B. B. S. Sec. School
IX (Maths)

② Decimal representation of rational numbers

A rational number can be expressed as a decimal number.

(i) Terminating decimal :-

The rational number with a finite decimal part are known as finite or terminating decimal for example $\frac{3}{4} = 0.75$

$$4)\overline{30}\,(0.75$$
$$\underline{28}$$
$$20$$
$$\underline{20}$$
$$\times$$

$\frac{1}{8} = 0.125$

$$8)\overline{10}\,(0.125$$
$$\underline{8}$$
$$20$$
$$\underline{16}$$
$$40$$
$$\underline{40}$$
$$\times$$

(ii) Non terminating repeating decimal :-

Sometimes we face the situation that the division process never comes to an end it means there is always remainder. The remainder starts repeating after certain number of steps in these cases, a block of digit repeats. Such decimals are called non terminating repeating decimal. for example

① $\frac{1}{3} = 0.3333\ldots$ → $0.\overline{3}$

④ $0.123123123\ldots$

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(3) Irrational numbers :-

A number is it called irrational if it can not be written in the form of $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

for example : $\sqrt{2}, \sqrt{3}, \sqrt{5}, \sqrt{15}, \pi$ ---- etc

Non termination non repeating decimal numbers also can not written in the form of $\frac{p}{q}$ therefor these are also irrational numbers.

for example 0·1010010001 ----

0·20 22 200 222 000 2222 ----

Ex 1.2 Q1 (1) We know that real number is either rational or irrational. So we can say that every irrational number is a real number. Hence the given statement is true.

(4) Since every real number can be represented on a number line. Thus every point on the number line is of the form $\sqrt{m}$ where m is natural number is correct.

Q.2 Square root of all positive integers are irrational number is not correct Such as

$\sqrt{16} = 4$ which is a rational number

$\sqrt{25} = 5$ " " " "

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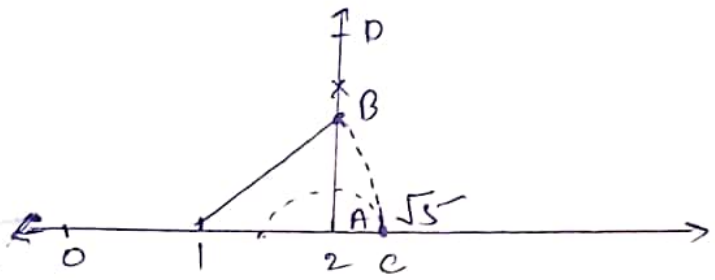

Construction: (i) Take OA = 2 units and draw perpendicular AB on A.

(ii) Cut AB = 1 unit (~~OA = AB~~) and join OB.

(iii) By taking O as centre and OB as radius draw an arc which intersect the number line at C.

Hence OC = $\sqrt{5}$

∴ point C represents $\sqrt{5}$ on number line

Proof In Rt Δ OAB

$OB^2 = OA^2 + AB^2$

$OB^2 = (2)^2 + (1)^2$

$OB^2 = 4 + 1$

$OB = \sqrt{5}$ Hence

Assignment: (1) Write properties of rational and irrational number.

(2) Represent $\sqrt{2}$, $\sqrt{3}$, $\sqrt{7}$, $\sqrt{11}$ on number line.

(3) Write three irrational number between $\sqrt{3}$ and $\sqrt{5}$.

(4) Write six rational number between 3 and 5.

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