STD - 10

**MATHS** 

CHAPTER - 1

REAL NUMBER

**EXERCISE-1.3 (Q.3)** 

## 3. Prove that the following are irrationals:

$$(i)\frac{1}{\sqrt{2}}$$

Let us assume  $\frac{1}{\sqrt{2}}$  is rational.

Then we can find co-prime x and y (y  $\neq$  0) such that  $\frac{1}{\sqrt{2}} = \frac{x}{y}$ 

Rearranging, we get,

$$\sqrt{2} = \frac{y}{x}$$

Since, x and y are integers, thus,  $\sqrt{2}$  is a rational number, which contradicts the fact that  $\sqrt{2}$  is irrational.

Hence, we can conclude that  $\frac{1}{\sqrt{2}}$  is irrational.

Let us assume  $7\sqrt{5}$  is a rational number.

Then we can find co-prime a and b (b  $\neq$  0) such that

$$7\sqrt{5} = \frac{x}{y}$$

Rearranging, we get,

$$\sqrt{5} = \frac{x}{7y}$$

Since, x and y are integers, thus,  $\sqrt{5}$  is a rational number, which contradicts the fact that  $\sqrt{5}$  is irrational.

Hence, we can conclude that  $7\sqrt{5}$  is irrational.

(iii) 
$$6 + \sqrt{2}$$

Let us assume  $6 + \sqrt{2}$  is a rational number.

Then we can find co-primes x and y (y  $\neq$  0) such that

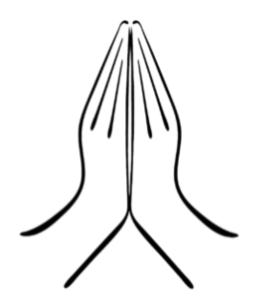
$$6+\sqrt{2}=\frac{x}{y}$$

Rearranging, we get,

$$\sqrt{2} = \left(\frac{x}{y}\right) - 6$$

Since, x and y are integers, thus  $(\frac{x}{v})$  - 6 is a rational number and therefore,  $\sqrt{2}$  is rational. This contradicts the fact that  $\sqrt{2}$  is an irrational number. Hence, we can conclude that  $6 + \sqrt{2}$  is irrational.

## Thanks



For watching