

IX Maths  
Ch-1 Number Systems

Q.1 What is irrational number?

Ans. A number which can not be expressed in the form of  $\frac{p}{q}$  (p and q are integers and  $q \neq 0$ ), is called an irrational number.

OR

A number whose decimal representation is non-terminating and non-repeating is called irrational number.

e.g.  $\sqrt{2}, \sqrt{5}, \sqrt{10}$  etc

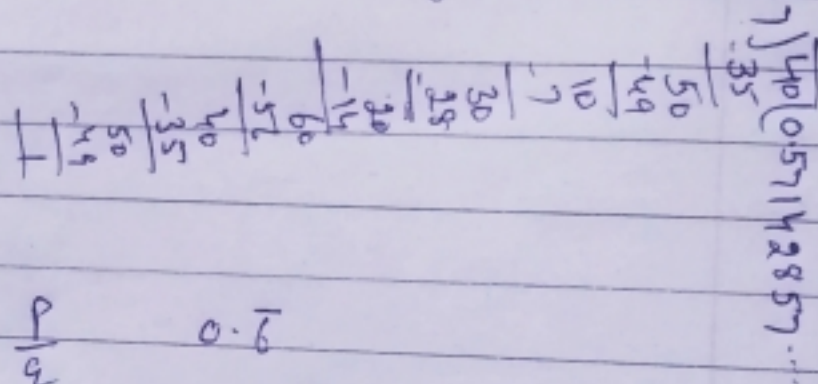
check whether  $\sqrt{2}$  is irrational or rational number?

Sol. Decimal expansion of  $\sqrt{2} = 1.414213 \dots$  It is non-terminating and non-repeating. So  $\sqrt{2}$  is an irrational no.

Q.2 Express  $\frac{4}{9}$  in decimal form and state the kind of decimal expansion.

Sol.  $\frac{4}{9} \rightarrow 0.\overline{4444}$

Non-terminating repeating decimal



Express in the form of  $\frac{p}{q}$   $0.\overline{6}$

Sol.  $\rightarrow$  Let  $x = 0.\overline{6}$   
 $= 0.6666 \dots$  (1)

Multiply by 10 on both sides  $\rightarrow 10x = 6.666 \dots$  (2)

Subtracting (1) from (2) we get  $10x - x = 6.666 \dots - 0.666 \dots$   
 $9x = 6$

$$\therefore 0.\overline{6} = \frac{2}{3}$$

$$x = \frac{6}{9} = \frac{2}{3}$$

which is in  $\frac{p}{q}$  form

Q.3  $\frac{p}{q}$  form  $\rightarrow 0.4\overline{7} \Rightarrow$  Let  $x = 0.4\overline{7} = 0.4777 \dots$  (1)

Multiply by 10 on both side  $\rightarrow 10x = 4.777 \dots$  (2)

Multiply again by 10 in (2)  $\rightarrow 100x = 47.777 \dots$  (3)

Subtracting (2) from (3) we get  $100x - 10x = 47.777 \dots - 4.777 \dots$   
 $90x = 43$

$$\Rightarrow 0.4\overline{7} = \frac{43}{90}$$

$$x = \frac{43}{90}$$

Q.4 Simplify  $\rightarrow (\sqrt{13} + \sqrt{5})(\sqrt{13} - \sqrt{5})$

Sol.  $(\sqrt{13} + \sqrt{5})(\sqrt{13} - \sqrt{5}) = (\sqrt{13})^2 - (\sqrt{5})^2$  using identity  $(a+b)(a-b) = a^2 - b^2$   
 $= 13 - 5 = 8$

(7) Find the value of  $\sqrt{20} \times \sqrt{5}$

Sol  $\sqrt{20} \times \sqrt{5} = \sqrt{100} = 10$

(8) Rationalise the denominator of  $\frac{1}{\sqrt{7}}$

Sol  $\frac{1}{\sqrt{7}} \rightarrow \frac{1}{\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}} = \frac{\sqrt{7}}{\sqrt{49}} = \frac{\sqrt{7}}{7}$

(9) Rationalise  $\frac{1}{\sqrt{5} + \sqrt{2}} \Rightarrow$  sol  $\frac{1}{\sqrt{5} + \sqrt{2}} \times \frac{\sqrt{5} - \sqrt{2}}{\sqrt{5} - \sqrt{2}} = \frac{\sqrt{5} - \sqrt{2}}{(\sqrt{5})^2 - (\sqrt{2})^2}$   
 $= \frac{\sqrt{5} - \sqrt{2}}{5 - 2} = \frac{\sqrt{5} - \sqrt{2}}{3}$

(10) Rationalise of  $\frac{1}{\sqrt{5}}$

Sol  $\Rightarrow \frac{1}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{5}}{\sqrt{25}} = \frac{\sqrt{5}}{5}$

### H.W.

Q1 Write five irrational numbers.

(2) Check whether  $\sqrt{5}$  is rational or irrational number.

(3) Express  $\frac{3}{11}$  in decimal form and state the kind of decimal expansion

(4) Simplify  $\rightarrow (\sqrt{5} + \sqrt{7})(\sqrt{5} - \sqrt{7})$

(5) Simplify  $(\sqrt{11} - \sqrt{7})(\sqrt{11} + \sqrt{7})$

(6) multiply  $\rightarrow 6\sqrt{5} \times 2\sqrt{5}$

(7) Express in the form of  $\frac{p}{q}$

(i)  $0.\overline{36}$

(ii)  $0.\overline{9}$

(8) Rationalise the following (i)  $\frac{1}{\sqrt{7} - \sqrt{6}}$  (ii)  $\frac{1}{\sqrt{7} - 2}$

Q.9 Express  $2.\overline{3}$  in the form of  $\frac{p}{q}$  where  $p$  and  $q$  are integers and  $q \neq 0$

(10) Find the value of  $\sqrt{20} \times \sqrt{45}$ .

Q.11 Evaluate  $\rightarrow$  (i)  $\left(-\frac{3}{4}\right)^{-2}$  (ii)  $\left(\frac{1}{3}\right)^{-3}$