

**Q 1.**

Is zero a rational number? Can you write it in the form  $\frac{p}{q}$  where  $p$  and  $q$  are integers and  $q \neq 0$ ?

**SOLUTION:**

Yes, zero is a rational number. We can write it in the form  $\frac{p}{q}$   
 $0 = \frac{0}{1} = \frac{0}{2} = \frac{0}{3}$  etc. denominator  $q$  can also be taken as negative integer.

**Q 2**

Find six rational numbers between 3 and 4.

**SOLUTION:**

We have,

$$q_1 = \frac{3+4}{2} = \frac{7}{2}; 3 < \frac{7}{2} < 4$$

$$q_2 = \frac{3 + \frac{7}{2}}{2} = \frac{13}{4}; 3 < \frac{13}{4} < \frac{7}{2} < 4$$

$$q_3 = \frac{4 + \frac{7}{2}}{2} = \frac{15}{4}; 3 < \frac{13}{4} < \frac{7}{2} < \frac{15}{4} < 4$$

$$q_4 = \frac{\frac{7}{2} + \frac{13}{4}}{2} = \frac{14+13}{4} = \frac{27}{8};$$

$$3 < \frac{13}{4} < \frac{27}{8} < \frac{7}{2} < \frac{15}{4} < 4$$

$$q_5 = \frac{1}{2} \left( \frac{7}{2} + \frac{15}{4} \right) = \frac{1}{2} \left( \frac{14+15}{4} \right) = \frac{29}{8};$$

$$3 < \frac{13}{4} < \frac{27}{8} < \frac{7}{2} < \frac{29}{8} < \frac{15}{4} < 4$$

$$q_6 = \frac{1}{2} \left( \frac{13}{4} + \frac{27}{8} \right) = \frac{1}{2} \left( \frac{26+27}{8} \right) = \frac{53}{16};$$

$$3 < \frac{13}{4} < \frac{53}{16} < \frac{27}{8} < \frac{7}{2} < \frac{29}{8} < \frac{15}{4} < 4$$

Thus, the six rational numbers between 3 and 4 are

$$\frac{7}{2}, \frac{13}{4}, \frac{15}{4}, \frac{27}{8}, \frac{29}{8} \text{ and } \frac{53}{16}.$$

**Q 3.**

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

**SOLUTION:**

Since, we need to find five rational numbers, therefore, multiply numerator and denominator by 6.

$$\therefore \frac{3}{5} = \frac{3 \times 6}{5 \times 6} = \frac{18}{30} \text{ and } \frac{4}{5} = \frac{4 \times 6}{5 \times 6} = \frac{24}{30}$$

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

**Q 4.**

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

- (i) Every natural number is a whole number.
- (ii) Every integer is a whole number.
- (iii) Every rational number is a whole number.

**SOLUTION:**

- (i) True,  $\therefore$  The collection of all natural numbers and 0 is called whole numbers.
- (ii) False,  $\therefore$  Negative integers are not whole numbers.
- (iii) False,  $\therefore$  Rational numbers of the form  $\frac{p}{q}$ ,  $q \neq 0$  and  $q$  does not divide  $p$  completely are not whole numbers.

**Q 5.**

State whether the following statements are true or false. Justify your answers.

- (i) Every irrational number is a real number.
- (ii) Every point on the number line is of the form  $\sqrt{m}$ , where  $m$  is a natural number.
- (iii) Every real number is an irrational number.

**SOLUTION:**

- (i) True; because all rational numbers and all irrational numbers form the group (collection) of real numbers.
- (ii) False; because negative numbers cannot be the square root of any natural number.
- (iii) False; because rational numbers are also a part of real numbers.