Short Answer Type Questions – II

[3 MARKS]

Que 1. Find the irrational numbers between $\frac{1}{2}$ *and* $\frac{2}{7}$.

Sol. $\frac{1}{2} = 0.142857142857\ldots \qquad \Rightarrow \frac{1}{7} = 0.\overline{142857}$

$\frac{2}{7} = 2 \times \frac{1}{7} = 0.285714285714\ldots \Rightarrow \frac{2}{7} = 0.\overline{285714}$

To find irrational numbers between $\frac{1}{2}$ *and* $\frac{2}{7}$. we find numbers which are non-terminating and non-repeating (non-recurring). There are infinitely many such numbers between $\frac{1}{2}$ *and* $\frac{2}{7}$. Two of them are:

0.150 1500 15000 150000 …

0.250 2500 25000 250000 …

Que 2. Find six rational numbers between 3 and 4.

Sol. A rational number between 3 and 4 is

$$\frac{1}{2}(3+4) = \frac{7}{2} \ \ i.e., 3 < \frac{7}{2} < 4$$

Now, a rational number between 3 and $\frac{7}{2}$ is

$$\frac{1}{2}\left(3+\frac{7}{2}\right) = \frac{13}{4} \ \ i.e., 3 < \frac{13}{4} < \frac{7}{2}$$

A rational number between $\frac{13}{4}$ *and* $\frac{7}{2}$

$$\frac{1}{7}\left(\frac{13}{4}+\frac{7}{2}\right) = \frac{27}{8} \ \ i.e., \qquad 3 < \frac{13}{4} < \frac{27}{8} < \frac{7}{2}$$

A rational number between $\frac{7}{2}$ and 4 is

$$\frac{1}{2}\left(\frac{7}{2}+4\right) = \frac{15}{4} \ \ i.e., \ 3 < \frac{13}{4} < \frac{27}{8} < \frac{7}{2} < \frac{15}{4} < 4$$

A rational number between $\frac{7}{2}$ and $\frac{15}{4}$ is

$$\frac{1}{2}\left(\frac{7}{2}+\frac{15}{4}\right)=\frac{29}{8} \quad i.e., \quad 3<\frac{13}{4}<\frac{27}{8}<\frac{7}{2}<\frac{29}{8}<\frac{15}{4}<4$$

A rational number between 15/4 and 4 is

$$\frac{1}{2}\left(\frac{15}{4}+4\right)=\frac{31}{8} \quad i.e., \quad 3<\frac{13}{4}<\frac{27}{8}<\frac{7}{2}<\frac{29}{8}<\frac{15}{4}<\frac{31}{8}<4$$

Hence, 6 rational numbers between 3 and 4 are

$$\frac{13}{4},\frac{27}{8},\frac{7}{2},\frac{29}{8},\frac{15}{4} \; and \; \frac{31}{8}$$

<u>Alternative method</u>

We have, $3 \;=\; 3\times\frac{(6+1)}{(6+1)}=\frac{21}{7} \quad and\; 4=4\times\frac{(6+1)}{(6+1)}=\frac{28}{7}$

We know that $21<22<23<24<25<26<27<28$

$$\Rightarrow \frac{21}{7}<\frac{22}{7}<\frac{23}{7}<\frac{24}{7}<\frac{25}{7}<\frac{26}{7}<\frac{27}{7}<\frac{28}{7}$$

Hence, six rational numbers between 3 = $\frac{21}{7}$ $and\; 4=\frac{28}{7} are$

$$\frac{22}{7},\frac{23}{7},\frac{24}{7},\frac{25}{7},\frac{26}{7}, and\; \frac{27}{7}$$

Que 3. Find six rational numbers between $\frac{5}{7}$ and $\frac{6}{7}$.

