NCERT Solutions for Class 9

Maths

Chapter 1 – Number System

Exercise 1.1

1. Do you think zero is a rational number? If it is, then can it be expressed in the form of $\frac{p}{q}$, where p and q are integers and $q \neq 0$? Describe it.

Ans: Remember that, according to the definition of rational number,

a rational number is a number that can be expressed in the form of $\frac{p}{q}$,

where p and q are integers and $q \neq 0$.

Now, notice that zero can be represented as $\frac{0}{1}, \frac{0}{2}, \frac{0}{3}, \frac{0}{4}, \frac{0}{5}.....$

Also, it can be expressed as $\frac{0}{-1}, \frac{0}{-2}, \frac{0}{-3}, \frac{0}{-4}.....$

Therefore, it is concluded from here that 0 can be expressed in

the form of $\frac{p}{q}$, where p and q are integers.

Hence, zero must be a rational number.

2. Write any 6 rational numbers between 3 and 4.

Ans: It is known that there are infinitely many rational numbers between any two numbers. Since we need to find 6 rational numbers between 3 and 4, so multiply and divide the numbers by 7 (or by any number greater than 6)

Then it gives,

$$3 = 3 \times \frac{7}{7} = \frac{21}{7}$$

$$4 = 4 \times \frac{7}{7} = \frac{28}{7}$$

Hence, 6 rational numbers found between 3 and 4 are $\frac{22}{7}, \frac{23}{7}, \frac{24}{7}, \frac{25}{7}, \frac{26}{7}, \frac{27}{7}$.

3. Write any five rational numbers between $\frac{3}{5}$ and $\frac{4}{5}$.

Ans: It is known that there are infinitely many rational numbers between any two numbers.

Since here we need to find five rational numbers between $\frac{3}{5}$ and $\frac{4}{5}$, so multiply and divide by 6 (or by any number greater than 5).

Then it gives,

$$\frac{3}{5}=\frac{3}{5}\times\frac{6}{6}=\frac{18}{30},$$

$$\frac{4}{5}=\frac{4}{5}\times\frac{6}{6}=\frac{24}{30}.$$

Hence, 5 rational numbers found between $\frac{3}{5}$ and $\frac{4}{5}$ are $\frac{19}{30},\frac{20}{30},\frac{21}{30},\frac{22}{30},\frac{23}{30}$.

4. Verify all the statements given below and state whether they are true or false. Show proper reasons for your answers.

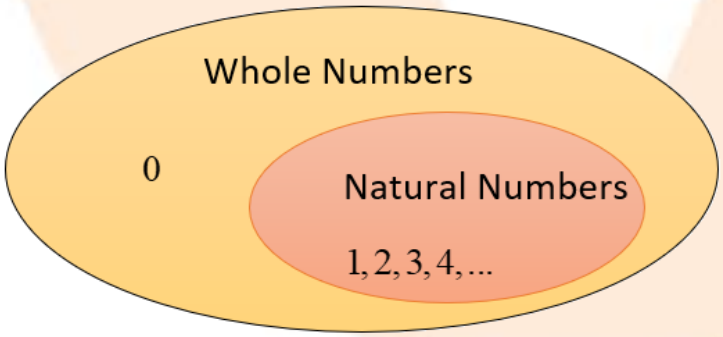
(i) Statement: Every natural number is a whole number.

Ans: Write the whole numbers and natural numbers in a separate manner.

It is known that the whole number series is $0,1,2,3,4,5.....$ and

the natural number series is $1,2,3,4,5.....$

Therefore, it is concluded that all the natural numbers lie in the whole number series as represented in the diagram given below.



Thus, it is concluded that every natural number is a whole number.

Hence, the given statement is true.

(ii) Statement: Every integer is a whole number.

Ans: Write the integers and whole numbers in a separate manner.

It is known that integers are those rational numbers that can be expressed in the form of $\frac{p}{q}$, where $q = 1$.

Now, the series of integers is like $0, \pm 1, \pm 2, \pm 3, \pm 4, \ldots$.

But the whole numbers are $0, 1, 2, 3, 4, \ldots$.

Therefore, it is seen that all the whole numbers lie within the integer numbers, but the negative integers are not included in the whole number series.

Thus, it can be concluded from here that every integer is not a whole number.

Hence, the given statement is false.

(iii) Statement: Every rational number is a whole number.

Ans: Write the rational numbers and whole numbers in a separate manner.

It is known that rational numbers are the numbers that can be expressed in the form $\frac{p}{q}$, where $q \neq 0$ and the whole numbers are represented as $0, 1, 2, 3, 4, 5, \ldots$

Now, notice that every whole number can be expressed in the form of $\frac{p}{q}$ as $\frac{0}{1}, \frac{1}{1}, \frac{2}{1}, \frac{3}{1}, \frac{4}{1}, \frac{5}{1}, \ldots$

Thus, every whole number is a rational number, but all the rational numbers are not whole numbers. For example,

$\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \ldots$ are not whole numbers.

Therefore, it is concluded from here that every rational number is not a whole number.

Hence, the given statement is false.