

\$1 Million Reward for... a Number Puzzle?

That must be some number puzzle, you'd think, although, of course, a puzzle is no longer a puzzle at all when looked at from the right perspective. The challenge in question, with the big money prize for its solution on offer from the Clay Mathematics Institute in the USA, is known in the world of mathematics as the *Riemann Hypothesis*. There have been several popular paperbacks about it published in the last few years, and it rides on the back of a much older and yet deeper mystery, itself unsolved for over 2000 years.

Mathematics Phobia

The very word mathematics triggers a reflex instant turn-off in many people, and recognizing this was a key factor in the emergence of *Threshold Mathematics*. This is not orthodox mathematics by any standards, but it does raise some surprisingly profound questions.

For the further you delve into it the more you get the sense that once its perspective is more widely shared, a whole lot more could crumble than just a few academic careers in mathematics. And it's perhaps this that accounts for the eerie, stony, official silence which it has so far encountered.

What's the problem?

So how come all this fuss and such a big prize on offer? After all, the puzzle only requires someone to come up with a proof of what most mathematicians assume to be a sound suggestion about certain numbers. Yet they've been unable to prove Riemann's Hypothesis since its appearance in 1859. And that's because the numbers involved are very special. These are the *prime numbers* which have been baffling minds for centuries.

The pattern behind the sequence of the primes has been the great enigma, the big unknown that lies behind the Riemann Hypothesis. It dates back to the days of ancient Greece and even earlier, to times when discovering and working with numbers was a new and exciting activity, conferring considerable power and prestige on those who were competent at it.

The primes enigma

The primes are those numbers which are not divisible by any other number except one. After numbers 1, 2 and 3, the next few primes are: 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47...

The mystery has been: Is there any underlying pattern governing the sequence of the primes? And if so, what is it? (So that a

formula could be worked out for predicting the next prime.)

Most mathematicians intuitively feel that there is a hidden order, but have so far been unable to discover it. And such has been the fascination and obsession with finding it that it has become a kind of holy grail quest. When Riemann speculated about it in a paper in 1859, he seemed tantalisingly close to revealing the hidden order. But he didn't, and died quite young, leaving no clues in his surviving notes for later seekers.

A major quest

Since then there have been many speculative and learned papers written on the subject, as well as gatherings of experts, producing various complex and abstract attempts to solve the mystery. Various patterns in the numbers have been found, but still no coherent understanding of the primes as a whole.

Meanwhile, the language of some mathematicians, regarding the primes, has grown increasingly expressive, aesthetic and mystical, with references to their incredible beauty, profound mystery, dark fascination, arcane musical qualities and their timeless universal character. For example,

"Why do the primes achieve such a delicate balance between randomness and order?....What secrets are locked within the primes?" 'Prime Time', E. Klarreich, (New Scientist, 11/11/00)

"The primes are...timeless numbers that exist in some world independent of our physical reality."

The Music of the Primes, Oxford Professor Marcus du Sautoy.

This strength of feeling suggests an intuitive sensing of something much more profound than a mere number puzzle. So, what might be the significance or meaning behind this sequence of numbers which uniquely stand out from all others? Once that question has been answered, it should then be clear whether Riemann's Hypothesis is sound, and can or can't be proved.

What is a 'proof'?

Mathematicians talk of 'proving' the hypothesis but one might ask whether it is valid to pursue a conclusive proof at all in this case. Or indeed whether anything in this ever changing world can ever be finally and conclusively proved. Mathematical proofs have to satisfy certain very limited

criteria, strictly governed by the rules and conventions of... mathematics.

All in the mind

Mathematics is a purely mental discipline, a language for 'reading' and describing the world we experience in a strictly ordered, disciplined way. It assumes that there exists an unlimited quantity of identical, imaginary units which do not represent any particular real objects. These are the normal numbers we use, which can be added, subtracted, multiplied and divided in various ways.

This artificial system of imaginary 'equal measuring units' (EMUs) - very convenient for counting, measuring and calculating - is our basic number system and has proved very useful. But, of course, the real world isn't like that. So the order and precision achievable in mathematics is always an 'as if' pretence, abstract and idealistic.

Ever since humans have been reproducing standardised material objects, such as bricks or coins, there seems to have been a temptation to look at the world around us as though it were actually made up of some kind of minute, identical building blocks. Physics calls them fundamental particles. Another feature of this mindset has been to look at the world as if through a grid and see all space divided up into identical squares and cubes. Similarly, time is imagined as a line divided up into equal units of duration, whether millennia or milliseconds. But Nature is actually a continuity - in both time and space.

Asking the right questions

One question that arises is: How come so many brilliant minds over so many years haven't managed to crack the secret of the primes or the Riemann Hypothesis? Perhaps the whole attitude of seeking to 'crack it', as a macho kind of conquering, is itself an inappropriate approach in the pursuit of pure knowledge.

A deeper question can also be asked: Could the answer be found, not in the numbers themselves, but in their wider context? Cue *Threshold Mathematics* with its much broader perspective.

The Threshold Perspective

In 2005/6 this different way of thinking, from a very different perspective, was applied to the enigma of the primes. Significantly, it was a non-mathematical approach and looked at the puzzle from

outside the highly specialised world and mindset of mathematics.

