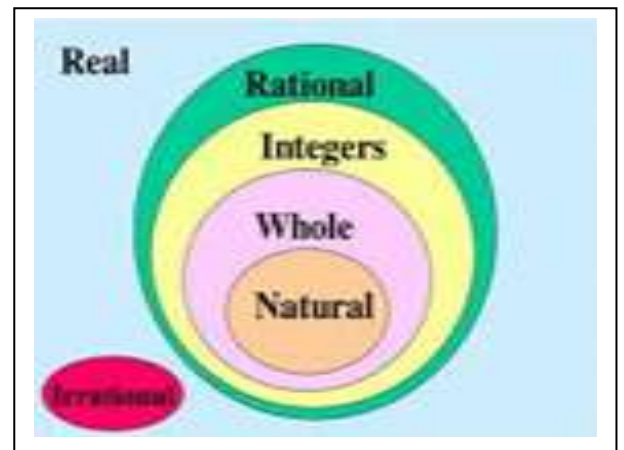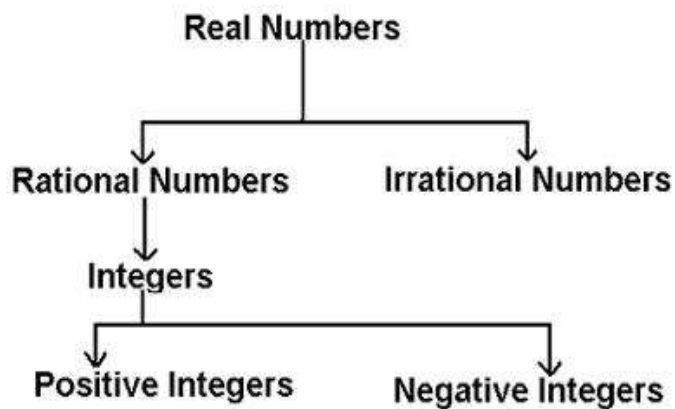# Chapter 1 Number Systems Exercise 1.1

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Types of Numbers

Natural numbers (N)

Numbers which start from 1 to infinity (No negative numbers and no fractions).

Denoted by N.

Eg: - 1, 2, 3, 4………..

Whole numbers (W)

Numbers which start from 0 to infinity with no fractional part (no decimals).

Denoted by W.

Eg: - 0, 1, 2, 3, 4…….

Integers (Z)

Positive and negative numbers with no fractional part (no decimals) are called integers. Denoted by Z.

Eg: - ……… -4, -3, -2, -1, 0, 1, 2, 3, 4…………………

Rational Numbers (Q)

A Numbers which can be written in p/q form, where p and q are integer and q≠ 0.

Either terminating or non-terminating recurring type.   .

Denoted by Q.

Eg: - 2/3, 4/5.....

Irrational Numbers

 A Number which cannot be expressed in p/q form, where p and q are integer and q≠ 0.
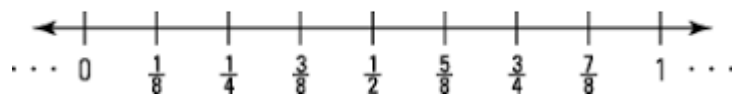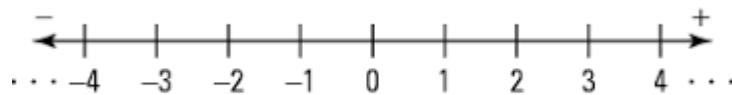
Non-terminating and non-repeating type.

Eg: - √2, √3, π

Real Numbers(R)

All Numbers on number line are real numbers.

Denoted by R.

It contains rational and irrational numbers both.

Equivalent rational Numbers or fraction:

Those rational numbers have a common factor are called equivalent rational numbers.

Ex: 4/6, 25/50 etc.

Co-prime numbers:

Those rational numbers which do not have any common factors other than 1are called co-prime numbers.

Ex: 1/3, 5/6 etc.

Important points:

➢ There are infinite rational numbers between any two rational numbers.
➢ In between any two real numbers there are infinite real numbers.
➢ To find out rational numbers between any two given rational numbers, there are two **methods:**

1) **Mid value method**: lets two given numbers are

$$= (A+B)/2$$

Means add to given numbers A and B and do divide them by 2, we will get mid value this is called mid value method.

2) This method apply in the only case when given two numbers have same denominator. While, this method easy and less time consuming to solve the problem.

$$= ((n+1) \times \text{numerator}) / ((n+1) \times \text{denominator})$$

Where, n is that number which asked in question to calculate

Que1). Is zero a rational number? Can you write it in the form p/q, Where p and q are integers and q ≠ 0?

