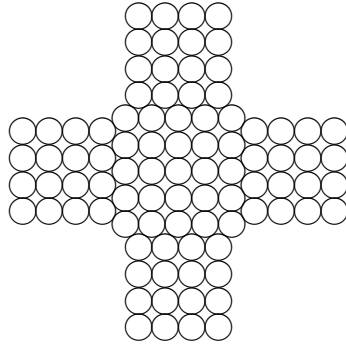


89 Eighty-Nine LXXXIX



Corresponding ordinal: eighty-ninth.

The number 89 is the forty-fifth odd number and the twenty-fourth prime number.

The number 89 is the sixty-eighth deficient number.

As a sum of four or fewer squares: $89 = 5^2 + 8^2 = 2^2 + 2^2 + 9^2 = 2^2 + 6^2 + 7^2 = 3^2 + 4^2 + 8^2$.

As a sum of nine or fewer cubes: $89 = 3 \cdot 1^3 + 4 \cdot 2^3 + 2 \cdot 3^3 = 1^3 + 3 \cdot 2^3 + 4^3 = 2^3 + 3 \cdot 3^3$.

As the difference of two squares: $89 = 45^2 - 44^2$.

The numbers 89 and 97 are the first two consecutive prime numbers that differ by 8.

The number 89 appears in two Pythagorean triples: [39, 80, 89] and [89, 3960, 3961].

Both are primitive, of course.

As a sum of three odd primes: $89 = 3 + 3 + 83 = 3 + 7 + 79 = 3 + 13 + 73 = 3 + 19 + 67 = 3 + 43 + 43 = 5 + 5 + 79 = 5 + 11 + 73 = 5 + 13 + 71 = 5 + 17 + 67 = 5 + 23 + 61 = 5 + 31 + 53 = 5 + 37 + 47 = 5 + 41 + 43 = 7 + 11 + 71 = 7 + 23 + 59 = 7 + 29 + 53 = 7 + 41 + 41 = 11 + 11 + 67 = 11 + 17 + 61 = 11 + 19 + 59 = 11 + 31 + 47 = 11 + 37 + 41 = 13 + 17 + 59 = 13 + 23 + 53 = 13 + 29 + 47 = 17 + 19 + 53 = 17 + 29 + 43 = 17 + 31 + 41 = 19 + 23 + 47 = 19 + 29 + 41 = 23 + 23 + 43 = 23 + 29 + 37 = 29 + 29 + 31$.

The number 89 is the smallest prime to start a *Cunningham chain of the first kind* of length six: 89, 179, 359, 719, 1439, 2879. These are sequences of primes each of which is 1 more than twice the previous one.

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The number 89 is the smallest prime whose digits are composites. The next one is 449. It is the only two-digit number that is equal to the sum of its first digit and the square of its second digit.

The Merseene prime $2^{89} - 1 = 618\,970\,019\,642\,690\,137\,449\,562\,111$ was first proved prime in 1911 by R. E. Powers, a man with a fitting last name. It is the smallest Mersenne prime that includes all ten digits (it is *pandigital*).

In the “reverse and add” procedure, you add a number to its reversal. So the number 1029 gets added to 9201 resulting in 10330. You can then repeat the procedure, getting $10330 + 0331 = 10661$. The game is to do this until you get a *palindromic number*, a number that reads the same forwards and backwards. The interesting thing about the number 89 for this game is that you end up with the 13-digit palindrome 8813200023188. For numbers less than 89, the size of the palindrome you get is at most five digits.

The sum $2^{89} + 89$ is prime, and 89 is the only two-digit prime with this property.