How do you make something interesting?

By Peter Horszowski , issued by Pert Industrials

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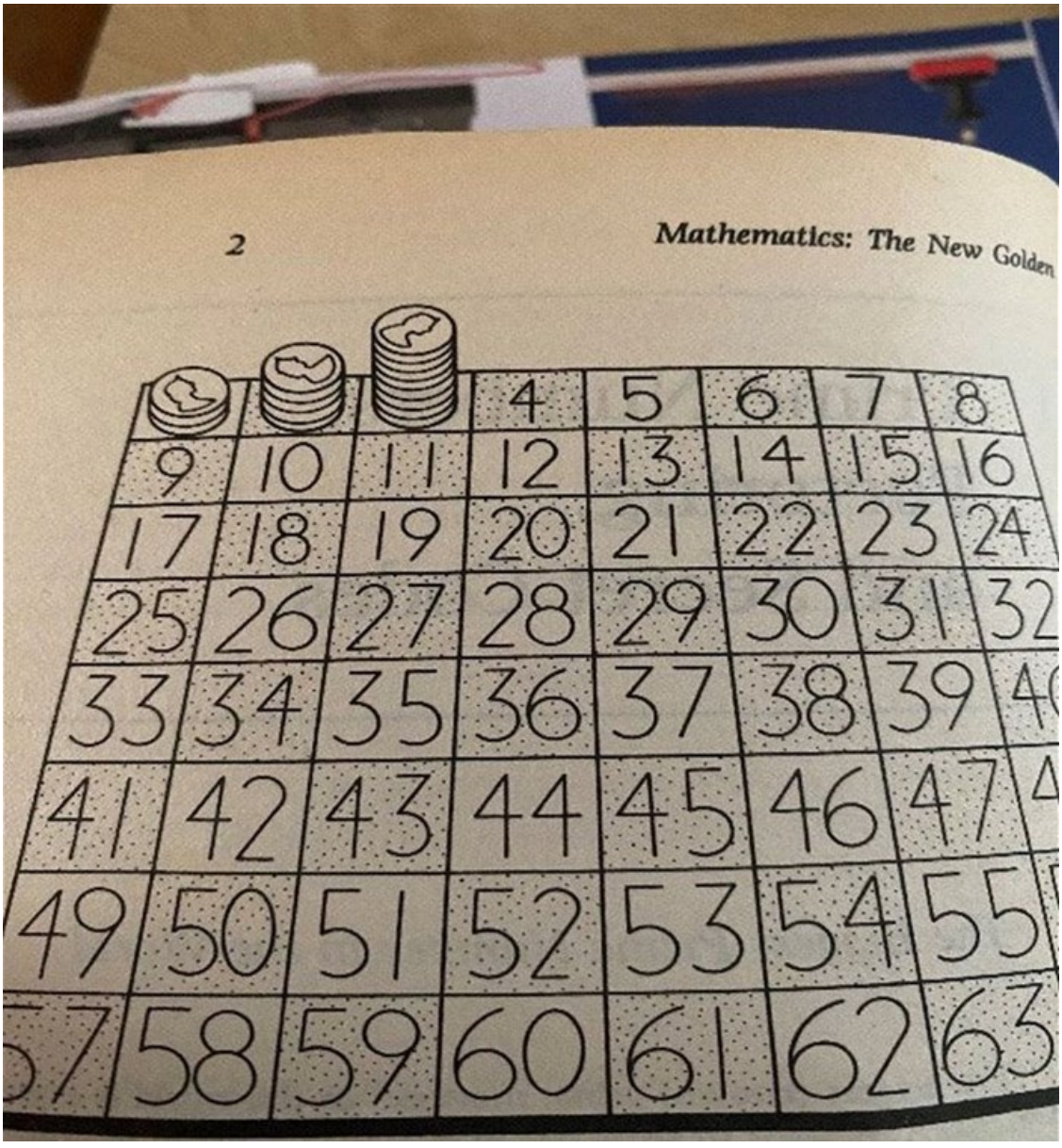
$2^{82,589,933} - 1$. That looks like a big number, but nothing too scary right? Maybe something a fancy calculator could handle, or, at least your computer should get to grips with it. After all, huge numbers are everywhere these days. Elon Musk's worth can easily fluctuate by $82m in a single tweet.

