Prime Numbers Quiz Answer Key PDF

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Why do prime numbers become less frequent as numbers increase?

Prime numbers become less frequent as numbers increase due to the increasing number of potential factors for larger numbers, as explained by the Prime Number Theorem.

Which of the following numbers are not prime? (Select all that apply)

A. 21 ✓

B. 22 ✓

C. 23

D. 24 ✓

Which of the following numbers is a prime number?

A. 4

B. 9

C. 11 ✓

D. 15

Explain why the number 1 is not considered a prime number.

The number 1 is not considered a prime number because it only has one positive divisor, itself, whereas prime numbers must have exactly two distinct positive divisors: 1 and the number itself.

Describe the significance of prime numbers in modern cryptography.

Prime numbers are significant in modern cryptography because they are used in algorithms like RSA encryption, which relies on the difficulty of factoring large numbers into their prime components, ensuring secure communication.

How does the Sieve of Eratosthenes algorithm work to identify prime numbers?

The Sieve of Eratosthenes algorithm works by iteratively marking the multiples of each prime number starting from 2, eliminating non-prime numbers, and leaving only primes up to a specified limit.

What is the Goldbach Conjecture, and why is it significant in number theory?

The Goldbach Conjecture is a hypothesis that every even integer greater than 2 can be expressed as the sum of two prime numbers. It is significant because, despite extensive numerical evidence, it remains unproven and is a major unsolved problem in number theory.

Discuss the historical contribution of Euclid to the study of prime numbers.

Euclid's contribution to the study of prime numbers includes his proof that there are infinitely many primes, found in his work 'Elements,' which laid the foundation for number theory.

What is the only even prime number?

A. 1

B. 2 ✓

C. 4

D. 6

Who is credited with proving that there are infinitely many prime numbers?

A. Pythagoras

B. Euclid ✓

C. Euler

D. Gauss

Which of the following is not a property of prime numbers?

A. They have exactly two distinct positive divisors.

B. They are always odd. ✓

C. They cannot be divided evenly by any number other than 1 and themselves.

D. They are greater than 1.

Which of the following are applications of prime numbers? (Select all that apply)

A. Cryptography ✓
B. Weather forecasting
C. Random number generation ✓
D. Error detection algorithms ✓

Which of the following are prime numbers? (Select all that apply)

A. 23 ✓
B. 25
C. 29 ✓
D. 31 ✓

Which of the following numbers is a Mersenne prime?

A. 7
B. 11
C. 31 ✓
D. 63

What is the smallest prime number greater than 10?

A. 11 ✓
B. 12
C. 13
D. 14

Which of the following statements about prime numbers are true? (Select all that apply)

A. Every prime number is odd.
B. There are infinitely many prime numbers. ✓
C. The number 1 is a prime number.
D. Prime numbers are used in cryptography. ✓

Which of the following numbers are prime? (Select all that apply)

A. 17 ✓
B. 18
C. 19 ✓
D. 20

Which method is commonly used to find all prime numbers up to a certain limit?

A. Euclidean Algorithm
B. Sieve of Eratosthenes ✓
C. Newton's Method
D. Monte Carlo Method

Which of the following are characteristics of the Sieve of Eratosthenes? (Select all that apply)

A. It is used to find prime numbers. ✓
B. It involves dividing numbers by all smaller numbers.
C. It systematically eliminates multiples of primes. ✓
D. It can find the greatest common divisor.

Which theorem describes the distribution of prime numbers among positive integers?

A. Fermat's Last Theorem
B. Pythagorean Theorem
C. Prime Number Theorem ✓
D. Goldbach's Conjecture