Page 1

Number system: [Answers for 'Do it yourself']

(36) $7, \boxed{7.01,\ 7.03,\ 7.05,\ 7.07,\ 7.09}, 7.25$

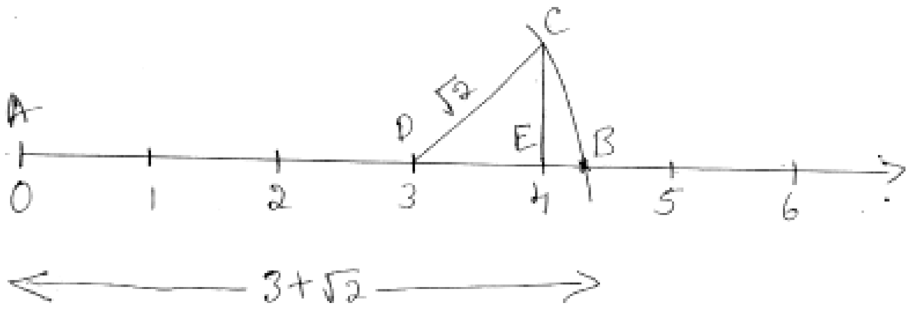
$$= 7, \boxed{\frac{701}{100}, \frac{703}{100}, \frac{705}{100}, \frac{707}{100}, \frac{709}{100},}\ 7.25$$

(37)

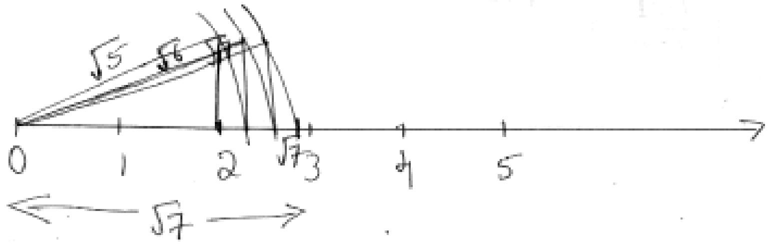
$$-\frac{3}{4}, \boxed{-\frac{2}{4}, -\frac{1}{4}, \frac{1}{4}, \frac{1.1}{4}, \frac{1.2}{4},} \quad \frac{1}{2}\times\frac{2}{2}$$

$$= -\frac{3}{4}, \boxed{-\frac{1}{2}, -\frac{1}{4}, \frac{1}{4}, \frac{11}{40}, \frac{13}{40},}\ \frac{2}{4}$$

(38)



39



40 $\frac{5}{7} = 0.\overline{714285}$ & $\frac{9}{11} = 0.\overline{81}$

∴ irrational numbers between $0.\overline{714285}$ & $0.\overline{81}$

are

0.72030030003000003........

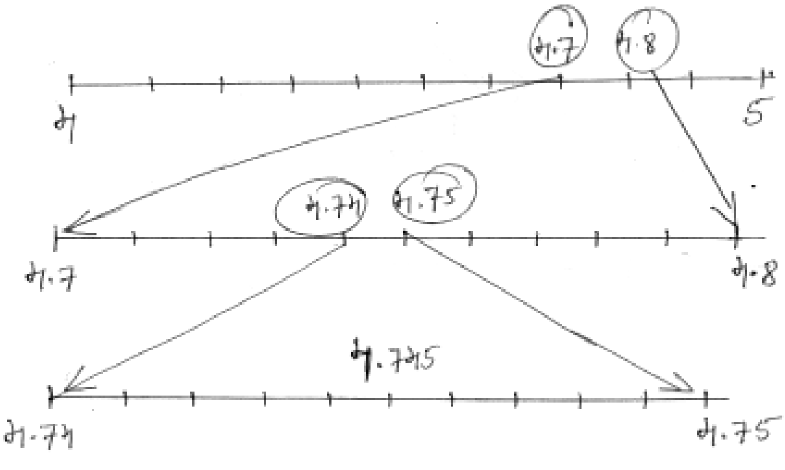
0.720400400040000004........

0.72050050005000005........

