HARDY – RAMANUJAN NUMBER

This is a story about one of India's great mathematic genius Srinivasa Ramanujan. Once another famous mathematician Prof. G. H. Hardy came to visit him in a taxi whose number has 1729 while taking to Ramanujan, Hardy described this number 'a dull number'. Ramanujan quickly pointed out this 1729 was indeed interesting. He said it is "the smallest number that can be expressed as a sum of two cubes in two different ways".

$$1729 = 1728 + 1 = 12^3 + 1^3$$
$$1729 = 1000 + 729 = 10^3 + 9^3$$

1729 has since been known as the Hardy - Ramanujan Number

Also

(i) In the decimal representation of transcendental number e, 1729th decimal place is the beginning of first occurrence of all ten digits (0 to 9) consecutively.

(ii) The sum of the digits of 1729 is $\mathbf{1 + 7 + 2 + 9 = 19}$, subsequently this concept gave rise to Euler's result

$$\mathbf{59^4 + 158^4 = 133^4 + 134^4 = 635318657}$$

1729 is the smallest Hardy – Ramanujan number. These are an infinitely many such numbers. Few are

$$\mathbf{4104 = 9^3 + 15^3 = 2^3 + 16^3}$$
$$\mathbf{13832 = 18^3 + 20^3 = 2^3 + 24^3}$$
$$\mathbf{20683 = 19^3 + 24^3 = 10^3 + 27^3}$$
$$\mathbf{39312 = 15^3 + 33^3 = 2^3 + 34^3}$$
$$\mathbf{40033 = 16^3 + 33^3 = 9^3 + 34^3}$$
$$\mathbf{64232 = 26^3 + 36^3 = 17^3 + 39^3}$$