1729

1729 is the natural integer following 1728 and preceding 1730. **It** is known as the **Hardy–Ramanujan number** because of a famous anecdote given us by the British mathematician G. H. Hardy, concerning a visit to Srinivasa Ramanujan who was in the hospital.

Srinivasa Ramanujan was a famous Indian mathematician. Born on December 22, 1887, to a poor Hindu Brahmin family in Erode in the state of Tamil Nadu in South India, he was a self-taught genius who discovered a variety of quirky and hitherto mostly unexplored properties of numbers, starting from his school days. He just liked to think about numbers. Later in life, he made contact with the English mathematician, G. H. Hardy, and went to live in England. While there, he became ill, and Hardy went to visit him in the hospital. Here is Hardy's account:

I remember once going to see him when he was ill at Putney. I had ridden in taxi cab number 1729 and remarked that the number seemed to me rather a dull one, and that I hoped it was not an unfavorable omen.

"No," he replied, "it is a very interesting number; it is the smallest number expressible as the sum of two cubes in two different ways."

You see, a mathematician is friendly with all sorts of numbers. I remember my father saying that he was not lonely at night because he thought of math. "It's always there," he said.

The two different ways of getting to 1729 from pairs of cubes are as follows:

$1729 = 1^3 + 12^3 \qquad 1729 = 9^3 + 10^3$

By the way, this curiosity was found in one of Ramanujan's notebooks dated years before the incident, and it was also noticed by Frenicle de Bessy in 1657.

And these two were not the only ones to have interesting things to say about 1729.
Masahiko Fujiwara showed that 1729 is one of four positive integers (the others being 1, 81, and 1458) which, when its digits are added together, produces a sum which, when multiplied by its reversal, yields the original number:

$--1 + 7 + 2 + 9 = 19$
$19 \times 91 = 1729$

$1 + 4 + 5 + 8 = 18$
$18 \times 81 = 1458$

Who would have thought of it all?

Note: 1729 may seem like a very big number, but this essay has 1729 letters (or other characters) at this time.