2.1 Factors and Multiples

Monday, June 20, 2022 1:12 PM

2.1 Factors and Multiples of Whole Numbers

A **prime number** is a number that is only divisible by one and itself.

Example: 2, 3, 5, 7, 11, 13, 17 . . . .

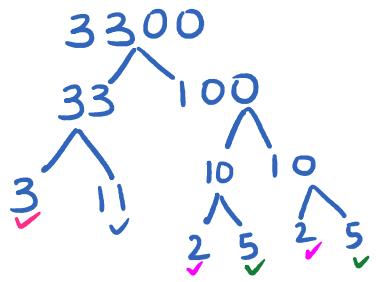
A **factor** is any number that will divides evenly into it.

Example: 8 $8 = 1 \times 8$ $8 = 2 \times 4$ Factors of 8: 1, 2, 4, 8

The **prime factorization** of a number is that number written as a product (multiplication) of its prime numbers.

Example 1: Write the prime factorization of 3,300.

Factor Tree

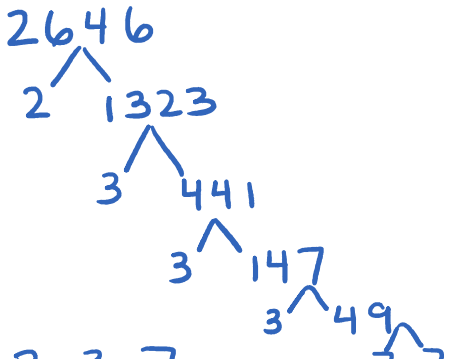


The prime factors of 3,300 are : 2, 3, 5, 11

The prime factorization of 3,300 is: $2 \cdot 2 \cdot 3 \cdot 5 \cdot 5 \cdot 11$

or $2^2 \cdot 3 \cdot 5^2 \cdot 11$

Example 2: Write the prime factorization of 2,646.



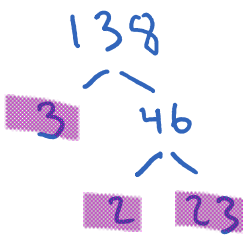
The prime factors of 2,646 are : 2, 3, 7

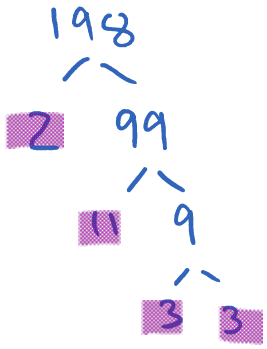
The prime factorization of 2,646 is: $2 \cdot 3 \cdot 3 \cdot 3 \cdot 7 \cdot 7$

or $2 \cdot 3^3 \cdot 7^2$

The **Greatest Common Factor** (**GCF**) is the largest number that will divide evenly into a group of numbers.

Example 3: Determine the greatest common factor of 138 and 198.





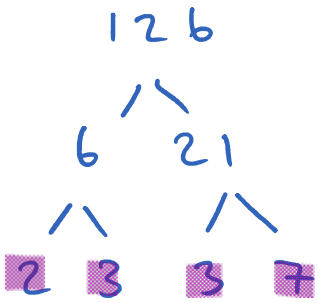
$138 = 2 \cdot 3 \cdot 23$

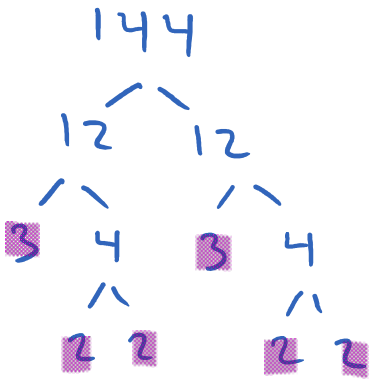
$198 = 2 \cdot 3 \cdot 3 \cdot 11$

GCF is the product of the prime factors which are common between the groups.

The greatest common factor is $6 = 2 \cdot 3$

Example 4: Determine the greatest common factor of 126 and 144.





$126 = 2 \cdot 3 \cdot 3 \cdot 7$

$144 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$

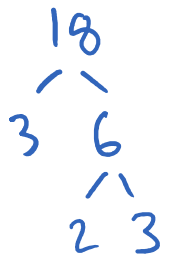
GCF

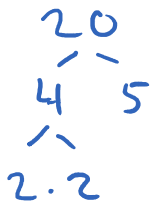
$2 \cdot 3 \cdot 3 = 2(9) = 18$

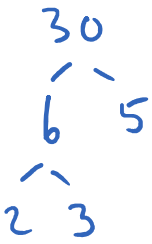
GCF

The **Least Common Multiple** (**LCM**) is the smallest number that a group of numbers will divide into.

Example 5: Determine the least common multiple of 18, 20, and 30.







$18 = 2 \cdot 3 \cdot 3$

$20 = 2 \cdot 2 \cdot 5$

$30 = 2 \cdot 3 \cdot 5$

$LCM = 2 \cdot 2 \cdot 5 \cdot 3 \cdot 3$

$= 2^2 \cdot 3^2 \cdot 5^1$

$= 180$

The LCM is the product of all the greatest exponent prime factors.

The least common multiple of 18, 20, and 30 is 180

Practice: p. 140 #3ae, 4acf, 5b, 6ae, 8ab, 9a, 10ab, 11ab, 15ae