Sol. We have, $\frac{5}{7}=\frac{5(6+1)}{7(6+1)}=\frac{35}{49}$ and $\frac{6}{7}=\frac{6(6+1)}{7(6+1)}=\frac{42}{49}$

Therefore, six rational numbers between $\frac{5}{7}=\frac{42}{49}$ and $\frac{6}{7}=\frac{42}{49}$ are

$$\frac{36}{49},\frac{37}{49},\frac{38}{49},\frac{39}{49},\frac{40}{49},\frac{41}{49}$$

Que 4. Write $4\frac{1}{8}$ in decimal form and find what kind of decimal expansion it has.

Sol. $4\frac{1}{8} = \frac{33}{8}$, By long division, we have

$$\begin{array}{r} 4.125 \\ \hline 8 \div 33.000 \\ -32 \\ \hline 10 \\ -8 \\ \hline 20 \\ -16 \\ \hline 40 \\ -40 \\ \hline 0 \end{array}$$

$$\therefore \frac{33}{8} = 4.125, Which\ is\ terminating.$$

Que 5. Write $\frac{3}{13}$ in decimal form and find what kind of decimal expansion it has.

Sol. By long division, we have

$$\begin{array}{r} 0.230769230 \\ \hline 13 \div 3.00 \\ -26 \\ \hline 40 \\ -39 \\ \hline 100 \\ -91 \\ \hline 90 \\ -78 \\ \hline 120 \\ -117 \\ \hline 30 \\ -26 \\ \hline 40 \\ -39 \\ \hline 1 \end{array}$$

$\therefore \frac{3}{13} = \overline{0.230769},$ non-terminating and repeating.

Que 6. Express 0.00323232… in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

Sol.

$$Let \quad x = 0.00323232...$$

$$Then, \quad 100x\ 0.323232... \qquad ...(i)$$

$$Also\ 10000x = 32.323232... \qquad ...(ii)$$

$$Subtracting\ (i)\ from\ (ii), we\ get$$

$$10000x - 100x = 32.32\ 32\ 32... - 0.32\ 32\ 32...$$

$$9900x = 32$$

$$x = \frac{32}{9900} \Rightarrow x = \frac{8}{2475}.$$

Que 7. Express $0.3\overline{57}$ in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

Sol.

$$Let\ x = 0.3\overline{57}.$$

$$Then,\ x = 0.35777\ ...$$

$$So, 100x = 35.777\ ... \qquad ...(i)$$

$$1000x = 357.777\ ... \qquad ...(ii)$$

$$Subtracting\ (i) from\ (ii), we\ get$$

$$1000x - 100x = 357.777\ ... - 35.777\ ...$$

$$900x = 322 \Rightarrow x = \frac{322}{9000}$$

$$x = \frac{322}{900} = \frac{161}{450}$$

Que 8. Express: $2.0\overline{15}$ in the $\frac{p}{q}$ Form, Where p and q are integers and $q \neq 0$.

Sol.

$$Let\ x = 2.0\overline{15}$$

$$Then,\ x = 2.0151515...$$

$$\Rightarrow 10x = 20.151515...$$

$$10x = 20 + 0.151515... \qquad ...(i)$$

$$Let\ y = 0.151515... \qquad ...(ii)$$

$$\Rightarrow\ 100y\ =\ 15.151515\ldots\qquad \ldots(iii)$$

$$Subtracting\ (ii)\ from\ (iii), we\ get$$

$$100y - y\ =\ 15.1515\ldots. - 0.151515\ldots.$$

$$99y\ =\ 15$$

$$y\ =\ \frac{15}{99}\ \Rightarrow\ y\ =\ \frac{5}{33}$$

$$Now\quad 10x\ =\ 20 + \frac{5}{33}\ \Rightarrow\ 10x = \frac{660+5}{33}$$

$$\Rightarrow\quad 10x = \frac{665}{33}\ \Rightarrow\ x\ = \frac{665}{330}\ \ \Rightarrow x = \frac{133}{66}.$$

Que 9. Show that 0.142857142857 … = $\frac{1}{7}$

Sol.

