Factors and Multiples

Factors

- Factors are numbers you can multiply together to get another number:

Example: 2 and 3 are factors of 6, because 2 × 3 = 6.

- A number can have MANY factors!

Example: 3 and 4 are factors of 12, because 3 × 4 = 12.

- Also 2*6 = 12 so 2 and 6 are also factors of 12.
- And 1*12 = 12 so 1 and 12 are factors of 12 as well.

So 1, 2, 3, 4, 6 and 12 are all factors of 12
And -1, -2, -3, -4, -6 and -12 also, because multiplying negatives makes a positive.

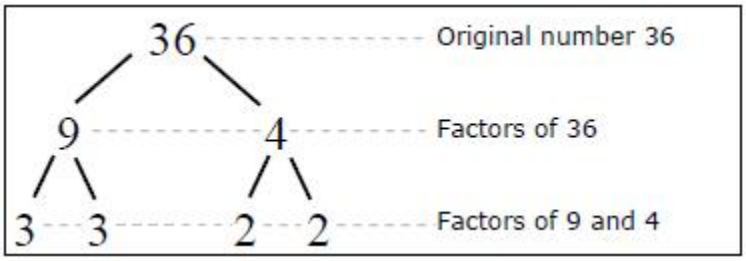
Greatest common factor

- Let us say you have worked out the factors of two numbers:
- factors of 12 and 30
- 12 = 1, 2, 3, 4, 6, 12
- 30 = 1, 2, 3, 5, 6, 10, 15, 30
- The common numbers that you see in both the lists are - 1, 2, 3, and 6
- The greatest common number is 6 and so it is the GCF of 12 and 30
- This is know as the listing method.
- You can also find GCF of as many numbers as you want.
- Prime factorization method:
- For example we want to find the GCF of 21 and 49

- To find the GCF of 21 and 49, we need to list down the common numbers between the 2.
- The common number between them is 7.
- so 7 is the GCF of 21 and 49.

writing a number as a product of its prime factors

- **For Eg.** Writing 36 as a product of its prime factors.



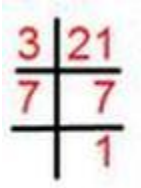
- 2 * 2 * 3 * 3 = 36

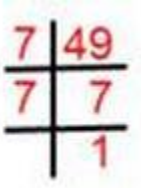
Multiples

- The multiples of a number are what you get when you **multiply it by other numbers** (such as if you multiply it by 1,2,3,4,5, etc). Just like the multiplication table.

Lowest common multiple

- When you list the multiples of two (or more) numbers, and find the **same value in both lists**, then that is a***common multiple*** of those numbers.
- For example, when you write down the multiples of **4** and **5**, the *common* multiples are those that are found in both lists:
- 4 = 4, 8, 12, 16, 20, 24, 28...
- 5 = 5, 10 ,15, 20, 25...
- 20 is the number which appeared in both the lists and so it is the LCM of 4 and 5.
- This is known as the listing method
- You can find LCM of as many numbers as you want.
- Prime factorization method:





- To find the LCM, multiply all prime factors. But the common factors are included only once.

=21 = 3*7.
=49 = 7*7 =

= 3*7*7 = 147.

- 7 was common in both the lists so we had to take 7 only once and them multiply all the other numbers.