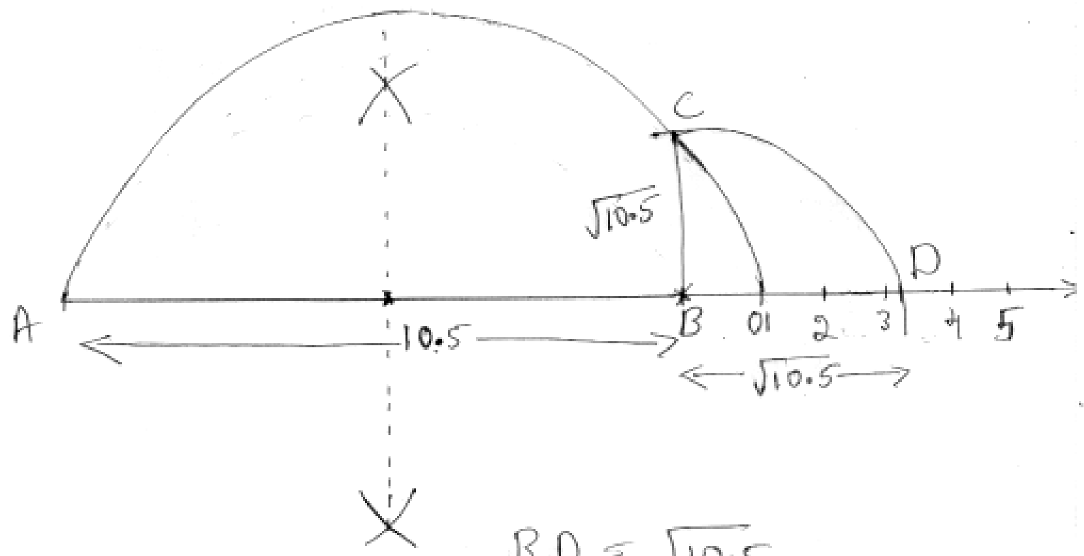
0.7206006000600006......

0.7307007000700007......

41

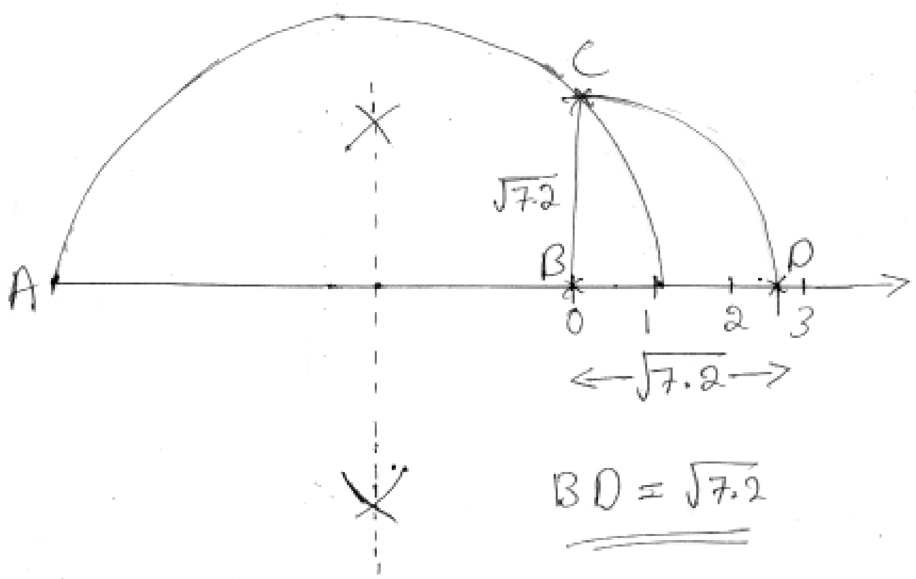


42



$BD = \sqrt{10.5}$

43



$BD = \sqrt{7.2}$

अभ (i) $\dfrac{12}{\sqrt{6}-\sqrt{2}} \times \dfrac{\sqrt{6}+\sqrt{2}}{\sqrt{6}+\sqrt{2}}$

$= \dfrac{12\sqrt{6}+12\sqrt{2}}{6-2}$

$= \dfrac{\cancelto{3}{12}\sqrt{6}+\cancelto{3}{12}\sqrt{2}}{\cancel{4}}$

$= \underline{\underline{3\sqrt{6}+3\sqrt{2}}}$

(ii) $\dfrac{15\sqrt{3}}{\sqrt{5}} \times \dfrac{\sqrt{5}}{\sqrt{5}}$

$= \dfrac{\cancelto{3}{15}\sqrt{15}}{\cancelto{1}{5}}$

$= \underline{\underline{3\sqrt{15}}}$

(iii) $\dfrac{\sqrt{7}+\sqrt{5}}{\sqrt{7}-\sqrt{5}} \times \dfrac{\sqrt{7}+\sqrt{5}}{\sqrt{7}+\sqrt{5}}$