$$Let\ x\ = 0.\overline{142857}\qquad \ldots(i)$$

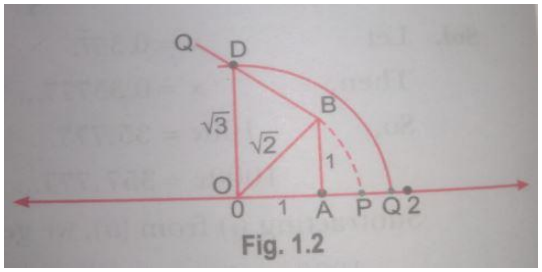
$$Then\ 10{,}00{,}000x\ =\ 142857.\overline{142857}\qquad \ldots(ii)$$

$$Subtracting\ (i)\ from\ (ii), we\ get$$

$$9{,}99{,}999x\ =\ 142857$$

$$\Rightarrow\quad x\ =\ \frac{142857}{999999} = \frac{1}{7}$$

$$Hence, 0.142857142857\ldots = \frac{1}{7}$$



Que 10. Locate $\sqrt{3}$ on the number line.

Sol. Construct a number line and mark a point O, representing zero. Let point A represents 1 as shown in **Fig.1.2** Clearly, OA = 1 unit. Now, draw a right triangle OAB in which AB = OA = 1 unit. Using Pythagoras theorem, we have

$$OB^2 = OA^2 + AB^2 = 1^2 + 1^2$$

$$\Rightarrow \quad OB^2 = 2 \quad \Rightarrow OB = \sqrt{2}$$

Taking O as centre OB as a radius draw an arc intersecting the number line at point P. Then P

corresponds to $\sqrt{2}$ on the number line. Now draw DB of unit length perpendicular to OB. Then using Pythagoras theorem, we have

$$OD^2 = OB^2 + DB^2$$

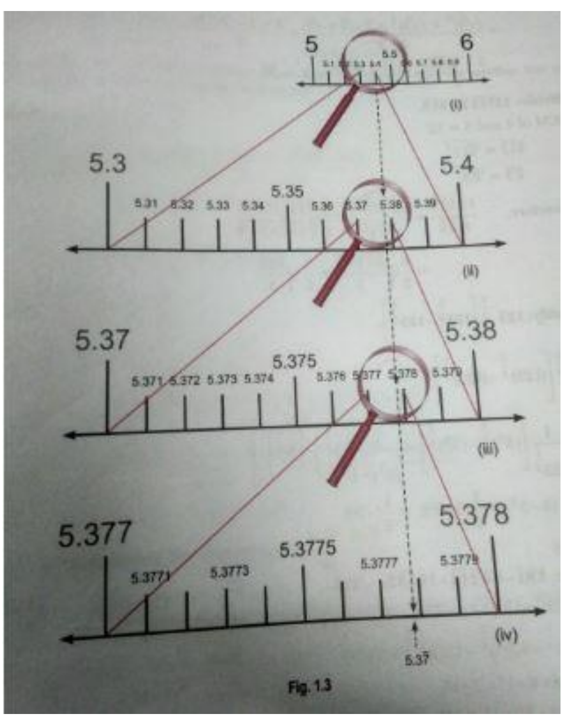
$$OD^2 = \left(\sqrt{2}\right)^2 + 1^2 = 2 + 1 = 3$$

$$OD = \sqrt{3}$$

Taking O as centre and OD as a radius draw an arc which intersects the number line at the point Q Clearly, Q corresponds to $\sqrt{3}$.

Que 11. Visualize the representation of 5. $3\overline{7}$ On the number line up to 5 decimal places, that is, up to 5.37777.

Sol. First, we se that $5.3\overline{7}$ is located between 5 and 6. In the next step, we locate $5.3\overline{7}$ between 5.3 and 5.4 To get a more accurate visualization of the representation, we divide this portion of the number line into 10 equal parts and use a magnifying glass to visualize that $5.3\overline{7}$ lies between $5.3\overline{7}$ and 5.38. To visualize 5.37 more accurately, we again divide the portion between 5.37 and 5.38 into ten equal parts and use a magnifying glass to visualize that $5.3\overline{7}$ lies between 5.377 and 5.378 into 10 equal parts, and visualize the representation of $5.3\overline{7}$ as in Fig. 1.3 (iv). We notice that $5.3\overline{7}$ is located closer to 5.3778 than to 5.3777.



