Exercise 1.1

Question 1: Is zero a rational number? Can you write it in the form p/q, where p and q are integers and q ≠ 0?
Solution:
Yes, zero is a rational number.

It can be written in p/q form provided that q ≠ 0.

For Example: 0/1 or 0/3 or 0/4 etc.

Question 2: Find five rational numbers between 1 and 2.
Solution:
We know, one rational number between two numbers m and n = (m+n)/2

To find: 5 rational numbers between 1 and 2

Step 1: Rational number between 1 and 2

= (1+2)/2

= 3/2

Step 2: Rational number between 1 and 3/2

= (1+3/2)/2

= 5/4

Step 3: Rational number between 1 and 5/4

= (1+5/4)/2

= 9/8

Step 4: Rational number between 3/2 and 2

= 1/2 [(3/2) + 2)]

= 7/4

Step 5: Rational number between 7/4 and 2

= 1/2 [7/4 + 2]

= 15/8

Arrange all the results: 1 < 9/8 < 5/4 < 3/2 < 7/4 < 15/8 < 2

Therefore required integers are, 9/8, 5/4, 3/2, 7/4, 15/8

Question 3: Find six rational numbers between 3 and 4.

Solution:

Steps to find n rational numbers between any two numbers:

Step 1: Multiply and divide both the numbers by n+1.

In this example, we have to find 6 rational numbers between 3 and 4. Here n = 6

Multiply 3 and 4 by 7

3 x 7/7 = 21/7 and

4 x 7/7 = 28/7

Step 2: Choose 6 numbers between 21/7 and 28/7

3 = 21/7 < 22/7 < 23/7 < 24/7 < 25/7 < 26/7 < 27/7 < 28/7 = 4

Therefore, 6 rational numbers between 3 and 4 are

22/7, 23/7, 24/7, 25/7, 26/7, 27/7

Question 4: Find five rational numbers between 3/5 and 4/5.

Solution:

Steps to find n rational numbers between any two numbers:

Step 1: Multiply and divide both the numbers by n+1.

In this example, we have to find 5 rational numbers between 3/5 and 4/5. Here n = 5

Multiply 3/5 and 4/5 by 6

3/5 x 6/6 = 18/30 and

4/5 x 6/6 = 24/30

Step 2: Choose 5 numbers between 18/30 and 24/30

3/5 = 18/30 < 19/30 < 20/30 < 21/30 < 22/30 < 23/30 < 24/30 = 4/5

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

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

Question 5: Are the following statements true or false? Give reason for your answer.

(i) Every whole number is a natural number.

(ii) Every integer is a rational number.

(iii) Every rational number is an integer.

(iv) Every natural number is a whole number,

(v) Every integer is a whole number.

(vi) Every rational number is a whole number.

Solution:

(i) False.

Reason: As 0 is not a natural number.

(ii) True.

(iii) False.

Reason: Numbers such as 1/2, 3/2, 5/3 are rational numbers but not integers.

(iv) True.

(v) False.

Reason: Negative numbers are not whole numbers.

(vi) False.

Reason: Proper fractions are not whole numbers