However, in this case the big number (82,589,933) hovers (apparently innocuously!) over a tiny little number: the number 2. This tells you how often to double up, which means things get pretty serious, pretty fast. Then they get impossible. Or almost impossible.

To give you a handle on this, consider Keith Devlin's illustration from *Mathematics: The New Golden Age.*



Imagine you put a couple of British 50p coins on the first square of a chessboard and then double up for each square. How high would the last tower of coins be? As high as Table Mountain? Up to the moon even? Maybe even beyond the moon?

Well, it turns out, the tower of coins would go right out our solar system and nearly touch a star, Proxima Centauri, almost

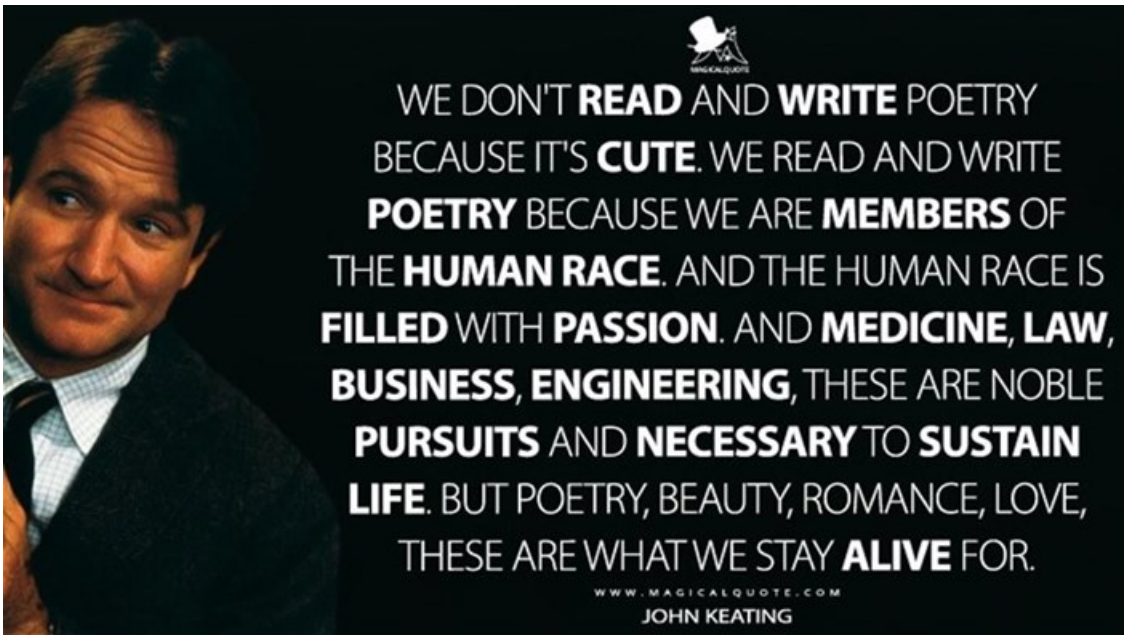
four light years away! 2^{65} is twice as big as that. Then, of course, 2^{66} doubles that number. Are you beginning to get an idea, just an inkling, of how huge 2 to the 82 million is?

Well, this is currently the largest known prime number. And that means that amongst the literally indescribable quantity of numbers that precede it, we know, for sure, that not a single one will divide exactly into it.

So what, you might ask? And that is exactly what my date *did ask*, when I explained this to her, many years ago.

“So what?” I repeated, stunned. “So what?! This an astonishing achievement of the human spirit; indeed, an astounding global collaboration of humans and machines, of creativity and commitment, of reasoning, ingenuity, and engineering. Prime numbers are the atoms of all mathematics, so this is an ancient and noble quest, an almost sacred search … a romantic endeavour, exquisite and profound. It is like poetry!”