Que 12. Rationalise the denominator of $\frac{2+\sqrt{3}}{2-\sqrt{3}}$.

Sol. We have,

$$\frac{2+\sqrt{3}}{2-\sqrt{3}} = \frac{(2+\sqrt{3})(2+\sqrt{3})}{(2-\sqrt{3})(2+\sqrt{3})} = \frac{(2+\sqrt{3})^2}{2^2-(\sqrt{3})^2}$$

$$= \frac{2^2+(\sqrt{3})^2+2\times 2\sqrt{3}}{4-3}$$

$$= \frac{4+3+4\sqrt{3}}{1} = 7+4\sqrt{3}$$

Que 13. Rationalise the denominator of $\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$.

Sol.

$$\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} = \frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}\times\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}+\sqrt{3}} = \frac{(\sqrt{5}+\sqrt{3})^2}{(\sqrt{5})^2-(\sqrt{3})^2}$$

$$= \frac{(\sqrt{5})^2+(\sqrt{3})^2+2.\sqrt{5}\times\sqrt{3}}{5-3} = \frac{5+3+2\sqrt{15}}{2}$$

$$= \frac{8+2\sqrt{15}}{2} = \frac{2(4+\sqrt{15})}{2} = 4+\sqrt{15}.$$

Que 14. Divide: $12\sqrt[4]{15}\ by\ 8\sqrt[3]{3}$.

Sol. LCM of 4and 3 = 12

$$\therefore\ \sqrt[4]{15} = \sqrt[12]{15^3}$$

$$\sqrt[3]{3} = \sqrt[12]{3^4}$$

$$Therefore, \frac{12\sqrt[4]{15}}{8\sqrt[3]{3}} = \frac{12\sqrt[12]{15^3}}{8\sqrt[12]{3^4}} = \frac{3}{2}\sqrt[12]{\frac{15\times15\times15}{3\times3\times3\times3}}$$

$$= \frac{3}{2}\sqrt[12]{\frac{5\times5\times5}{3}} = \frac{3}{2}\sqrt[12]{\frac{125}{3}}$$

Que 15. Simplify: $\mathbf{125^{-\frac{1}{3}}\left[125^{\frac{1}{3}} - 125^{\frac{2}{3}}\right]}$.

Sol.

$$125^{-\frac{1}{3}}\left[(125)^{\frac{1}{3}} - (125)^{\frac{2}{3}}\right]$$

$$= \frac{1}{125^{\frac{1}{3}}}\left[(5^3)^{\frac{1}{3}} - (5^3)^{\frac{2}{3}}\right] = \frac{1}{(5^3)^{\frac{1}{3}}}\left[\left(5^{\frac{3}{3}}\right) - \left(5^{\frac{2}{3}}\right)^2\right]$$

$$= \frac{1}{5}(5 - 5^2) = \frac{1}{5}(5 - 25) = \frac{1}{5}(5 - 25) = \frac{1}{5}(-20)$$

$$= -4$$

Que 16. Simplify: $\mathbf{\sqrt[4]{81} - 8\sqrt[3]{216} + 15\sqrt[5]{32} + \sqrt{225}}$.

Sol.

$$\sqrt[4]{81} - 8\sqrt[3]{216} + 15\sqrt[5]{32} + \sqrt{225}$$

$$= (3^4)^{\frac{1}{4}} - 8(6^3)^{\frac{1}{3}} + 15(2^5)^{\frac{1}{5}} + (15^2)^{\frac{1}{2}}$$

$$= 3 - 8 \times 6 + 15 \times 2 + 15$$

$$= 3 - 48 + 30 + 15 = 48 - 48 = 0$$

Que 17. Locate $\sqrt{10}$ on the number line.