$= \dfrac{7+5+2\sqrt{35}}{7-5}$

$= \underline{\underline{\dfrac{12+2\sqrt{35}}{2}}}$

(iv) $\dfrac{3+\sqrt{5}}{2\sqrt{5}+3} \times \dfrac{2\sqrt{5}-3}{2\sqrt{5}-3}$

$= \dfrac{6\sqrt{5}-9+10-3\sqrt{5}}{20-9}$

$= \underline{\underline{\dfrac{3\sqrt{5}+1}{11}}}$

(v) $\dfrac{2\sqrt{6}}{\sqrt{2}+\sqrt{3}} \times \dfrac{(\sqrt{2}-\sqrt{3})}{(\sqrt{2}-\sqrt{3})} + \dfrac{6\sqrt{2}}{\sqrt{6}+\sqrt{3}} \times \dfrac{(\sqrt{6}-\sqrt{3})}{(\sqrt{6}-\sqrt{3})} - \dfrac{8\sqrt{3}}{\sqrt{6}+\sqrt{2}} \times \dfrac{(\sqrt{6}-\sqrt{2})}{(\sqrt{6}-\sqrt{2})}$

$= \dfrac{2\sqrt{12}-2\sqrt{18}}{2-3} + \dfrac{6\sqrt{12}-6\sqrt{6}}{6-3} + \dfrac{-8\sqrt{18}+8\sqrt{6}}{6-2}$

$= \dfrac{2\sqrt{12}-2\sqrt{18}}{-1} + \dfrac{6\sqrt{12}-6\sqrt{6}}{3} + \left(-\dfrac{8\sqrt{18}+8\sqrt{6}}{4}\right)$

$= \cancel{-2\sqrt{12}}+\cancel{2\sqrt{18}}+\cancel{2\sqrt{12}}-\cancel{2\sqrt{6}}-\cancel{2\sqrt{18}}+\cancel{2\sqrt{6}}$

$= \underline{\underline{0}}$

(45)

(i) $\frac{4+\sqrt{2}}{2+\sqrt{2}} \times \frac{(2-\sqrt{2})}{(2-\sqrt{2})}$

$= \frac{8-4\sqrt{2}+2\sqrt{2}-\sqrt{2}\cdot\sqrt{2}}{2^2-(\sqrt{2})^2}$

$= \frac{8-2\sqrt{2}-2}{4-2}$

$= \frac{6-2\sqrt{2}}{2}$

$= \underline{3-\sqrt{2}} = a-\sqrt{b}$

$\therefore \underline{a=3}$ & $\underline{b=2}$

(ii) $\frac{7}{\sqrt{15}+2\sqrt{2}} \times \frac{\sqrt{15}-2\sqrt{2}}{\sqrt{15}-2\sqrt{2}}$

$= \frac{7\sqrt{15}-14\sqrt{2}}{(\sqrt{15})^2-(2\sqrt{2})^2}$

$= \frac{7\sqrt{15}-14\sqrt{2}}{15-8}$

$= \frac{7\sqrt{15}}{7} - \frac{14\sqrt{2}}{7}$

$= \sqrt{15} - 2\sqrt{2}$

$= a\sqrt{15} - b\sqrt{2}$

$\therefore \underline{a=1,\ b=2}$

46 a $0.1\overline{63}$

let $x = 0.1\overline{63}$

multiply by 10 on both sides. then we get

$$10x = 1.\overline{63} \quad — \quad (1)$$

multiply by 100 on both sides.

$$\Rightarrow 100 \times 10x = 100 \times 1.\overline{63}$$

$$1000x = 163.\overline{63} \quad — \quad (2)$$

(2) - (1) gives.

$$1000x - 10x = 163.\overline{63} - 1.\overline{63}$$

$$990x = 162$$

$$x = \frac{\cancel{162}^{81}}{\cancel{990}_{495}}$$

$$\boxed{x = \frac{\cancel{81}^{9}}{\cancel{495}_{55}}} \Rightarrow \boxed{x = \frac{9}{55}} \quad \text{i.e} \ \boxed{0.1\overline{63} = \frac{9}{55}}$$

(b) $32.\overline{7} \Rightarrow$ let $x = 32.\overline{7} \quad — \quad (1)$

$$(x = 32.\overline{7}) \times 10$$

$$\Rightarrow 10x = 327.\overline{7} \quad — \quad (2)$$

(2) - (1) gives.

