Exercise-1.2

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.

Ans.

(i) Consider the irrational numbers and the real numbers separately.

We know that irrational numbers are the numbers that cannot be converted in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

We know that a real number is the collection of rational numbers and irrational numbers.

Therefore, we conclude that, yes every irrational number is a real number.

(ii) False, Consider a number line. We know that on a number line, we can represent negative as well as positive numbers.

We know that we cannot get a negative number after taking square root of any number.

Therefore, we conclude that not every number point on the number line is of the form $\sqrt{m}$, where m is a natural number.

(iii) False, Consider the irrational numbers and the real numbers separately.

We know that irrational numbers are the numbers that cannot be converted in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

We know that a real number is the collection of rational numbers and irrational numbers.

So, we can conclude that every irrational number is a real number. But every real number is not an irrational number.

Therefore, we conclude that, every real number is not a rational number.

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 number.

Ans. We know that square root of every positive integer will not yield an integer.
We know that $\sqrt{4}$ is 2, which is an integer. But, $\sqrt{7}$ or $\sqrt{10}$ will give an irrational number.

Therefore, we conclude that square root of every positive integer is not an irrational number.

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

Ans. According to the Pythagoras theorem, we can conclude that

$$\left(\sqrt{5}\right)^2 = (2)^2 + (1)^2.$$

We need to draw a line segment AB of 1 unit on the number line. Then draw a straight line segment BC of 2 units. Then join the points C and A, to form a line segment BC.

Then draw the arc ACD, to get the number $\sqrt{5}$ on the number line.