifting'.

2. The Statistics of Microwave Popcorn - this video explains the science of popcorn kernels while introducing the normal distribution.

3. The Tea Lady Experiment – this Numberphile video discusses hypothesis testing and a famous experiment involving cups of tea.

4. The best way to pack spheres is explained in this Numberphile video.

5. In this very short video Hannah Fry explains why you should be polite to AI.