

Exercise 1.1

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1. Is zero a rational number? Can you write it in the form p/q where p and q are integers and $q \neq 0$?

Solution:

We know that, a number is said to be rational if it can be written in the form p/q , where p and q are integers and $q \neq 0$.

Taking the case of '0',

Zero can be written in the form $0/1, 0/2, 0/3 \dots$ as well as $, 0/1, 0/2, 0/3 \dots$

Since it satisfies the necessary condition, we can conclude that 0 can be written in the p/q form, where q can either be positive or negative number.

Hence, 0 is a rational number.

2. Find six rational numbers between 3 and 4.

Solution:

There are infinite rational numbers between 3 and 4.

As we have to find 6 rational numbers between 3 and 4, we will multiply both the numbers, 3 and 4, with $6+1 = 7$ (or any number greater than 6)

i.e., $3 \times (7/7) = 21/7$

and, $4 \times (7/7) = 28/7$. \therefore The numbers in between $21/7$ and $28/7$ will be rational and will fall between 3 and 4.

Hence, $22/7, 23/7, 24/7, 25/7, 26/7, 27/7$ are the 6 rational numbers between 3 and 4.

3 Find five rational numbers between $3/5$ and $4/5$.

Solution:

There are infinite rational numbers between $3/5$ and $4/5$.

To find out 5 rational numbers between $3/5$ and $4/5$, we will multiply both the numbers $3/5$ and $4/5$ with $5+1=6$ (or any number greater than 5)

i.e., $(3/5) \times (6/6) = 18/30$

and, $(4/5) \times (6/6) = 24/30$

\therefore The numbers in between $18/30$ and $24/30$ will be rational and will fall between $3/5$ and $4/5$.

Hence, $19/30, 20/30, 21/30, 22/30, 23/30$ are the 5 rational numbers between $3/5$ and $4/5$.

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

(i) Every natural number is a whole number.

Solution:

True

Natural numbers- Numbers starting from 1 to infinity (without fractions or decimals)

i.e., Natural numbers = 1, 2, 3, 4, ...

Whole numbers- Numbers starting from 0 to infinity (without fractions or decimals)

i.e., Whole numbers = 0, 1, 2, 3, ...

Or, we can say that whole numbers have all the elements of natural numbers and zero.

\therefore Every natural number is a whole number, however, every whole number is not a natural number.

(ii) Every integer is a whole number.

Solution:

False

Integers- Integers are set of numbers that contain positive, negative and 0; excluding fractional and decimal numbers.

i.e., integers = $\{\dots -4, -3, -2, -1, 0, 1, 2, 3, 4, \dots\}$

Whole numbers- Numbers starting from 0 to infinity (without fractions or decimals)

i.e., Whole numbers = $0, 1, 2, 3, \dots$

Hence, we can say that integers include whole numbers as well as negative numbers.

\therefore Every whole number is an integer, however, every integer is not a whole number.

(iii) Every rational number is a whole number.

Solution:

False

Rational numbers- All numbers in the form p/q , where p and q are integers and $q \neq 0$.

i.e., Rational numbers = $0, 19/30, 2, 9/-3, -12/7, \dots$

Whole numbers- Numbers starting from 0 to infinity (without fractions or decimals)

i.e., Whole numbers = $0, 1, 2, 3, \dots$

Hence, we can say that integers include whole numbers as well as negative numbers.

\therefore Every whole numbers are rational, however, every rational numbers are not whole numbers.