

① Write three numbers whose decimal expansion are non-terminating and non-repeating

Sol Non-terminating and non-repeating decimal expansions are called as irrational numbers. The possible irrational nos are

(i) $0.45045004500045\dots$ (ii) $0.23123112311123\dots$ (iii) $0.501501150111\dots$

2 classify as rational or irrational numbers.

(i) $\sqrt{23}$ (ii) $\sqrt{225}$ (iii) 0.125 (iv) $1.10100100010000\dots$

Sol (i) $\sqrt{23} = 4.7958315233\dots$ Its decimal expansion is non-terminating and non-repeating. $\therefore \sqrt{23}$ is an irrational no.

(ii) $\sqrt{225} = \sqrt{15 \times 15} = 15 \rightarrow \frac{15}{1} = \frac{p}{q} \therefore \sqrt{225}$ is a rational no

(iii) $0.125 \Rightarrow \frac{125}{1000} = \frac{5}{40} = \frac{1}{8} \rightarrow \frac{p}{q} \therefore 0.125$ is a rational no

(iv) $1.10100100010000\dots$ The no is non-terminating and non-repeating \therefore It is an irrational no.

⑤ Simplify $\rightarrow (\sqrt{5} + \sqrt{2})^2 \rightarrow$ Sol. $(\sqrt{5} + \sqrt{2})^2 = (\sqrt{5})^2 + 2\sqrt{5}\sqrt{2} + (\sqrt{2})^2$
 $[a^2 + b^2 + 2ab = (a+b)^2]$
 $\Rightarrow 5 + 2\sqrt{10} + 2 = 5 + 2 + 2\sqrt{10} \Rightarrow 7 + 2\sqrt{10}$

⑥ Simplify \rightarrow (i) $(3 + \sqrt{3})(2 + \sqrt{2})$ (ii) $4\sqrt{2} - 2\sqrt{8} + \frac{3}{\sqrt{2}}$

Sol: \rightarrow (i) $(3 + \sqrt{3})(2 + \sqrt{2}) = 3(2 + \sqrt{2}) + \sqrt{3}(2 + \sqrt{2}) \Rightarrow 6 + 3\sqrt{2} + 2\sqrt{3} + \sqrt{6}$ Ans

(ii) $4\sqrt{2} - 2\sqrt{8} + \frac{3}{\sqrt{2}} \rightarrow 4\sqrt{2} - 2 \times \sqrt{4 \times 2} + \frac{3 \times \sqrt{2}}{\sqrt{2} \times \sqrt{2}} \Rightarrow 4\sqrt{2} - 2 \times 2\sqrt{2} + \frac{3\sqrt{2}}{2}$

$= 4\sqrt{2} - 4\sqrt{2} + \frac{3\sqrt{2}}{2} = \frac{3\sqrt{2}}{2}$ Ans

⑦ Rationalise the denominator: $\rightarrow \frac{1 + \sqrt{7}}{1 - \sqrt{7}}$

Sol $\rightarrow \frac{1 + \sqrt{7}}{1 - \sqrt{7}} \times \frac{1 + \sqrt{7}}{1 + \sqrt{7}} = \frac{(1 + \sqrt{7})(1 + \sqrt{7})}{(1 - \sqrt{7})(1 + \sqrt{7})} = \frac{(1 + \sqrt{7})^2}{(1)^2 - (\sqrt{7})^2} [(a+b)^2 = a^2 + 2ab + b^2]$
 $[(a-b)(a+b) = a^2 - b^2]$
 $\Rightarrow \frac{1^2 + 2 \times 1 \times \sqrt{7} + (\sqrt{7})^2}{1 - 7} = \frac{1 + 2\sqrt{7} + 7}{-6} = \frac{8 + 2\sqrt{7}}{-6}$

$= \frac{2(4 + \sqrt{7})}{-6} \rightarrow \frac{(4 + \sqrt{7})}{-3}$
 $= \frac{-(4 + \sqrt{7})}{3}$

