

Fundamentals of Number Theory

Mathematics · Practice Test · 18 Questions

1. Which of the following is the definition of a perfect number?

- A) A number equal to the sum of its proper divisors
- B) A number that is the square of a prime
- C) A number with exactly two factors
- D) A number that is prime in base 10

2. What is the greatest common divisor (GCD) of 48 and 72?

- A) 8
- B) 12
- C) 24
- D) 36

3. According to the Fundamental Theorem of Arithmetic, every integer greater than 1 can be represented as:

- A) A unique sum of two primes
- B) A unique product of prime numbers
- C) A unique power of 2
- D) A unique sequence of squares

4. What is the result of 17 modulo 5?

- A) 1
- B) 2
- C) 3
- D) 4

5. Which of the following numbers is a Mersenne prime?

- A) 9
- B) 15
- C) 31
- D) 33

6. What is the smallest prime number?

- A) 0
- B) 1
- C) 2
- D) 3

7. How many factors does the number 12 have?

- A) 4
- B) 5
- C) 6
- D) 8

8. Which theorem states that if p is prime, then $a^p \equiv a \pmod{p}$ for any integer a ?

- A) Wilson's Theorem
- B) Fermat's Little Theorem
- C) Euler's Totient Theorem
- D) Chinese Remainder Theorem

9. What is the sum of the first 5 positive integers?

- A) 10
- B) 15
- C) 20
- D) 25

10. Which of these numbers is coprime to 14?

- A) 2
- B) 7
- C) 9
- D) 21

11. The value of Euler's totient function $\phi(10)$ is:

- A) 2
- B) 4
- C) 5
- D) 8

12. What is the least common multiple (LCM) of 6 and 8?

- A) 12
- B) 16
- C) 24
- D) 48

13. A number is divisible by 3 if and only if:

- A) The last digit is even
- B) The last two digits are divisible by 3
- C) The sum of its digits is divisible by 3
- D) The number ends in 3, 6, or 9

14. Which of the following is a composite number?

- A) 13
- B) 17
- C) 21
- D) 23

15. What is the prime factorization of 60?

- A) $2^2 \times 3 \times 5$
- B) $2 \times 3^2 \times 5$
- C) $2 \times 3 \times 5^2$
- D) $2^3 \times 3 \times 5$

16. In modular arithmetic, what is the inverse of 3 modulo 7?

- A) 2
- B) 3
- C) 4
- D) 5

17. What is the 6th term of the Fibonacci sequence, starting with 1, 1, 2, 3, 5...?

- A) 6
- B) 8
- C) 10
- D) 13

18. Which property describes that for any integers a and b, $a + b = b + a$?

- A) Associative
- B) Distributive
- C) Commutative
- D) Identity