- Euclid proved that $2^{p-1}(2^p - 1)$ is an even perfect number whenever $2^p - 1$ is prime, where p is prime.

  Prime numbers of the form $2^p - 1$ are known as Mersenne primes. For $2^p - 1$ to be prime, it is necessary that p itself be prime. However, not all numbers of the form $2^p - 1$ with a prime p are prime.

  For $p = 11 \implies 2^{11} - 1 = 2047 = 23 \cdot 89$ is not a prime number.

  Evaluate perfect numbers for some primes $(2, 3, 5, 7, 13, 17, 19, 31)$ only. For a bigger prime numbers, perfect number will not fit in 64 bits.

- Consider that the given number k which have m distinct factor - $n_1, n_2, \ldots n_m$. Since the number k is divisible by n_i, than it is also divisible by n_j, $k = n_i * n_j$. So, the largest number in such a pair can only be up to $\sqrt{k}$. Further, if $\sqrt{k}$ is also a factor, we have to consider the factor only while checking for the perfect number property.

  We sum all factors and check if the given number is perfect or not. 1 and k will be also considered as the other factor, so we need to subtract k from the computed sum.