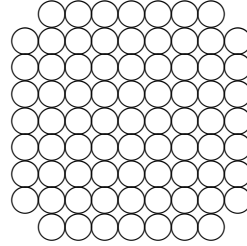


# 77 Seventy-Seven LXXVII



Corresponding ordinal: seventy-seventh.

The number 77 is the thirty-ninth odd number and the fifty-fifth composite number.

As a product of primes:  $77 = 7 \cdot 11$ .

The number 77 has four divisors: 1, 7, 11, 77.

The number 77 is the sixtieth deficient number:  $s(77) = 1 + 7 + 11 = 19 < 77$ .

As a sum of four or fewer squares:  $77 = 2^2 + 3^2 + 8^2 = 4^2 + 5^2 + 6^2 = 1^2 + 2^2 + 6^2 + 6^2 = 3^2 + 4^2 + 4^2 + 6^2$ .

As a sum of nine or fewer cubes:  $77 = 5 \cdot 1^3 + 2^3 + 4^3 = 2 \cdot 1^3 + 6 \cdot 2^3 + 3^3$ .

As a difference of two squares:  $77 = 9^2 - 2^2 = 39^2 - 38^2$ .

The number 77 appears in four Pythagorean triples:

[36, 77, 85], [77, 264, 275], [77, 420, 427], [77, 2964, 2965].

The first and fourth are primitive.

As a sum of three odd primes:  $77 = 3 + 3 + 71 = 3 + 7 + 67 = 3 + 13 + 61 = 3 + 31 + 43 = 3 + 37 + 37 = 5 + 5 + 67 = 5 + 11 + 61 = 5 + 13 + 59 = 5 + 19 + 53 = 5 + 29 + 43 = 5 + 31 + 41 = 7 + 11 + 59 = 7 + 17 + 53 = 7 + 23 + 47 = 7 + 29 + 41 = 11 + 13 + 53 = 11 + 19 + 47 = 11 + 23 + 43 = 11 + 29 + 37 = 13 + 17 + 47 = 13 + 23 + 41 = 17 + 17 + 43 = 17 + 19 + 41 = 17 + 23 + 37 = 17 + 29 + 31 = 19 + 29 + 29 = 23 + 23 + 31$ .

The number 77 is the sum of three consecutive squares as well as the sum of the first eight prime numbers.

The number 77 clues do not necessarily suffice to guarantee a unique solution in Sudoku. Any greater number of clues do.

The number 77, and its sibling 49, are the only two-digit numbers whose home prime is not known. The *home prime* is obtained by repeatedly taking a number and concatenating its prime factors until you reach a prime. The first six terms of the sequence starting at 49 are 49, 77, 711, 3379, 31109, 132393, . . . . That's because  $49 = 7 \cdot 7$ ,  $77 = 7 \cdot 11$ ,  $711 = 3 \cdot 3 \cdot 79$ ,  $3379 = 31 \cdot 109$ , and  $31109 = 13 \cdot 2393$ .

The number  $77! + 1$  is a prime.

The number 77 is the smallest number of multiplicative persistence four. To find the multiplicative persistence of a multi-digit number, multiply its digits together and repeat until you get a single digit number. So for 77 you get the sequence 77, 49, 36, 18, 8, and you have a single digit number after four steps.

The number 77 is the largest number that cannot be written as a sum of distinct numbers greater than 1, the sum of whose reciprocals is equal to 1. This curious result was proved by Ron Graham in *A theorem on partitions* in 1963, with a little help from D. H. Lehmer who showed that you couldn't write 77 that way. Notice that you can write 11 that way:  $11 = 2 + 3 + 6$  and  $1/2 + 1/3 + 1/6 = 1$ . Also  $181 = 2 + 3 + 7 + 78 + 91$ . One feature of Graham's proof is that it lists explicit ways of doing this for each number from 78 to 333.

The number 77 is the smallest number that requires five syllables to say in English.

American Airlines Flight 77 crashed into the Pentagon on September 11, 2001.

Red Grange, the Galloping Ghost, played football wearing the number 77 for the University of Illinois and for the Chicago Bears.