Number Systems: Exercise 1.2

Q.1 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.

Sol. **(i)** Every irrational number is a real number: True
Justification: A real number can be either rational or irrational.
(ii) Every point on the number line is of the form $\sqrt{m}$: False
Justification: Numbers of any other types also lie on the number line.
(iii) Every real number is an irrational number: False
Justification: Rational numbers are also in real numbers.

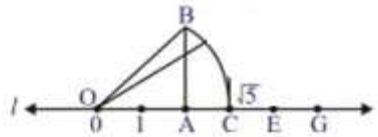
Q.2 Are the square roots of all positive integers irrational? If not, give an example of the square root of a number that is a rational numbers.

Sol. No, the square roots of all positive integers are not irrational.
Example: 9 is a positive integer but $\sqrt{9} = 3$ is a natural number.

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

Sol. Represent $\sqrt{5}$ on the number line.

Firstly, we represent $\sqrt{5}$ on the number line l and construct a right -angled ΔOAB, right - angled at A such that OA = 2 and AB = 1 unit



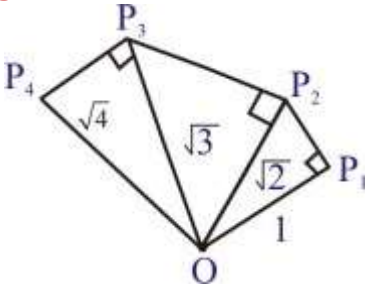
Then, from the Pythagoras theorem

$$OB^2 = OA^2 + AB^2$$
$$= 4+1$$
$$OB = \sqrt{5}$$

Now, cut off a length OB = OC = $\sqrt{5}$ on the number line at point C.

Thus, the point C represents the irrational number $\sqrt{5}$.

Q.4 Classroom activity (Constructing the 'square root spiral'): Take a large sheet of paper and construct the 'square root spiral' in the following fashion. Start with a point O and draw a line segment OP_1 of unit length. Draw a line segment P_1P_2 perpendicular to OP_1 of unit length (see figure). Now draw a line segment P_2P_3 perpendicular to OP_2. Then draw a line segment P_3P_4 perpendicular to OP_3. Continuing in the manner, you can get the line segment $P_{n-1}P_n$ by drawing a line segment of unit length perpendicular to OP_{n-1}. In this manner, you will have created the points P_2, P_3....P_n,.... and joined them to create a beautiful spiral depicting $\sqrt{2}$, $\sqrt{3}$, $\sqrt{4}$,.....



Sol. This is classroom activity - Do it as directed own your basis.