Srinivasa Ramanujan

Indian mathematician

Srinivasa Ramanujan, (born December 22, 1887, Erode, India—died April 26, 1920, Kumbakonam), Indian mathematician whose contributions to the theory of numbers include pioneering discoveries of the properties of the partition function.

When he was 15 years old, he obtained a copy of George Shoobridge Carr's *Synopsis of Elementary Results in Pure and Applied Mathematics,* 2 vol. (1880–86). This collection of thousands of theorems, many presented with only the briefest of proofs and with no material newer than 1860, aroused his genius. Having verified the results in Carr's book, Ramanujan went beyond it, developing his own theorems and ideas. In 1903 he secured a scholarship to the University of Madras but lost it the following year because he neglected all other studies in pursuit of mathematics.

Ramanujan continued his work, without employment and living in the poorest circumstances. After marrying in 1909 he began a search for permanent employment that culminated in an interview with a government official, Ramachandra Rao. Impressed by Ramanujan's mathematical prowess, Rao supported his research for a time, but Ramanujan, unwilling to exist on charity, obtained a clerical post with the Madras Port Trust.

In 1911 Ramanujan published the first of his papers in the *Journal of the Indian Mathematical Society*. His genius slowly gained recognition, and in 1913 he began a correspondence with the British mathematician Godfrey H. Hardy that led to a special scholarship from the University of Madras and a grant from Trinity College, Cambridge. Overcoming his religious objections, Ramanujan traveled to England in 1914, where Hardy tutored him and collaborated with him in some research.

Ramanujan's knowledge of mathematics (most of which he had worked out for himself) was startling. Although he was almost completely unaware of modern developments in mathematics, his mastery of continued fractions was unequaled by any living mathematician. He worked out the Riemann series, the elliptic integrals, hypergeometric series, the functional equations of

the zeta function, and his own theory of divergent series. On the other hand, he knew nothing of doubly periodic functions, the classical theory of quadratic forms, or Cauchy's theorem, and he had only the most nebulous idea of what constitutes a mathematical proof. Though brilliant, many of his theorems on the theory of prime numbers were wrong.

In England Ramanujan made further advances, especially in the partition of numbers (the number of ways that a positive integer can be expressed as the sum of positive integers; e.g., 4 can be expressed as 4, 3 + 1, 2 + 2, 2 + 1 + 1, and 1 + 1 + 1 + 1). His papers were published in English and European journals, and in 1918 he was elected to the Royal Society of London. In 1917 Ramanujan had contracted tuberculosis, but his condition improved sufficiently for him to return to India in 1919. He died the following year, generally unknown to the world at large but recognized by mathematicians as a phenomenal genius, without peer since Leonhard Euler (1707–83) and Carl Jacobi (1804–51). Ramanujan left behind three notebooks and a sheaf of pages (also called the "lost notebook") containing many unpublished results that mathematicians continued to verify long after his death.