Sol. We write 10 as the sum of the squares of two natural numbers.

$10 = 9 + 1 = 3^2 + 1^2$

Take OA = 3 units, on the number line

Draw BA = 1 unit, perpendicular to OA. Join OB (Fig. 1.4).

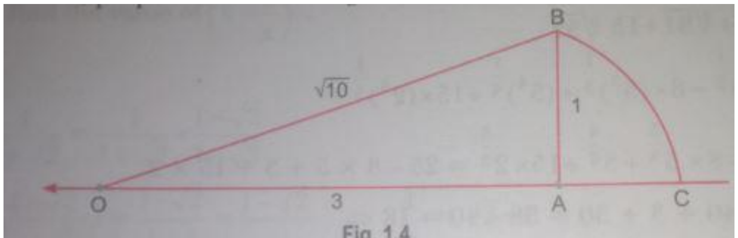


Fig. 1.4

Now, by Pythagoras theorem,

$OB^2 = AB^2 + OA^2$

$OB^2 = 1^2 + 3^2 = 10 \quad \Rightarrow \quad OB = \sqrt{10}$

Taking O as Centre and OB as a radius, draw an arc which intersects the number line at point C. Clearly, C corresponds to $\sqrt{10}$ on the number line.

Que 18. Simplify: $\frac{7+3\sqrt{5}}{3+\sqrt{5}} + \frac{7-3\sqrt{5}}{3-\sqrt{5}}$.

Sol.

$$\frac{7+3\sqrt{5}}{3+\sqrt{5}} + \frac{7-3\sqrt{5}}{3-\sqrt{5}} = \frac{(3-\sqrt{5})(7+3\sqrt{5}) + (3+\sqrt{5})(7-3\sqrt{5})}{(3+\sqrt{5})(3-\sqrt{5})}$$

$$= \frac{21+9\sqrt{5}-7\sqrt{5}-15+21-9\sqrt{5}+7\sqrt{5}-15}{3^2 - (\sqrt{5})^2}$$

$$= \frac{42-30}{9-5} = \frac{12}{4} = 3$$

Que 19. Simplify: $\frac{2+\sqrt{3}}{2-\sqrt{3}} - \frac{2-\sqrt{3}}{2+\sqrt{3}}$.

Sol.

$$\frac{2+\sqrt{3}}{2-\sqrt{3}} - \frac{2-\sqrt{3}}{2+\sqrt{3}} = \frac{(2+\sqrt{3})^2 - (2-\sqrt{3})^2}{(2-\sqrt{3})(2+\sqrt{3})}$$

$$= \frac{2^2 + (\sqrt{3})^2 + 2 \times 2\sqrt{3} - \left[(2)^2 + \left(\sqrt{3}\right)^2 - 2 \times 2\sqrt{3}\right]}{2^2 - (\sqrt{3})^2}$$

$$= \frac{4+3+4\sqrt{3} - \left(4+3-4\sqrt{3}\right)}{4-3} = \frac{7+4\sqrt{3} - \left(7-4\sqrt{3}\right)}{1}$$

$$= 7 + 4\sqrt{3} - 7 + 4\sqrt{3} = 8\sqrt{3}.$$

Que 20. Simplify by rationalizing the denominator: $\frac{4\sqrt{3}+5\sqrt{2}}{\sqrt{48}+\sqrt{18}}$.

