TRUE FALSE

Every integer greater than 1 can be expressed as a unique product of prime factors.

Every integer greater than 1 can be expressed as a unique product of prime factors.

True. This is the Fundamental Theorem of Arithmetic, which states every integer greater than 1 has a unique prime factorization, regardless of the order of factors.

TRUE FALSE

The prime factorization of 12 includes the factor 6.

The prime factorization of 12 includes the factor 6.

False. Prime factors must be prime numbers. While 6 is a factor of 12, it is not prime. The correct prime factorization is $2 \times 2 \times 3$ (or $2^2 \times 3$).

TRUE FALSE

The prime factorization of a prime number is the number itself.

The prime factorization of a prime number is the number itself.

True. Prime numbers have exactly two distinct factors: 1 and themselves. Since 1 is not prime, the prime factorization consists solely of the prime number.

TRUE FALSE

1 can be expressed as a product of prime factors.

1 can be expressed as a product of prime factors.

False. 1 has no prime factors. By definition, prime factorization applies only to integers greater than 1; 1 is represented as an empty product.

TRUE FALSE

The prime factorization of 18 is 2×3^2.

The prime factorization of 18 is 2×3^2.

True. $18 = 2 \times 3 \times 3$, which simplifies to 2×3^2 when using exponents for repeated factors.

TRUE FALSE

The prime factorization of 30 is 2 × 15.

The prime factorization of 30 is 2×15.

False. 15 is not a prime number. The correct prime factorization is $2 \times 3 \times 5$, as $15 = 3 \times 5$.

TRUE FALSE

In the prime factorization of 100, all exponents are even numbers.

In the prime factorization of 100, all exponents are even numbers.

True. $100 = 2^2 \times 5^2$. Both exponents (2 and 2) are even.

TRUE FALSE

The prime factors of 9 are 1, 3, and 9.

The prime factors of 9 are 1, 3, and 9.

False. Prime factors include only prime numbers. 1 and 9 are not prime. The only prime factor is 3 (since $9 = 3 \times 3$).

TRUE FALSE

24 and 36 share the same distinct prime factors (2 and 3).

24 and 36 share the same distinct prime factors (2 and 3).

True. $24 = 2^3 \times 3$ and $36 = 2^2 \times 3^2$. Both have 2 and 3 as their only distinct prime factors.

TRUE FALSE

The prime factorization of 16 is 4×4.

The prime factorization of 16 is 4×4.

False. 4 is not a prime number. The correct prime factorization is 2^4 ($16 = 2 \times 2 \times 2 \times 2$).

TRUE FALSE

If a number’s prime factorization includes the prime 5, the number must be divisible by 5.

If a number's prime factorization includes the prime 5, the number must be divisible by 5.

True. Any prime factor in the factorization divides the number. If 5 is a factor, the number is divisible by 5.

TRUE FALSE

The prime factorization of 7 is 1 × 7.

The prime factorization of 7 is 1×7.

False. 1 is not a prime number. The prime factorization of a prime like 7 is just 7.

TRUE FALSE

45 written as a product of primes is $3^2 \times 5$.

45 written as a product of primes is $3^2 \times 5$.

True. $45 = 9 \times 5 = 3 \times 3 \times 5$, which is $3^2 \times 5$.

TRUE FALSE

The prime factorization of 60 is $2 \times 3 \times 10$.

The prime factorization of 60 is $2 \times 3 \times 10$.

False. 10 is not prime ($10 = 2 \times 5$). Correct factorization is $2^2 \times 3 \times 5$ ($60 = 2 \times 2 \times 3 \times 5$).

TRUE FALSE

Two different numbers cannot have the same prime factorization.

Two different numbers cannot have the same prime factorization.

True. The Fundamental Theorem of Arithmetic guarantees uniqueness. Each integer >1 has exactly one prime factorization (up to order).

TRUE FALSE

The prime factors of 4 are 1, 2, and 4.

The prime factors of 4 are 1, 2, and 4.

False. Prime factors are only prime numbers. 1 and 4 are not prime. The prime factor is 2 ($4 = 2 \times 2$).

TRUE FALSE

The prime factorization of 50 is 2×5^2.

The prime factorization of 50 is 2×5^2.

True. $50 = 2 \times 25 = 2 \times 5 \times 5$, which simplifies to 2×5^2.

TRUE FALSE

A composite number must have at least three prime factors in its factorization.

A composite number must have at least three prime factors in its factorization.

False. A composite number has more than two factors but can have just two prime factors (e.g., $15 = 3 \times 5$ has two prime factors).

TRUE FALSE

The prime factorization of 27 is 3^3.

The prime factorization of 27 is 3^3.

True. $27 = 3 \times 3 \times 3 = 3^3$.

TRUE FALSE

The product of prime factors for 20 is the same as for 30 (both are $2 \times 3 \times 5$).

The product of prime factors for 20 is the same as for 30 (both are $2 \times 3 \times 5$).

False. $20 = 2^2 \times 5$, while $30 = 2 \times 3 \times 5$. They have different prime factorizations.