What it does is move us away from endless permutations of numbers and formulae, away from technical cleverness, and towards an inclusive overview of and an insight into the whole situation.

Two-faced primes

Threshold Mathematics shows that only the prime numbers bridge the gap between mathematics and certain fundamental processes in the cosmos. So, what is this special quality they have?

This new approach sees the primes as double-sided – as having two polar opposite faces, two functions, two roles, so to speak. One is their familiar role in the normal number system.

The other role is their function, not as numbers as such, but as markers of an ordered progression of events in the formation of matter, and thus in the evolving of the physical cosmos, ie before there were mathematicians.

This immediately puts the subject in a much bigger context, perhaps more in tune with some of the expressive language about the primes referred to earlier. So when some mathematicians allude to other dimensions of reality, they seem to be intuitively aware of this greater context.

It's as if the primes serve as portals between two very different worlds, like a valve or duct which connects two distinct spaces and is thus part of both. Awareness of this dual quality has a significant bearing on how to tackle both the Riemann Hypothesis and the primes enigmas.

Threshold Mathematics

The way we habitually use numbers, like little mosaic building blocks, gives us an artificial view of the world, just as our 'grid' view of the world similarly breaks the cosmic, living wholeness down into rigid, measurable units or bits.

In Threshold thinking the primes have a unique correspondence with the way this world was and continues to be formed – that is, through a rhythmic process involving their harmonic resonance with the one, all-inclusive cosmos. They also only resonate numerically with oneness, one being both the biggest and the smallest number, depending on which way it's viewed.

Polarity

The universal principle of polarity-within-wholeness in everything is a key concept in all this, especially regarding the dual nature of the primes. And it seems to be one of the

vital missing factors that has prevented both puzzles being solved.

The *Threshold* view puts them in a much bigger context. It proposes that Riemann's intuition, in presenting his now famous hypothesis, was sound in relation to cosmic and natural reality. For he knew that the primes represented a consistent pattern, which he expressed as an infinite line of zeros. However, his mathematical model, a strange 'landscape', artificially constructed from graphs, was based on an inadequate conception of what *zero, one, positive* and *negative* mean in the bigger cosmic picture.

That failing already existed in the culture in which he grew up and later worked. So the model he devised for a more accurate understanding of the primes had an inherent inconsistency which left his hypothesis neither provable nor disprovable.

Yet it appears to be logically sound because he used certain strangely ambivalent mathematical values called complex numbers. These have both positive and negative qualities simultaneously, a peculiarity which perhaps distracts from the basic inconsistency.

However, by introducing this complexity, Riemann also created something of a mathematical Gordian Knot which until now no one has been able to untie. So, as long as the underlying fallacies remained unquestioned, it's not surprising that the puzzle remained unsolved.

Special numbers

Threshold Mathematics, clear in its own assumptions, has found that all the primes occur within just two simple sequences of numbers, known as arithmetic progressions.

In these, we count in sixes, starting from minus one and from plus one – given the principle of universal polarity.

The crucial number 6, a vital part of this pattern, is what's known as a perfect number. That's because, uniquely, it symmetrically combines the functions of addition and multiplication. That is to say, its three factors, 1, 2 and 3, added or multiplied together, result in 6.

Combining addition and multiplication is also a unique characteristic of the primes, when used in a special mathematical device called the *zeta function*, as Riemann well knew.

Happy ending?

So, in conclusion, if this Threshold approach is valid, then just about everything in mathematics, as

we've known it, shifts. Not only does *Threshold Mathematics* reveal the deeper meaning of the primes and the fallacy behind the Riemann Hypothesis, but it also explains other mathematical enigmas such as *pi*, the *Golden Ratio* and the *Fibonacci series*.

These, we realise, are all vital, interconnected parts of the one pattern we can appreciate from the *Threshold*. It gives us a picture of how beautifully coherent and elegantly simple, in principle, this vast, complex universe is.

Getting there

And how do we get to this threshold? It's obviously not something that money or worldly power can achieve for us. It's an inner process involving the will to discover, which we first have to apply to ourselves with integrity and honesty, along with the courage temporarily to put aside prejudices and step out of familiar comfort zones. So there are no easy short cuts.

But once we have the goal and the vision in mind, we can move ever closer to it. That vision is set out in a simple, straightforward way in *Notes From the Threshold*, the core essence and heart of a longer work, *The Threshold Perspective*, available online as a free download.

The \$1 million prize?

And as for that \$1 million prize? The double puzzle, along with several others, has, it seems, now been solved. It has been clearly shown why the Riemann Hypothesis can neither be proved nor disproved.

So will the Clay Mathematics Institute pay up? Or will it play a classic procedural *Catch 22* game to avoid acknowledging that an outsider has solved its two oldest and most famous problems - and spoiled the primes party? The catch is its requirement for any solution to be published in two 'respected' journals, none of which, of course, will touch such an unorthodox work, even though it does logically and consistently do the business and deliver the numbers.

The Primal Code is available free from www.pathwayinitiatives.co.uk under **Threshold Mathematics**.