Sol.

$$= \frac{4\sqrt{3}+5\sqrt{2}}{\sqrt{48}+\sqrt{18}} = \frac{4\sqrt{3}+5\sqrt{2}}{\sqrt{16 \times 3} + \sqrt{9 \times 2}} = \frac{4\sqrt{3}+5\sqrt{2}}{4\sqrt{3}+3\sqrt{2}} \times \frac{4\sqrt{3}-3\sqrt{2}}{4\sqrt{3}-3\sqrt{2}}$$

$$= \frac{16\left(\sqrt{3}\right)^2 + 20\sqrt{6} - 12\sqrt{6} - 15\left(\sqrt{2}\right)^2}{\left(4\sqrt{3}\right)^2 - \left(3\sqrt{2}\right)^2}$$

$$= \frac{16 \times 3 + (20 - 12)\sqrt{6} - 15 \times 2}{16 \times 3 - 9 \times 2}$$

$$= \frac{48 + 8\sqrt{6} - 30}{48 - 18} = \frac{18 + 8\sqrt{6}}{30}$$

$$= \frac{2\left(9 + 4\sqrt{6}\right)}{30} = \frac{9 + 4\sqrt{6}}{15}$$

Que 21. Simplify: $\boldsymbol{\sqrt{625} - 8\sqrt[3]{125} + \sqrt[4]{81} + 15\sqrt[5]{32}}$.

Sol.

$$\sqrt{625} - 8\sqrt[3]{125} + \sqrt[4]{81} + 15\sqrt[5]{32}$$

$$= (25^2)^{\frac{1}{2}} - 8 \times (5^3)^{\frac{1}{3}} + (3^4)^{\frac{1}{4}} + 15 \times (2^5)^{\frac{1}{5}}$$

$$= 25^{\frac{2}{2}} - 8 \times 5^{\frac{3}{3}} + 3^{\frac{4}{4}} + 15 \times 2^{\frac{5}{5}} = 25 - 8 \times 5 + 3 + 15 \times 2$$

$$= 25 - 40 + 3 + 30 = 58 - 40 = 18$$

Que 22. Rationalise the denominator of $\frac{1}{\sqrt{3}+\sqrt{2}}$ and hence evaluate by taking $\sqrt{2}$ =1.414 and $\sqrt{3}$ = 1.732, up to three places of decimal.

Sol. Rationalising the denominator, we get

$$\frac{1}{\sqrt{3} + \sqrt{2}} \times \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} - \sqrt{2}} = \frac{\sqrt{3} - \sqrt{2}}{\left(\sqrt{3}\right)^2 - \left(\sqrt{2}\right)^2}$$

$$= \frac{\sqrt{3} - \sqrt{2}}{3 - 2} = \sqrt{3} - \sqrt{2}$$

Substituting the values of $\sqrt{3}$ and $\sqrt{2}$, we get 1.732 – 1.414 = 0.318.

Que 23. Simplify: $\boldsymbol{\frac{9^{\frac{1}{3}} \times 27^{-\frac{1}{2}}}{3^{\frac{1}{6}} \times 3^{-\frac{2}{3}}}}$

Sol.

$$\frac{9^{\frac{1}{3}} \times 27^{-\frac{1}{2}}}{3^{\frac{1}{6}} \times 3^{-\frac{2}{3}}} = \frac{9^{\frac{1}{3}} \times 3^{\frac{2}{3}}}{3^{\frac{1}{6}} \times 27^{\frac{1}{7}}} = \frac{(3^2)^{\frac{1}{3}} \times 3^{\frac{2}{3}}}{3^{\frac{1}{6}} \times (3^3)^{\frac{1}{2}}} = \frac{3^{\frac{2}{3}} \times 3^{\frac{2}{3}}}{3^{\frac{1}{6}} \times 3^2}$$

$$= \frac{3^{\frac{2}{3}+\frac{2}{3}}}{3^{\frac{1}{6}+\frac{3}{2}}} = \frac{3^{\frac{4}{3}}}{3^{\frac{1+9}{6}}} = \frac{3^{\frac{4}{3}}}{3^{\frac{10}{6}}} = 3^{\frac{4}{3}-\frac{5}{3}} = 3^{-\frac{1}{3}} = \frac{1}{3^{\frac{1}{3}}}$$

Que 24. Simplify: $\left[9\left(64^{\frac{1}{3}}+125^{\frac{1}{3}}\right)^{3}\right]^{\frac{1}{4}}$.