⑧ Divide $5\sqrt{45}$ by $\frac{\sqrt{75}}{\sqrt{3}}$

Sol \rightarrow

P.T.O \rightarrow

$$\begin{aligned} \text{Sol} \Rightarrow 5\sqrt{45} \div \frac{\sqrt{75}}{\sqrt{5}} &\Rightarrow 5 \times \sqrt{9 \times 5} \div \frac{\sqrt{25 \times 3}}{\sqrt{5}} \\ &= 5 \times 3\sqrt{5} \div \frac{5\sqrt{3}}{\sqrt{5}} \Rightarrow 15\sqrt{5} \times \frac{\sqrt{5}}{5\sqrt{3}} \\ &\Rightarrow \frac{3 \times \sqrt{5} \times \sqrt{5}}{\sqrt{3}} = \frac{3 \times 5}{\sqrt{3}} = \frac{15 \times \sqrt{3}}{\sqrt{3} \sqrt{3}} = \frac{15\sqrt{3}}{3} = 5\sqrt{3} \end{aligned}$$

⑧ Simplify $\rightarrow 3\sqrt{48} - \frac{5}{2} \cdot \frac{1}{\sqrt{3}} + 4\sqrt{3}$

$$\begin{aligned} \text{Sol} \Rightarrow 3\sqrt{48} + \frac{5}{2} \cdot \frac{1}{\sqrt{3}} + 4\sqrt{3} &\Rightarrow 3 \times \sqrt{16 \times 3} - \frac{5}{2\sqrt{3}} + 4\sqrt{3} \\ &\Rightarrow 3 \times 4\sqrt{3} - \frac{5}{2\sqrt{3}} + 4\sqrt{3} \\ &= 12\sqrt{3} - \frac{5}{2\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} + 4\sqrt{3} = 12\sqrt{3} - \frac{5\sqrt{3}}{2 \times 3} + 4\sqrt{3} \\ &\Rightarrow 12\sqrt{3} + 4\sqrt{3} - \frac{5\sqrt{3}}{6} \\ &= \frac{16\sqrt{3} - \frac{5\sqrt{3}}{6}}{6} = \frac{96\sqrt{3} - 5\sqrt{3}}{6} = \frac{\sqrt{3}(96-5)}{6} = \frac{91\sqrt{3}}{6} \text{ Ans} \end{aligned}$$

⑨ Simplify $\rightarrow (5+\sqrt{3}) - (9+\sqrt{3})$

$$\begin{aligned} \text{Sol} \Rightarrow (5+\sqrt{3}) - (9+\sqrt{3}) &= (5+\sqrt{3}) - 9 - \sqrt{3} \\ &= 5 + \sqrt{3} - 9 - \sqrt{3} = 5 - 9 = -4 \text{ Ans} \end{aligned}$$

(H. W.)

- ① Write the following in decimal form and state the kind of decimal expansion of each \rightarrow (i) $\frac{56}{1000}$ (ii) $4\frac{1}{8}$ (iii) $\frac{2}{11}$
- ② Express the following in $\frac{p}{q}$ form where p and q are integers and $q \neq 0$
(i) $0.\overline{001}$ (ii) $1.\overline{27}$
- ③ Simplify $(\sqrt{3} + \sqrt{2})^2$
- ④ Simplify $\rightarrow (5 + \sqrt{8}) - (\sqrt{2} - 6)$
- ⑤ Simplify $\rightarrow (32)^{\frac{1}{5}}$
- ⑥ Simplify $\rightarrow (64)^{\frac{1}{2}}$
- ⑦ Rationalise the denominator $\rightarrow \frac{1}{2 + \sqrt{3}}$
- ⑧ Multiply $9\sqrt{7} \times 5\sqrt{7}$
- ⑨ Add $\rightarrow 2\sqrt{2} + 5\sqrt{3}$ and $\sqrt{2} - 3\sqrt{3}$
- ⑩ Divide $\rightarrow 8\sqrt{5}$ by $2\sqrt{5}$.