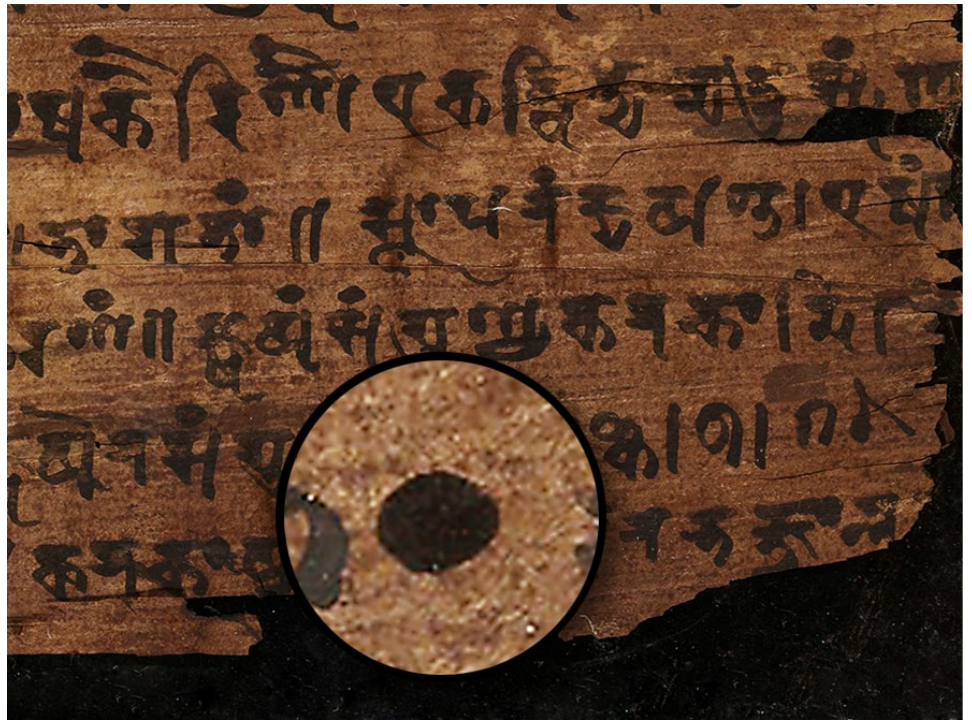


Zero: the idea that changed the world

Has the number “zero” done more to advance humanity than any other invention? Many mathematicians think so – and yesterday, it emerged that it is far older than they originally thought.



Zero the hero: The number's round shape represents the circle of life. © Oxford University

According to scientist David Chivall, the number zero is a bit like The Beatles.

Today, we take both for granted. But for those who were alive in the 1960s, the four Liverpoolians changed everything. “I imagine it’s very similar to zero,” he mused. Hundreds of years ago, when people first realised that the *lack* of something could be counted like a number, “it must have been quite a revolutionary idea.”

Now, he and his colleagues at Oxford University have discovered that the revolution began far earlier than they thought.

The university owns the **Bakhshali manuscript**, which is essentially an ancient Indian maths textbook; it is full of problems intended to teach merchants arithmetic.

“There’s a lot of ‘If someone buys this and sells this how much have they got left?’” says mathematics professor Marcus du Sautoy. More importantly, it contains the earliest example of a circular figure, zero, which eventually evolved into the symbol used today.

Q&A

Q: What do we know?

A: Zero has two basic uses: as a placeholder (as in 101) and as a number in its own right (between one and minus one). The manuscript

When du Sautoy and Chivall **carbon dated** it, they discovered that it was from the third or fourth century – around 500 years older than expected.

Around this time, ancient Mayan and Babylonian mathematicians had also invented placeholders to represent nothing (such as the lack of tens in the number 101). But India gave zero its shape, and eventually became the first to treat it as a number in its own right.

Du Sautoy thinks this is because Indian philosophy is based on concepts like *nirvana* and *shunya*: the idea that meaning is found in contemplating nothingness. It shows that “Culture is important in making big mathematical breakthroughs.”

And what a breakthrough. Zero helped merchants to balance their books, an essential part of successful trade. It allowed scholars to invent **algebra** and **calculus**, which are central to physics, engineering and medicine. Zero was also key to inventing **computing**.

In fact, it is “widely seen as one of the

greatest innovations in human history”, says the president of the **Project Zero**. Could it be the greatest of all?

Much ado about nothing

“No,” say some. When it comes to the greatest innovation in history, there is only one contender: the ability to control fire. This helped people to cook food, stay warm, fight off danger, and evolve into Earth’s dominant species. Humanity survived for millennia without the number zero, but we could not have done without heat.

“But zero made things interesting,” counter mathematicians. It advanced trade, medicine and technology: the foundations of modern civilisation. Without zero we would be stuck in ancient ways, with short lifespans, few opportunities, and – perhaps worst of all – no internet to entertain us. We should celebrate it more often.

does not use the latter; one of its problems has the answer zero, but it is represented by a blank space. However, it uses a round symbol to show zero as a placeholder.

Q: What do we not know?

A: Who first invented the idea of zero as a

number in its own right. The earliest example is a text by the Indian mathematician Brahmagupta, which was written in 628AD. He wrote rules which showed how to reach zero through addition and subtraction, and how to use it in an equation. But he did not claim to have invented the concept himself.

YOU DECIDE

1. Which would you rather live without: fire or the number zero?
2. What do you think is the most important innovation in history? (It does not have to be either of the above!)

WORD WATCH

Bakhshali manuscript – Discovered in 1881, buried in the village of Bakhshali. The village is now in Pakistan, but was then part of India. It is written in Sanskrit and made from birch bark.

Carbon dated – A way of finding out how old something is, if it is made from natural materials containing carbon. Scientists

ACTIVITIES

1. There are three classes with 27 students. Every day, nine students read an article on *The Day*. How many days will it be until zero students have NOT read an article?
2. Choose one of the areas which the number zero helped to advance, mentioned in the article above (ie, trade or physics). Then create a short presentation on how that thing changed the world.

measure the amount of carbon-14, a radioactive isotope which decays over time.

Algebra – A branch of mathematics in which numbers are replaced by letters to create formulae and equations. This is useful in everything from accounting to architecture.

Calculus – A branch of mathematics which studies how something changes over time. This can then be used to try to predict the future, and is useful in everything from driving

SOME PEOPLE SAY...

"In nothingness, there is everything."
Jiddu Krishnamurti

WHAT DO YOU THINK?

to computer graphics.

Computing – Computers use a binary code (the numbers 1 and 0) to represent data, sound and images.

Project Zero – A group of Indian and global academics who are trying to solve "the continuing controversy in the world, among mathematicians and laymen alike, as to when, where and why the zero digit was invented".

BECOME AN EXPERT

Read this article on theday.co.uk for links to recommended videos and further reading.

 Notes

