Who Was Srinivasa Ramanujan?

After demonstrating an intuitive grasp of mathematics at a young age, Srinivasa Ramanujan began to develop his own theories and in 1911, he published his first paper in India. Two years later Ramanujan began a correspondence with British mathematician G. H. Hardy that resulted in a five-year-long mentorship for Ramanujan at Cambridge, where he published numerous papers on his work and received a B.S. for research. His early work focused on infinite series and integrals, which extended into the remainder of his career. After contracting tuberculosis, Ramanujan returned to India, where he died in 1920 at 32 years of age.

Early Life

Srinivasa Ramanujan was born on December 22, 1887, in Erode, India, a small village in the southern part of the country. Shortly after this birth, his family moved to Kumbakonam, where his father worked as a clerk in a cloth shop.

Ramanujan was a child prodigy and a mathematical genius. The greatest thing about him probably is how he turned out to this this amazing mathematician despite having little or no formal outside exposure to advanced mathematics. He

was a self – taught genius from a very humble origins completely disconnected from the world other excelling mathematicians and largely worked out of his own in utter isolation and often in poverty.

Ramanujan possessed an incredibly amazing intuition of numbers, fractions and and infinite series, possibly like no other mathematician did.

He churned out a huge number of significant and complex results largely based on intuition mingled with argument and induction and some sort of innate insight that only seemed to be possessed often without formal proofs and coherent accounts. Ramanujan attended the local grammar school and high school and early on demonstrated an affinity for mathematics.

When he was 15, he obtained an out-of-date book called *A Synopsis of Elementary Results in Pure and Applied Mathematics*, Ramanujan set about feverishly and obsessively studying its thousands of theorems before moving on to formulate many of his own. At the end of high school, the strength of his schoolwork was such that he obtained a scholarship to the Government College in Kumbakonam.

A Blessing and a Curse

However, Ramanujan's greatest asset proved also to be his Achilles heel. He lost his scholarship to both the Government College and later at the University of Madras because his devotion to math caused him to let his other courses fall by the wayside. With little in the way of prospects, in 1999 he sought government unemployment benefits.

Yet despite these setbacks, Ramanujan continued to make strides in his mathematical work, and in 1911, published a 17-page paper on Bernoulli numbers in the *Journal of the Indian Mathematical Society*. Seeking the help of members of the society, in 1912 Ramanujan was able to secure a low-level post as a shipping clerk with the Madras Port Trust, where he was able to make a living while building a reputation for himself as a gifted mathematician.

Cambridge

Around this time, Ramanujan had become aware of the work of British mathematician G. H. Hardy — who himself had been something of a young genius — with whom he began a correspondence in 1913 and shared some of his work. After initially thinking his letters a hoax, Hardy became convinced of

Ramanujan's brilliance and was able to secure him both a research scholarship at the University of Madras as well as a grant from Cambridge.

The following year, Hardy convinced Ramanujan to come study with him at Cambridge. During their subsequent five-year mentorship, Hardy provided the formal framework in which Ramanujan's innate grasp of numbers could thrive, with Ramanujan publishing upwards of 20 papers on his own and more in collaboration with Hardy. Ramanujan was awarded a bachelor of science degree for research from Cambridge in 1916 and became a member of the Royal Society of London in 1918.

Doing the Math

"[Ramanujan] made many momentous contributions to mathematics especially number theory," states George E. Andrews, an Evan Pugh Professor of Mathematics at Pennsylvania State University. "Much of his work was done jointly with his benefactor and mentor, G. H. Hardy. Together they began the powerful "circle method" The circle method has played a major role in subsequent developments in analytic number theory. Ramanujan also discovered and proved that 5 always divides p(5n+4), 7 always divides p(7n+5) and 11 always divides p(11n+6). This discovery led to extensive advances in the theorem of modular forms."

Of Ramanujan's published papers — 37 in total — Professor Bruce.C.Berndt reveals that "a huge portion of his work was left behind in three notebooks and a 'lost' notebook. These notebooks contain approximately 4,000 claims, all without proofs. Most of these claims have now been proved, and like his published work, continue to inspire modern-day mathematics."

A biography of Ramanujan titled *The Man Who Knew Infinity* was published in 1991, and a movie of the same name starring Dev Patel as Ramanujan and Jeremy Irons as Hardy, premiered in September 2015 at the Toronto Film Festival.

Years of hard work, a growing sense of isolation and exposure to the cold, wet English climate soon took their toll on Ramanujan and in 1917 he contracted tuberculosis. After a brief period of recovery, his health worsened and in 1919 he returned to India.

The Man Who Knew Infinity

Ramanujan died of his illness on April 26, 1920, at the age of 32. Even on his deathbed, he had been consumed by math, writing down a group of theorems that he said had come to him in a dream. These and many of his earlier theorems are so complex that the full scope of Ramanujan's legacy has yet to be completely revealed and his work remains the focus of much mathematical research. His collected papers were published by Cambridge University Press in 1927.

National Mathematics day

The Indian government declared 22 December to be **National Mathematics Day**. This was announced by Prime Minister Manmohan Singh on 26 February 2012 at Madras University, during the inaugural ceremony of the celebrations to mark the 125th anniversary of the birth of the Indian mathematical genius Srinivasa Ramanujan (22 Dec 1887- 26 Apr 1920). On this occasion Singh also announced that 2012 would be celebrated as the National Mathematics Year.

Since then, India's National Mathematics Day is celebrated every 22 December with numerous educational events held at schools and universities throughout the country. In 2017, the day's significance was enhanced by the opening of the Ramanujan Math Park in Kuppam, in Chittoor, Andhra Pradesh