

PRIME NUMBERS

A positive integer $n \geq 2$ is prime if its only factors are 1 and n .
(divisors)

A positive integer $n \geq 2$ is composite if it has at least one divisor other than 1 and n .

Note: 1 is neither prime nor composite.

Primes: 2, 3, 5, 7, 11, 13, 17, 19, ...

How to determine if a number is prime?

2,931,133 is prime? No!
 $= 1031 \times 2843$

CURRENT RECORDS

- Arbitrary numbers up to about 200 digits can be factored.
- Feb. 2020: RSA-250, a 250-digit number with only 2 prime factors, was factored
This required 2700 core-years of CPU time
- Arbitrary numbers of more than 15,000 digits can be proven prime.
- Largest known prime (discovered Oct. 2024):

$$2^{136,279,841} - 1 \quad (41 \text{ million digits})$$