NCERT Class 9th Mathematics CH:-1 Number Systems

★ Excercise 1.1:-

Q.1] Is zero a rational number? Can you write it in the form p q , where p and q are integers and q ≠ 0?

Sol:- Yes, Zero is a rational number

Explanation:- A rational number can be expressed in form of $\frac{p}{q}$ where p and q are integers and $q \neq 0$.

0 can be a rational as it can be written as $\frac{0}{2}$ or $\frac{0}{3}$ or $\frac{0}{4}$ etc.

Q.2] Find six rational numbers between 3 and 4.

Sol:- Given numbers,

3 & 4

$3 = \frac{3\times4}{1\times4} = \frac{12}{3} = \frac{12\times4}{3\times4} = \frac{48}{12}$

$4 = \frac{4\times4}{1\times4} = \frac{14}{4} = \frac{12\times3}{4\times3} = \frac{36}{12}$

Therefore, 6 rational numbers between 3 and 4 =

$\frac{46}{12}, \frac{44}{12}, \frac{40}{12}, \frac{38}{12}, \frac{39}{12}$

$\Rightarrow \frac{23}{6}, \frac{22}{6}, \frac{10}{3}, \frac{19}{6}, \frac{13}{4}$

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

Sol:- Given rational numbers = $\frac{3}{5}$ & $\frac{4}{5}$

$\frac{3}{5} = \frac{3\times6}{5\times6} = \frac{18}{30}$

$\frac{4}{5} = \frac{4\times6}{5\times6} = \frac{24}{30}$

Therefore, 5 rational numbers between $\frac{3}{5}$ and $\frac{4}{5}$ are:

$\frac{19}{30}, \frac{20}{30}, \frac{21}{30}, \frac{22}{30}, \frac{23}{30}$

$\Rightarrow \frac{19}{30}, \frac{2}{3}, \frac{7}{10}, \frac{11}{15}, \frac{23}{30}$

Q.4

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

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

(ii) Every integer is a whole number. **False**

(iii) Every rational number is a whole number. **False**

★ Excercise:- 1.2

Q.1 State True or False and justify your answer.

(i) Every irrational number is a real number.

Ans:- True

(ii) Every point on the number line is of form $\sqrt{m}$ where m is a rational number.

Ans:- False, no negative number can be the square root of a natural number

(iii) Every real number is an ~~irratio~~ irrational number.

Ans:- False, for example 2 is real number but not irrational.

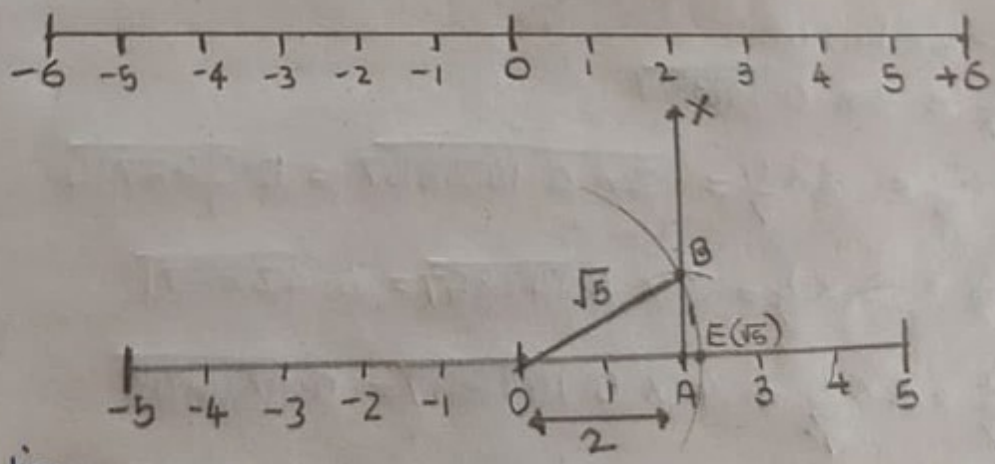
Q.2 Are the square roots of all positive integers irrational? If not give an example of the square root of a number that ~~is so~~ is a rational number.

Ans:- No, the square roots of all positive integers are not irrational.

For example, $\sqrt{9} = 3$ which is a rational number.

Q. 3] Show how $\sqrt{5}$ can be represented on a number line.

Ans:-



Justification:-

1. Draw number line.
2. Make 2 as A and draw a perpendicular AX.
3. With A as centre and radius 1 unit cut AX at B and join OB

In $\triangle OAB$, By Pythagoras Theorem

$OB = \sqrt{OA^2 + AB^2}$

$OB = \sqrt{(2)^2 + (1)^2}$

$= \sqrt{4+1}$

$= \sqrt{5}$

$\therefore$ OB represents $\sqrt{5}$

Take O as centre and radius OB intersecting number line at E.

$\therefore$ E is the representation of $\sqrt{5}$ on number line.

☆ Excercise 1.3

Q.1 Write the following in decimal form and say what kind of decimal expansion each has :

(i) $\frac{36}{100}$

Sol:- $\frac{36}{100} = 0.36$

Terminating decimal expansion

(ii) $\frac{1}{11}$

Sol:- $\frac{1}{11} =$

```
       0.0909
  11 | 10
       -0
       ----
       100
       -99
       ----
         10
        - 0
       ----
        100
       - 99
       ----
         10
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$\therefore$ Decimal Expansion of $\frac{1}{11} = 0.\overline{09}$

Thus, non-terminating recurring decimal expansions.

Q.2 You know that $\frac{1}{7} = 0.\overline{142857}$. Can you predict what the decimal expansions of $\frac{2}{7}, \frac{3}{7}, \frac{4}{7}, \frac{5}{7}, \frac{6}{7}$ are, without actually doing the long division? If so, how?

Sol:- We know,

$\frac{1}{7} = 0.\overline{142857}$

$\therefore \frac{2}{7} = 2 \times \frac{1}{7} = \overline{2 \times 0.142857} = 0.\overline{285714}$

$\frac{3}{7} = 3 \times \frac{1}{7} = 3 \times 0.\overline{142857} = 0.\overline{428571}$

$\frac{4}{7} = 4 \times \frac{1}{7} = 4 \times 0.\overline{142857} = 0.\overline{571428}$

$\frac{5}{7} = 5 \times \frac{1}{7} = 5 \times 0.\overline{142857} = 0.\overline{714285}$

$\frac{6}{7} = 6 \times \frac{1}{7} = 6 \times 0.\overline{142857} = 0.\overline{857142}$