Maths Matters

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FORTITUDINE CRESCAMUS

Welcome to the first issue of the Newstead monthly maths newsletter

Each issue will cover 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 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.

Please contact **Elleanore P in12F or Dr. Neman.**

MATHS Time Machine

13 years ago (in November 2011) Minecraft was fully released. This fun game originally created using the Java programming language, is also a fantastic example of mathematics in action engaging players with a variety of mathematical concepts. What? I hear you ask. Well, as you craft and construct your dream structures, you're applying **geometry** to create shapes and understand **spatial reasoning** to navigate your three-dimensional world.

Each block you place relies on a **coordinate system**, helping you keep track of your position and resources. Crafting items involves **ratios** and **proportions**, ensuring you gather just the right amount of materials. Plus, with redstone mechanics, you can dive into **logic** and **algorithms**, creating intricate machines and systems. Whether designing **symmetrical patterns** or **scaling** models from real-life architecture, Minecraft turns math into a fun and interactive experience in geometry and spatial reasoning. Only this month an artificial intelligence company named Etched released Oasis, an artificially generated copy of Minecraft, as a proof of concept so still in an early prototype stage.

MATHS In The Moment
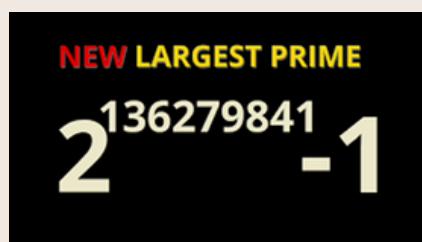
On 21 October 2024 **a new prime number** was officially announced, marking an exciting addition to the list of known primes. This newly identified number is a Mersenne prime, found by searching numbers that take the form $2^p - 1$ where p itself is a prime.

Prime numbers are highly valued for their unique properties, particularly the difficulty of their factorisation, which is widely applied in banking and cryptography for functions like digital signatures, secure communication, and data encryption, all of which maintain privacy and security. However, it is uncertain whether the new prime, due to its size, will find practical application straight away. If you would like to see the new prime in full and find out more about it then check out the links in the recommendations section below

The newly discovered prime, also known as M136279841, is calculated by multiplying together 136,279,841 twos, and then subtracting 1 (i.e. $2^{136,279,841} - 1$) so not one for our school calculators.

It has **41,024,320 digits** which is totally mind blowing. Reading two digits a second round the clock, it would take 237.5 days in total just to read M136279841 in full. This discovery is not just a mathematical milestone but also reflects advancements in computational power and algorithmic techniques that make finding such large primes possible.

> "Pure mathematics is, in its way, the poetry of logical ideas."
>
> — Albert Einstein

MATHS in the unexpected

Musicians often rely on the math-based harmonic principles because they tap into what naturally appeals to human ears, blending art and math into memorable songs that stick with listeners. They often use the **"four-chord progression"** —a popular harmonic sequence in pop music that's surprisingly mathematical. The four-chord progression follows a specific order of chords that sound naturally pleasing together.This can be seen in many songs, for example Taylor Swift's song "All Too Well (from the vault 10 min version)" or Ed Sheeran's "Perfect", just to name a couple.

MATHS Meets The World

In today's world we rarely stop to think about the application of ancient mathematical methods but Matt Parker and Professor Hannah Fry did just that and captured it in a fascinating and hilarious YouTube video. They demonstrate **a method for measuring the Earth's radius inspired by the ancient mathematician Eratosthenes** who, by observing the angles of shadows cast by sticks placed in different locations, famously measured the Earth's circumference. Matt and Hannah use basic geometry to estimate the Earth's radius, illustrating the principles behind Eratosthenes' original method from ancient Greece. They used the Shard (instead of a mountain), a home made protractor and two "Matt's cubit" measures (a cubit is an ancient measure of length, approximately equal to the length of a forearm which in Matt's case happens to be 50cm precisely) strapped to Matt's shoes. Sadly, the security prevented them from taking their home made maths tools up the Shard but they still cleverly illustrated how simple tools can yield significant insights into our planet's size. The photo shows geometry used and if you would like to see the video then please check the link in the recommendations section below.

5 REASONS THIS MONTH TO LOVE MATHS

1. See all 41,024,320 digits of the newly discovered prime and learn about it in this video by Matt Parker.

2. In this hilarious video featuring two serious mathematicians you can see how the Earth's radius can be measured using ancient methods.

3. Whilst spooky season may have already passed us, the following article scratches the surface on the connection between Zombies and pandemics in terms of mathematical modelling, covered by mathematical biologist Dr Thomas Woolley.

4. Learn in this video about "the forgetting / Ebbinghaus curve" and importance of why spaced repetition works.

5. In this BBC podcast Jim Al-Khalili talks to pioneering mathematician Professor Sir Adrian Smith about how a once-derided approach to statistics paved the way for AI.