Sol.

$$\left[9\left(64^{\frac{1}{3}}+125^{\frac{1}{3}}\right)^{3}\right]^{\frac{1}{4}} = \left[9\left((4^3)^{\frac{1}{3}}+(5^3)^{\frac{1}{3}}\right)^{3}\right]^{\frac{1}{4}}$$

$$= [9(4+5)^3]^{\frac{1}{4}} = (9\times 9^3)^{\frac{1}{4}} = (9^4)^{\frac{1}{4}} = 9$$

Que 25. If a=2 + $\sqrt{3}$, Find the value of a-$\frac{1}{a}$.

Sol.

$$a = 2+\sqrt{3} \quad \Rightarrow \frac{1}{a} = \frac{1}{2+\sqrt{3}} = \frac{1}{2+\sqrt{3}}\times\frac{2-\sqrt{3}}{2-\sqrt{3}} = \frac{2-\sqrt{3}}{2^2-\left(\sqrt{3}\right)^2}$$

$$\therefore \frac{1}{a} = \frac{2-\sqrt{3}}{4-3} = 2-\sqrt{3}$$

$$Hence, a-\frac{1}{a} = 2+\sqrt{3}-\left(2-\sqrt{3}\right) = 2+\sqrt{3}-2+\sqrt{3} = 2\sqrt{3}$$

Que 26. If x = 1 + $\sqrt{2}$, find the value of $\left(x-\frac{1}{x}\right)^{3}$.

Sol.

$$x = 1+\sqrt{2}$$

$$and, \frac{1}{x} = \frac{1}{1+\sqrt{2}} = \frac{1}{1+\sqrt{2}}\times\frac{1-\sqrt{2}}{1-\sqrt{2}}$$

$$\frac{1}{x} = \frac{1-\sqrt{2}}{1^2-\left(\sqrt{2}\right)^2} = \frac{1-\sqrt{2}}{1-2} = \frac{1-\sqrt{2}}{-1} \Rightarrow \frac{1}{x} = \sqrt{2}-1$$

$$Now, x-\frac{1}{x} = 1+\sqrt{2}-\left(\sqrt{2}-1\right) = 1+\sqrt{2}-\sqrt{2}+1 = 2$$

$$\Rightarrow \left(x-\frac{1}{x}\right)^{3} = 2^3 = 8$$

Que 27. Find the value of x, if $\left(\frac{6}{5}\right)^{x}\left(\frac{5}{6}\right)^{2x} = \frac{125}{216}$

Sol.

$$\left(\frac{6}{5}\right)^{x}\left(\frac{5}{6}\right)^{2x} = \frac{125}{216} \Rightarrow \left(\frac{6}{5}\right)^{x}\left(\frac{5}{6}\right)^{x}\left(\frac{5}{6}\right)^{x} = \frac{125}{216}$$

$$\Rightarrow \left(\frac{6}{5}\times\frac{5}{6}\right)^{x}\left(\frac{5}{6}\right)^{x} = \frac{5^3}{6^3}$$

$$\Rightarrow 1^x\left(\frac{5}{6}\right)^{x} = \left(\frac{5}{6}\right)^{3} \Rightarrow \left(\frac{5}{6}\right)^{x} = \left(\frac{5}{6}\right)^{3}$$

$$\Rightarrow x = 3$$

Que 28. Represent $\sqrt{4.5}$ on the number line.

Sol. Consider a line segment AB = 4.5 units. Extend AB upto point C such that BC = 1 unit.

AC = 4.5 + 1 5.5 units. Now mark O as the midpoint of AC. With O as centre and radius OC draw a semicircle. Draw Perpendicular BD on AC which intersect the semicircle at D.

This length BD = $\sqrt{4.5}$ units.

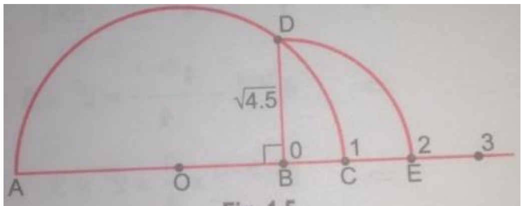


Fig. 1.5

To show BD on the number line, consider line ABC as number line with point B as zero. Therefore, BC = 1 unit.

