In your own words and workings explain how prime factorization is useful to find the Greatest common factor and Least common multiple

Defination1: Prime number is any whole number apart from 1 that cannot be made by multiplying other whole numbers. Example; 2,3,5,7,11,13...

Defination2: Prime factorization is finding which prime numbers multiplied together can make the original number. Example; what are the prime factor of 12?

We need to check which prime number that can divide 12. Its best to start working from the smallest which is 2.

12÷2=6

Its divides by 2 and 2 becomes our first prime number. We note that 6 is not a prime number therefore we need to find the next prime number.

Check the next prime number that divides 6 equally. We have $6 \div 2=3$.

6 divides 2 equally and also 3 is a prime number. Therefore, our prime factors are

2×2×3=12.

How Prime Factorization is useful to find Greatest Common Factor

It is often useful to write numbers in terms of its Prime factorization or as a product of its prime factors. Greatest Common factor(GCF) of two number is the greatest number that divides both numbers. To find the GCF of two numbers, take the prime factorization of both numbers. then write down the factors that they have in common. If they have more than one of the same factor, write them both. Then multiply the factors they have in common.

Example: find the greatest common factor of 36 and 60.

Find the prime factor for $36 = 2 \times 2 \times 3 \times 3$ and prime factor for $60 = 2 \times 2 \times 3 \times 5$. The factors they have in common are $2 \times 2 \times 3 = 12$.

How Prime Factorization is useful to find the Least Common Multiple

The least common multiple(LCM) for two numbers is the smallest number that is divisible by both numbers. To find the LCM, Take the prime factor of the two numbers. Then take one factor from each common group of factors and find their product. multiply their product with other ungrouped factors.

Example; find the least common multiple of 9 and 16.

9=3×3=3^2

15=3×5

The LCM is given by $3^2 \times 5 = 45$.