**PRIME NUMBERS AND GCD**

**Definition: An integer p>1 is said to be prime if its only positive divisors are 1 and p. An integer greater than 1 that is not prime is called Composite**

* **2, 3, 5, 7 … are primes**
* **4,6,8,9,10,… are composites**
* **2 is the only prime which is even.**
* **1 is neither prime nor composite**

**Theorem: If p is a prime and *p|ab* then *p|a or p|b* .**

**Fundamental Theorem of Arithmetic: Every positive integer n>1 can be expressed as a product of primes; this representation is unique, apart from the order in which the factors occur**

**How to decide whether a given integer is a prime or composite**

* **In testing the Primality of a specific integer a>1, it therefore suffices to divide *a* by those primes not exceeding .**



* **For example consider 509. Now, find therefore we need to try out only primes which are not larger than 22 namely:**

**2,3,5,7,11,13,17,19. Dividing 509 by each of these results in that none divides 509. Thus it is concluded that 509 is a prime number**

**The Sieve of Eratosthenes:**

**A method for finding all primes below a given integer**

**Write down the integers from 2 to *n* in their natural order and then systematically eliminate all the composite numbers by striking out all multiples of the primes , the integers that are left on the list-those that do not fall through the “sieve” are primes**



**THE GREATEST COMMON DIVISOR**

**Def:**

**Let a and b be given integers, with at least one of them different from zero. The greatest common divisor of a and b is the positive integer d satisfying the following properties:**



**Example:**

**The divisors of 12 are 1, 2, 3, 4, 6, 12**

**The divisors of 30 are 1, 2, 3, 5, 6, 10, 15, 30**

**Hence the common divisors of 12 and 30 are 1, 2, 3, 6**

**Therefore gcd(12, 30) = 6**

**Gcd(8,17) = 1**

**Gcd(5,5) = 5**