Solution: (Rational number: A Numbers which can be written in p/q form, where p and q are integer and q≠ 0.)

(Integer numbers: where, Positive and negative numbers are called integers. Eg: - ……… -4, -3, -2, -1, 0, 1, 2, 3, 4.......)

See in the case of zero:

Zero can be represented as 0/1, 0/2, 0/3, 0/4.......

And zero also can be represented as 0/-1, 0/-2......

So, you can see zero satisfies all necessary condition to become a rational number as given above.

Hence, we can say yes 0 is a rational number.

Que2) Find six rational numbers between 3 and 4.

Solution: As we tell above in chapter description that, There are infinite rational numbers between any two rational numbers.

So, in between 3 and 4 infinite rational numbers lies.

Here are two methods to calculate six rational numbers between 3 and 4:

1) Mid value method: (A+B)/2 = (3+4)/2 =7/2, (3+7/2)/2= 13/4 same like this we can calculate other 4 terms also.

2) ((n+1) × numerator) / ((n+1) × denominator)

 Where, n is that number which asked in question to calculate.

Here, n=6

Now apply on both terms 3 and 4.

For term 3   for term 4:

So, $((6+1) \times 3)/ (6+1) \times 1)$ $((6+1) \times 4)/ (6+1) \times 1)$

$=21/7$ $=28/7$

Now write next terms of 21/7 to 28/7

Hence, answer is 22/7, 23/7, 24/7, 25/7, 26/7, 27/7.

Answer may be different from different methods but all the answers are corrects because there are infinite numbers lies between two rational numbers.

Third method to solve this problem u can see in our video of ex 1.1

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que3). Find five rational numbers between 3/5 and 4/5.

Solution: There are infinite rational numbers in between 3/5 and 4/5

By use: $((n+1) \times$ numerator) / $((n+1) \times$ denominator).

$3/5 = 3\times6/5\times6 = 18/30$
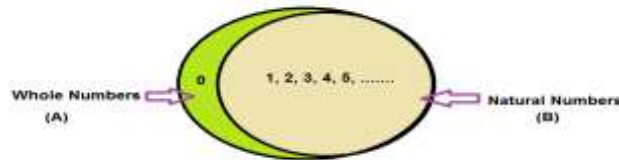
$4/5 = 4\times6/5\times6 = 24/30$

Now write next terms of 18/30 to 24/30.

Therefore, five rational numbers between 3/5 and 4/5 are

19/30, 20/30, 21/30, 22/30, 23/30.

Que4). State whether the following statements are true or false. Give reasons for your answers.

(i) **Every natural number is a whole number.**

Solution: As we know natural numbers are those which start from 1.series is: 1, 2,3,4,5...

Whole numbers numbers start from 0. Series is: 0,1,2,3...

► True, since the collection of whole numbers contains all natural numbers.

(ii) Every integer is a whole number.

Solution: Integer series have Positive and negative numbers and o, except to fraction and decimal values.

Eg: - .... -4, -3, -2, -1, 0, 1, 2, 3, 4...)

While, Whole numbers numbers start from 0. Series is: 0,1,2,3...

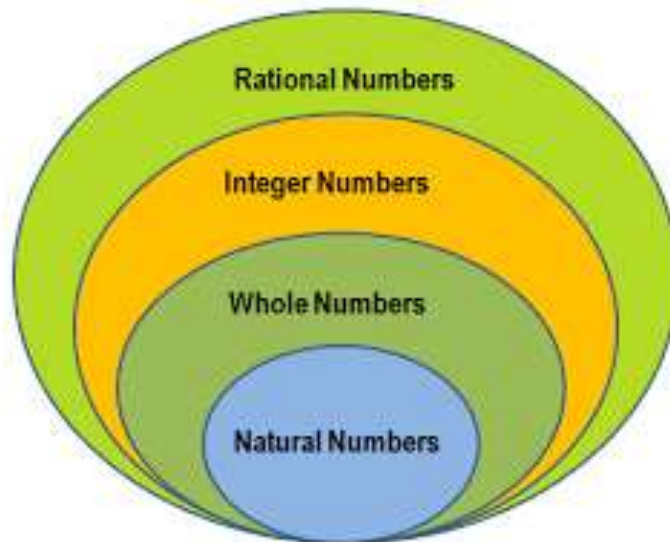► False, as integers may be negative but whole numbers are always positive.

(iii) Every rational number is a whole number.

Solution: A Numbers which can be written in p/q form, where p and q are integer and q≠ 0.

Eg: - 2/3, 4/5 etc.

While, Whole numbers numbers start from 0 (without fraction or decimal values). Series is: 0,1,2,3...

► False, as rational numbers may be fractional but whole numbers may not be.