6^{th} Standard Maths

Whole Numbers

Natural numbers: The counting numbers 1,2, 3,4, are called natural numbers.

Predecessor: If we subtract 1 from a natural number, what we get is its predecessor. For example, the predecessor of 10 is 10 – 1 = 9.

Successor: If we add 1 to a natural number, what we get is its successor. For example, the successor of 9 is 9 + 1 = 10.

The natural number 1 has no predecessor in natural numbers.

There is no largest natural number

If we add the number 0 to the collection of whole numbers. Thus, the numbers 0, 1, 2, 3,... form the collection of whole numbers, natural numbers, what we get is the collection

We regard 0 as the predecessor of 1 in the collection of whole numbers.

Every whole number has a successor.

Every whole number except zero has a predecessor.

All the natural numbers are whole numbers but all the whole numbers are not a natural number. [0 is a whole number but not a natural number]

The Number Line

Draw a line. Mark a point on it and label it 0. Mark a second point to the right of 0 at the certain proper distance and label it 1. Then, the distance between the points labeled as 0 and 1 is called the unit distance. Now, mark another point on this line to the right of 1 at a unit distance from 1 and label it 2. Proceeding in this manner, we may find consecutive points and label them as 3, 4, 5,... in order. Thus, we can go to any whole number. This line is called the number line for whole numbers.

Addition on the number line: Let us add 2 and 3. We start from 2 on the number line and make 3 jumps to the right by unit distance each. We reach 5. So, 2 + 3 = 5.

Subtraction on the number line: Let us find 5-3. We start from 5 on the number line and make 3 jumps to the left by unit distance each. We reach 2. So, 5 – 3 = 2.

Multiplication on the number line: Let us find 2×3. We start from 0 on the number line and move 2 units to the right at a time. We make 3 such moves. We reach 6. So. 2 × 3 = 6.

Properties of Whole Numbers

The result of the addition of two whole numbers is always a whole number. We say that the collection of whole numbers is closed under addition.

The result of the multiplication of two whole numbers is always a whole number. We say that the collection of whole numbers is closed p under multiplication.

The result of the subtraction of two whole numbers is not always a whole number. For example: 5 – 2 = 3 is a whole number but 2 – 4 = -2 is not a whole number. We say that the collection of whole numbers is not closed under subtraction.

The result of the division of two whole numbers is not always a whole number. For example: 6 ÷ 2 = 3 is a whole number but 2 ÷ 5 = 25 is not a whole number. We say that the collection of whole numbers is not closed under division.
Division of a whole number by 0 is not defined.

We can add two whole numbers in any order. For example: 1 + 2 = 2 + 1 = 3. We say that addition is commutative for the collection of whole numbers.

We can multiply two whole numbers in any order.
For example: 2 × 3 = 3 × 2 = 6. We say that multiplication is commutative for the collection of whole numbers.

Addition is associative for whole numbers. For example: 1 + (2 + 3) = 1 + 5 = 6 (1 + 2) + 3 = 3 + 3 = 6 So, 1 + (2 + 3) = (1 + 2) + 3.

Multiplication is associative for whole numbers.

For example: 2 × (3 × 5) = 2 × 15 = 30 (2 × 3) × 5 = 6 × 5 = 30 So, 2 × (3 × 5) = (2 × 3) × 5.

Multiplication is distributive over addition for whole numbers. For example:

3 × (4 + 5) = 3 × 9 = 27

3 × 4 + 3 × 5 = 12 + 15 = 27

So, 3 × (4 + 5) = 3 × 4 + 3 × 5.

This is known as distributivity of multiplication over addition.

Note: The properties of commutativity, associativity, and distributivity of whole numbers are useful in simplifying calculations and we use them without being aware of them.

The result of the addition of zero to any whole number is the same whole number. We say that zero is the identity for the addition of whole numbers or additive identity for whole numbers.

The whole number zero has a special role in multiplication too. Any number, when multiplied by zero, becomes zero.

The result of the multiplication of 1 to any whole number is the same whole number. We say that 1 is the identity for multiplication of whole numbers or multiplicative identity for whole numbers.

Patterns in Whole Numbers

Some numbers can be arranged in elementary shapes a line, a rectangle, a

square and a triangle only made up of dots.
Every number can be arranged as a line.

Some numbers like 6 can be arranged as a rectangle. Note that the number of rows should be smaller than the number of columns. Also, the rectangle should have more than 1 row.

Some numbers like 4, 9 can be arranged as a square. Note that every square number is also a rectangular number.

Some numbers like 3, 6 can be arranged as a triangle. Note that the triangle should be right-angled and its two sides must be equal. The number of dots in the rows starting from the bottom row should be like 4, 3,2, 1. The top row should always have 1 dot.

The patterns with numbers are not only interesting but also useful especially for mental calculations and help us understand the properties of numbers better.