Then, even louder and with rising passion (many people in the restaurant were listening by now) I concluded with a perfect rendition from *Dead Poets’ Society*:



Well, of course, I didn’t say any of that. As I recall, I sweated profusely and stammered something about a possible use in cryptography. Needless to add, there was no second date.

I was reminded of all of this, at a panel discussion during the 2022 World Science Forum (WSF) in Cape Town: *What if? Is Curiosity Still the Main Driving Force Behind Revolutionary Ideas in Science?*

Using examples from history and their own work, the panel showed the extraordinary impact of basic research (research for its own sake). Utility inevitably follows, sometimes immediately, as in the case of large primes and cryptography; sometimes only after many centuries, as in Euclid’s geometry and Kepler’s laws of planetary motion.

But it always proves itself useful and it can even be the difference between life and death on a huge scale: one panellist showed how her research in plant biology became part of the Covid mRNA vaccine. *If you build it, they will come.* The idea is to follow your interests and passions and the application will arrive when it arrives. Your own curiosity is the key -a holy curiosity, as Einstein phrased it.

And here is what another great 20th Century physicist responded, when asked if you need any special ability to do this kind of science:

“They just got interested in it!” Ah, but there is the rub: maths and science aren’t obviously interesting, as I unfortunately found out, when dating. Maybe I found it interesting, but my date clearly did not.

So how do you make this stuff interesting for everyone?

Well, that is an educational question with millions of academic responses. I won’t swim long in those deep waters. I will just share an experience. When I lived in Italy, I was consumed by Seria A Soccer. I religiously read the Gazzetta, bet the Totocalcio, and stayed up for the expert analysis.

And so I developed *expectations*: who would play, who would score, who would win, and what that would mean for the other teams. I became very interested to see if I got it right. (I usually didn’t, which is why I lost money.)

Gradually, I developed a sense of consequence, an idea of what one incident, in one game might mean, and what needed to happen then, as a consequence. Today, I don’t even know who is in the league – I still enjoy watching occasionally but I am not all that interested.

So, I’d say this: when you have a sense of connection, and you begin to develop your own expectations and predictions, a thing naturally becomes interesting. Anything. Even prime numbers. And that’s why I believe informal science education is vital to a country’s development and progress in the field. Here is Dr Derek Fish, interviewed by SABC News at the booth I shared at WSF, the Unizulu Science Centre’s Booth:

Do you see how he tries to meet people where they are at – attempting to make science real, meaningful, accessible, fun?

The Unizulu Science centre is not the only centre where PERT has had the honour to collaborate. There is also the STEC Centre in Westville, the Cape Town Science Centre in Observatory, the STEM lab in Missionvale, Sci-Bono in Joburg, Osizweni in Secunda and the ArcelorMittal centres in Newcastle and Vanderbijl.

I am sure it comes as a surprise to many readers, just how many centres there are, all around the country, trying, every day, to make science interesting.

The resources of this sector are tiny compared to the money poured into the formal school system, but one should not underestimate the impact of these talented and passionate communicators - particularly in stimulating a child's curiosity. And whether it proves useful or not (for careers, social and economic development etc. etc.) the ideas of science enrich our existence. They add to the texture of life and the joy and wonder of it all. As I wanted to say (but was too confused and shy on my date) there is a rousing beauty, a poetic, almost musical harmony, and elegance here.

Feynman again: "The world looks so different after learning science. For example, trees are made of air, primarily. When they are burned, they go back to air, and in the flaming heat is released the flaming heat of the sun which was bound in to convert the air into tree, and in the ash is the small remnant of the part which did not come from air, that came from the solid earth, instead. These are beautiful things, and the content of science is wonderfully full of them. They are very inspiring, and they can be used to inspire others."

ABOUT PETER HORSZOWSKI

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