Forgotten Mathematics

Fun with Prime Numbers

Compiled By: Musafir

A prime number is an integer grater than 1 that can be divided evenly only by itself and 1. The first ten primes are 2,3,5,7, 11, 13, 17, 19, 23, and 29. One thing we know about the primes is that there are infinitely many of them. That is, the list of prime never ends. The smallest prime is 2 – the only even prime number. The largest prime number computed, so far, is $2^{2,976,221}-1$, an 895,932-digit number. If printed, it would fill a 450-page book.

Primes, once the exclusive domain of pure mathematics, have recently found an unexpectedly ally in matters of national security, based on the difficulty of factoring a product of two very large primes, if these primes are unknown to the users. This is the basic of pubic-key cryptography (the science or study of the techniques of secret writing, esp. code and cipher systems, methods, and the like).

There are some unsolved mysteries around the primes. For instance, primes have a tendency to arrange themselves in pairs of the form p and p+2. Some examples are 3 and 5, 7 and 11, 29879 and 29881. It is not known whether there are infinitely many of these 'twin primes.' No one has yet proved this conjecture.

Another unsolved question involving primes is the Goldbach Conjecture. Goldbach conjectured that every even number ≥ 4 is the sum of two primes; for example, 4=2+2, 6=3+3 and 12=5+7. The conjecture does not work for odd numbers.

Why is 1 not considered to be a prime number? The number 1 is a special case which is considered neither prime nor composite. Although the number 1 used to be considered a prime, it requires special treatment in so many definitions and applications involving primes greater than or equal to 2 that it is usually placed into a class of its own. A good reason not to call 1 a prime number is that if 1 were prime, then the statement of the fundamental theory of arithmetic would have to be modified. The fundamental theorem of arithmetic states that every positive integer (except the number 1) can be represented in exactly one way apart from rearrangement as a product of one or more primes.

Fun with Primes: If you square any prime number bigger then 3, then subtract 1, the answer always divides by 24!

E.g. $11^2 = 121$ then 121 - 1 = 120 and *yes* 120 does divide by 24.

Why? All prime numbers can be written as (6n+1) or (6n-1).

$(6n+1)^2 = 36n+12n+1$. So $(6n+1)^2 -1 = 36n+12n$. This factorises to 12n(3n+1). Either n or (3n+1) must be even, therefore the whole expression must be divisible by 24.