With B as centre and radius BD draw an arc which intersects number line ABC at E. So this point E represents $\sqrt{4.5}$ on number line.

AB = 4.5 units

BC = 1 unit

BD = BE = $\sqrt{4.5}$ units

Que 29. Multiply: $5\sqrt[3]{4}\ by\ \sqrt{3}$.

Sol. LCM of 3 and 2 = 6

$$\therefore\ 5\sqrt[3]{4} = 5\sqrt[6]{4^2} = 5\sqrt[6]{16}$$

$$\sqrt{3} = \sqrt[6]{3^3} = \sqrt[6]{27}$$

$$5\sqrt[3]{4}\times\sqrt{3} = 5\sqrt[6]{16}\times\sqrt[6]{27}$$

$$= 5\sqrt[6]{16 \times 27} = 5\sqrt[6]{432.}$$

Que 30. If $2^{5x} \div 2^{x} = \sqrt[5]{2^{20}}, find\ x.$

Sol.

$$\frac{2^{5x}}{2^{x}} = (2^{20})^{\frac{1}{5}}$$

$$\Rightarrow 2^{5x-x} = 2^{20\times\frac{1}{5}} \quad \Rightarrow 2^{4x} = 2^{4}$$

$$\Rightarrow 4x = 4 \quad \Rightarrow x = 1$$

2	384
2	192
2	96
2	48
2	24
2	12
2	6
	3

Que 31. Simplify: $\frac{\sqrt{25}}{\sqrt[3]{64}} + \left(\frac{256}{625}\right)^{-\frac{1}{4}} + \frac{1}{\left(\frac{64}{125}\right)^{\frac{2}{3}}}.$

Sol.

$$\frac{\sqrt{25}}{\sqrt[3]{64}} + \left(\frac{256}{625}\right)^{-\frac{1}{4}} + \frac{1}{\left(\frac{64}{125}\right)^{\frac{2}{3}}}.$$

$$= \frac{\sqrt{5\times 5}}{\sqrt[3]{4\times 4\times 4}} + \left(\frac{625}{256}\right)^{\frac{1}{4}} + \left(\frac{125}{64}\right)^{\frac{2}{3}}$$

$$= \frac{5}{4} + \left(\frac{5^4}{4^4}\right)^{\frac{1}{4}} + \left(\frac{5^3}{4^3}\right)^{\frac{2}{3}} = \frac{5}{4} + \left(\frac{5}{4}\right)^{4\times\frac{1}{4}} + \left(\frac{5}{4}\right)^{3\times\frac{2}{3}}$$

$$= \frac{5}{4} + \frac{5}{4} + \left(\frac{5}{4}\right)^{2} = \frac{5}{4} + \frac{5}{4} + \frac{25}{16}$$

$$= \frac{20+20+25}{16} = \frac{65}{16}$$

Que 32. If $4^{2x-1} - 16^{x-1}$ = 384, find the value of x.

Sol. $4^{2x-1} - 16^{x-1} = 384,$

$$\Rightarrow 4^{2x-1} - 4^{2(x-1)} = 384 \quad \Rightarrow 4^{2x-1} - \frac{4^{2x-2+1}}{4} = 384$$

$$\Rightarrow\ 4^{2x-1} - \frac{4^{2x-1}}{4} = 2^7 \times 3 \quad \Rightarrow\ 4^{2x-1}\left(1 - \frac{1}{4}\right) = 2^7 \times 3$$

$$\Rightarrow\ 2^{2(2x-1)} \times \frac{3}{4} = 2^7 \times 3 \quad \Rightarrow\ 2^{4x-2} = 2^7 \times 3 \times \frac{2^2}{3} = 2^9$$

Equating the exponents, we get

$$4x - 2 = 9 \ or\ x = \frac{11}{4}.$$