Chapter 9

Rational Numbers

What are Rational Numbers?

• A rational number is defined as a number that can be expressed in the form p/q , where p and q are integers and q ≠ 0. Thus, 4/5 is a rational number. Here, p = 4 and q = 5.

Numerator and Denominator

• In p/q , the integer p is the numerator, and the integer q (≠ 0) is the denominator. Thus, in -3/7 , the numerator is –3 and the denominator is 7.

• Any integer can be thought of as a rational number. For example, the integer –5 is a rational number, because you can write it as -5/1. The integer 0 can also be written as 0 = 0/2 or 0/7 etc. Hence, it is also a rational number. Thus, rational numbers include integers and fractions.

Equivalent rational numbers

• By multiplying the numerator and denominator of a rational number by the same non zero integer, we obtain another rational number equivalent to the

given rational number. This is exactly like obtaining equivalent fractions.

Positive and Negative Rational Numbers

• A rational number in which both the numerator and denominator of the number is positive integer is called a positive rational number. Example, 3/8, 5/7, 2/9 etc. are positive rational numbers.

• A rational number in which the numerator is a negative integer and denominator is positive integer is called a positive rational number. Example, -3/8, -5/7, -2/9 etc. are negative rational numbers.

Rational Number on a Number Line

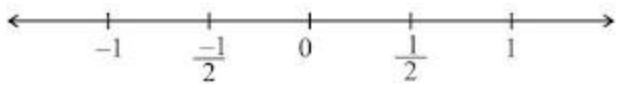
• The points to the right of 0 are denoted by + sign and are positive integers. The points to the left of 0 are denoted by – sign and are negative integers.

• Let represent the number − 1/2 on the number line.

Being a negative rational number, it would be marked to the left of 0.

While marking integers on the number line, successive integers are marked at equal intervals.

The rational numbers 1/2 and − 1/2 would be at equal distance from 0.



Rational Numbers in Standard Form

• A rational number is said to be in the standard form if its denominator is a positive integer and the numerator and denominator have no common factor other than 1.

• If a rational number is not in the standard form, then it can be reduced to the standard form.

Operations on Rational Number

Addition

• Two rational numbers with the same denominator can be added by adding their numerators, keeping with the same denominator.

• Two rational numbers with different denominators are added by first taking the LCM of the two denominators and then converting both the rational numbers to their equivalent forms having the LCM as the denominator.

Subtraction

• While subtracting two rational numbers, we add the additive inverse of the

rational number to be subtracted to the other rational number.

Multiplication

• While multiplying a rational number by a positive integer, we multiply the numerator by that integer, keeping the denominator unchanged.

Division

• To divide one rational number by the other non-zero rational number we multiply the rational number by the reciprocal of the other.

Rational Numbers between two rational numbers

• There are unlimited number of rational numbers between two rational numbers.