CHAPTER 02

Whole Numbers

Properties of whole numbers:

Studying the properties of whole numbers help us to understand numbers better. Let us

Look at some of the properties

The properties of whole number includes:

1) Closure for addition and multiplication.
2) Commutative property for addition and multiplication.
3) Associative property for addition and multiplication.
4) Distributive property of multiplication over addition.
5) Identity for addition and multiplication.

We shall understand these properties one by one with some examples.

CLOSURE PROPERTY

Consider any two whole numbers for example 11 and 21.

When we add these two numbers, we get 32, which is also a whole number.

Some more examples:

10 + 9 = 10, a whole number

13 + 2 = 15, a whole number

56 + 22 = 78, a whole number

101 + 201 = 302, a whole number

In all the above examples, we can clearly see that when we add two whole numbers, the answers are also whole numbers.

Can you identify any pair of whole numbers, when added will not give a whole number?

Well we see that no such pair exists.

This property is known as the closure property of addition for whole numbers.

Closure property states that addition of two or more whole numbers gives another whole number.

If x and y are two whole numbers then x+ y is also a whole number.

Then a collection of whole numbers are said to be closed under addition.

Let us check whether the collection of whole numbers is also closed for multiplication too.

Observe these examples,

5 x 6 = 30, a whole number

10 x 10 = 100, a whole number

17 x 12 = 204, a whole number

The product of any two whole numbers is found to be a whole number too. Hence, we say that the collection of whole numbers is closed under multiplication.

We can now conclude that,

Whole Numbers are closed under addition and multiplication.

Example:

3 + 5 = 8 (a Whole number)

3 x 5 = 15 (a Whole number)

You should now be thinking what about the other two operations subtraction and division?

Lets find out !

CLOSURE PROPERTY FOR SUBTRACTION

Consider these examples of subtraction,

5 – 3 , a whole number

10 – 5 , a whole number

But what if we interchange the digits, i.e.

5 – 7 = -2, not a whole number

5 – 10 = -5 not a whole number

You can see that closure property doesn't work when the minuend and subtrahend are interchanged. It works only when Minuend is bigger than the subtrahend.

Hence, whole numbers are not closed for subtraction

CLOSURE PROPERTY FOR DIVISION

Consider the examples,

10 ÷ 2 = 5, a whole number

6 ÷ 6 = 1, a whole number

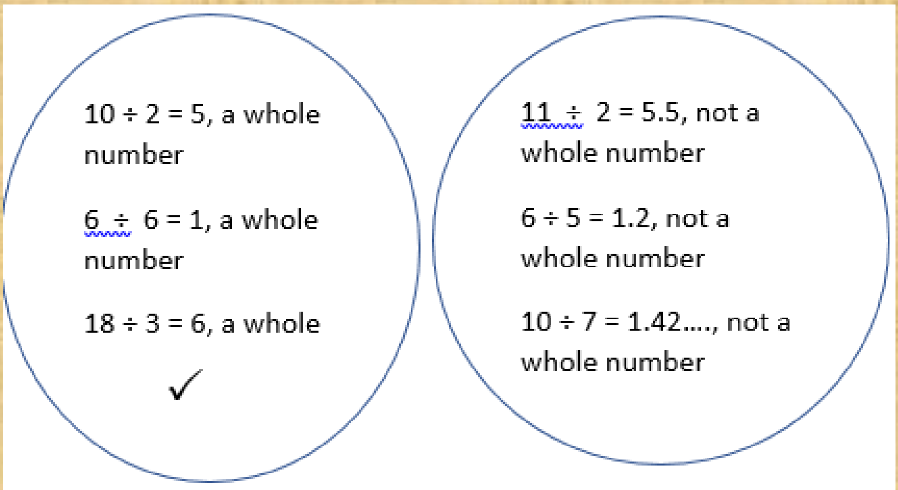
18 ÷ 3 = 6, a whole number

But,

11 ÷ 2 = 5.5, not a whole number

6 ÷ 5 = 1.2, not a whole number

10 ÷ 7 = 1.42...., not a whole number



In the above examples, we observe that closure property works as long as the divisor a factor of the number under consideration, but it does not work for any other combination.

As decimals and fractions are not whole numbers, we can say that closure property doesn't hold good for division too.

We can finally conclude that whole numbers are not closed under subtraction and division.

DIVISION WITH ZERO

- Zero divided by a number equals zero.

- For example: 0 ÷ 5 = 0

Let us consider the other 5 ÷ 0,

Here we have to subtract zero again and again from 5

5- 0 = 5 once

5 - 0 = 5 twice

5 - 0 = 5 thrice and so on.....

Will this ever stop? No.

So, 5 ÷ 0 is not a number that we can reach.

The division of a whole number by 0 does not give a known number as the answer.

- Dividing by zero is impossible; it is undefined.