$$10x - x = 327.\overline{7} - 32.\overline{7}$$

$$9x = 295$$

$$\Rightarrow x = \frac{295}{9}$$

i.e $\boxed{32.5 = \frac{295}{9}}$

(47) $$\frac{5+\sqrt{3}}{7-4\sqrt{3}} \times \frac{(7+4\sqrt{3})}{(7+4\sqrt{3})}$$

$$= \frac{35 + 20\sqrt{3} + 7\sqrt{3} + 12}{(7)^2 - (4\sqrt{3})^2}$$

$$= \frac{47 + 27\sqrt{3}}{49 - 48}$$

$$= 47 + 27\sqrt{3}$$

$$= \frac{94}{2} + 3\times 9\sqrt{3} = 94a + 3\sqrt{3}\,b$$

i.e $a = \frac{1}{2}$ & $b = 9$

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

$$= \frac{9 - 6\sqrt{5} - 3\sqrt{5} + 10}{9 - 20}$$

$$= \frac{19 - 9\sqrt{5}}{-11}$$

$$= \frac{9\sqrt{5}}{11} - \frac{19}{11} = a\sqrt{5} - \frac{19}{11} b \quad [\because \text{Given}]$$

$$= a\sqrt{5} - \frac{19}{11} b$$

$$\therefore a = \frac{9}{11}, \quad b = 1$$

(49). $$p = \frac{(\sqrt{3} - \sqrt{2})}{(\sqrt{3} + \sqrt{2})} \times \frac{(\sqrt{3} - \sqrt{2})}{(\sqrt{3} - \sqrt{2})}$$

$$p = \frac{3 + 2 - 2\sqrt{6}}{(\sqrt{3})^2 - (\sqrt{2})^2}$$

$$p = \frac{5 - 2\sqrt{6}}{1} \quad \text{———} \quad (1)$$

lll^{ly} $$q = \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}} \times \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} + \sqrt{2}}$$

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

$$= \frac{3 + 2 + 2\sqrt{6}}{3 - 2}$$

$$q = \frac{5 + 2\sqrt{6}}{1} \quad \text{———} \quad (2)$$

From (1) & (2)

$$\therefore p^2 + q^2 = (5 - 2\sqrt{6})^2 + (5 + 2\sqrt{6})^2$$

$$= (5)^2 + (2\sqrt{6})^2 + 2(5)(2\sqrt{6}) + [(5)^2 + (2\sqrt{6})^2 - 2(5)(2\sqrt{6})]$$

$$= 25 + 24 + 20\sqrt{6} + 25 + 24 - 20\sqrt{6}$$

$$= 98$$

50 given: $a = \frac{\sqrt{3}+1}{\sqrt{3}-1}$ $b = \frac{1}{a} = \frac{\sqrt{3}-1}{\sqrt{3}+1}$

On substituting the values of a & b in

a^2+ab-b^2, we get

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

$$= 1 + \frac{(\sqrt{3})^2+2(\sqrt{3})(1)+(1)^2}{(\sqrt{3})^2-2(\sqrt{3})(1)+(1)^2} - \frac{[(\sqrt{3})^2-2(\sqrt{3})(1)+(1)^2]}{[(\sqrt{3})^2+2(\sqrt{3})(1)+(1)^2]}$$

$$= \frac{3+2\sqrt{3}+1}{3-2\sqrt{3}+1} + 1 - \frac{[3-2\sqrt{3}+1]}{[3+2\sqrt{3}+1]}$$

$$= \frac{4+2\sqrt{3}}{4-2\sqrt{3}} + 1 - \frac{[4-2\sqrt{3}]}{[4+2\sqrt{3}]}$$

$$= \frac{[4+2\sqrt{3}]}{[4-2\sqrt{3}]} \times \frac{(4+2\sqrt{3})}{(4+2\sqrt{3})} + 1 - \frac{[4-2\sqrt{3}]}{[4+2\sqrt{3}]} \times \frac{(4-2\sqrt{3})}{(4-2\sqrt{3})}$$

$$= \frac{16+8\sqrt{3}+8\sqrt{3}+4\times 3}{16-12} + 1 - \frac{[16-8\sqrt{3}-8\sqrt{3}+12]}{16-12}$$

$$= \frac{28+16\sqrt{3}}{4} + 1 - \frac{[28-16\sqrt{3}]}{4}$$

$$= \cancel{7} + 4\sqrt{3} + 1 - \cancel{7} + 4\sqrt{3}$$

$$= \underline{\underline{8\sqrt{3}+1}}$$