Math - Number Sysystems

1) Simplify $= \frac{\sqrt{32} + \sqrt{48}}{\sqrt{8} + \sqrt{12}}$

$$\frac{\sqrt{32} + \sqrt{48}}{\sqrt{8} + \sqrt{12}} \times \frac{\sqrt{8} + \sqrt{12}}{\sqrt{8} + \sqrt{12}}$$

$$\frac{(\sqrt{32} + \sqrt{48}) \times (\sqrt{8} + \sqrt{12})}{(\sqrt{8})^2 - (\sqrt{12})^2}$$

$$\frac{(\sqrt{256} + \sqrt{304} - \sqrt{304} - \sqrt{576})}{8 - 12}$$

$$\frac{16 + 1959 - 1959 - 24}{-4}$$

$$\frac{942}{-142}$$

$= 2$

2) Simplify $[\{(625)^{-\frac{1}{2}}\}^{-\frac{1}{4}}]^2$

$$(625)^{-\frac{1}{2} \times -\frac{1}{4} \times 2}$$

$$625^{\frac{1}{4}}$$

$5^{4\frac{1}{4}}$

$=5$

3) Rationalise $\frac{5}{\sqrt{3}-\sqrt{5}}$

$\sqrt{5}$

$\frac{5}{\sqrt{3}-\sqrt{5}} \times \frac{\sqrt{3}+\sqrt{5}}{\sqrt{3}+\sqrt{5}}$

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

$\frac{5\sqrt{3}+5\sqrt{5}}{3-5}$

$\frac{5\sqrt{3}+5\sqrt{5}}{-2}$

$\frac{5\sqrt{3}}{-2} - \frac{5\sqrt{5}}{-2}$

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

4) If $a = 2+\sqrt{3}$, find $a - \frac{1}{a}$

$a = 2+\sqrt{3}$

$a - \frac{1}{a}$

$\frac{1}{a} = \frac{1}{2+\sqrt{3}}$

$\frac{1}{a} = \frac{1}{2+\sqrt{3}} \times \frac{2-\sqrt{3}}{2-\sqrt{3}}$

$\frac{1}{a} = \frac{2-\sqrt{3}}{(2)^2-(\sqrt{3})^2}$

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

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

$a - \frac{1}{a} = (2+\sqrt{3}) - (2-\sqrt{3})$

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

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

5) Express $0.\overline{245}$ in $\frac{p}{q}$ form

$x = 0.245245\cdots$ ①

$x = 10$ $10x = 2.45245\ldots$ ②

$100x = 24.5245\ldots$ ③

$1000x = 245.245\ldots$ ④

$(1000x - x) = ((245.245\ldots) - (0.245\ldots))$

$999x = 245$

$x = \frac{245}{999}$

6) find three rational numbers between $\frac{2}{3}$ and $\frac{3}{4}$

$d = \frac{y - x}{n+1}$

$d = \frac{\frac{3}{4} - \frac{2}{3}}{3+1}$

$LCM = 2 \times 2 \times 3 = 12$

$\frac{3}{4} \times \frac{3}{3} = \frac{9}{12}$

$\frac{2}{3} \times \frac{4}{4} = \frac{8}{12}$

$d = \frac{\frac{9}{12} - \frac{8}{12}}{4}$

$d = \frac{\frac{1}{12}}{4/1}$

$$d = \frac{1}{12} \times \frac{12}{1}$$

$$d = \frac{1}{3} + \frac{2}{3}$$

$$d = \frac{3}{3}$$

$$d = \frac{4}{3}, \frac{5}{3}, \frac{6}{3}$$

7) Show that $\sqrt{\frac{1}{4} + (0.01)^{-\frac{1}{2}} - (27)^{\frac{2}{3}}} = \frac{3}{2}$

$$\sqrt{\frac{1}{4}} + (0.01)^{-\frac{1}{2}} - (27)^{\frac{2}{3}}$$

$$= \frac{1}{2} + \frac{1}{0.01^{\frac{1}{2}}} - (3)^{3 \times \frac{2}{3}}$$

$$= \frac{1}{2} + \frac{1}{0.1^{2 \times \frac{1}{2}}} - (3)^{3 \times \frac{2}{3}}$$

$$= \frac{1}{2} + \frac{1}{0.1^{1}} - (3)^{2}$$

$$= \frac{1}{2} + \frac{1}{0.1} - 9$$

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

8) If $x = 3+\sqrt{8}$, find the value of $x+\frac{1}{x}$ and x^2

$x = 3+\sqrt{8}$

$x = (3+\sqrt{8})\frac{(3-\sqrt{8})}{(3-\sqrt{8})}$

$x = \frac{(3^2)-(\sqrt{8})^2}{3-\sqrt{8}}$

$x = \frac{9-8}{3-\sqrt{8}}$

$x = \frac{1}{3-\sqrt{8}}$

$x^2 + \frac{1}{x^2} = x^2 + 1/x^2$

$x^2 + 1/x^2 = (3+\sqrt{8}^2) + (3-\sqrt{8}^2)$

$= 9+6\sqrt{8}+8+9-6\sqrt{8}-8$

$= 34$

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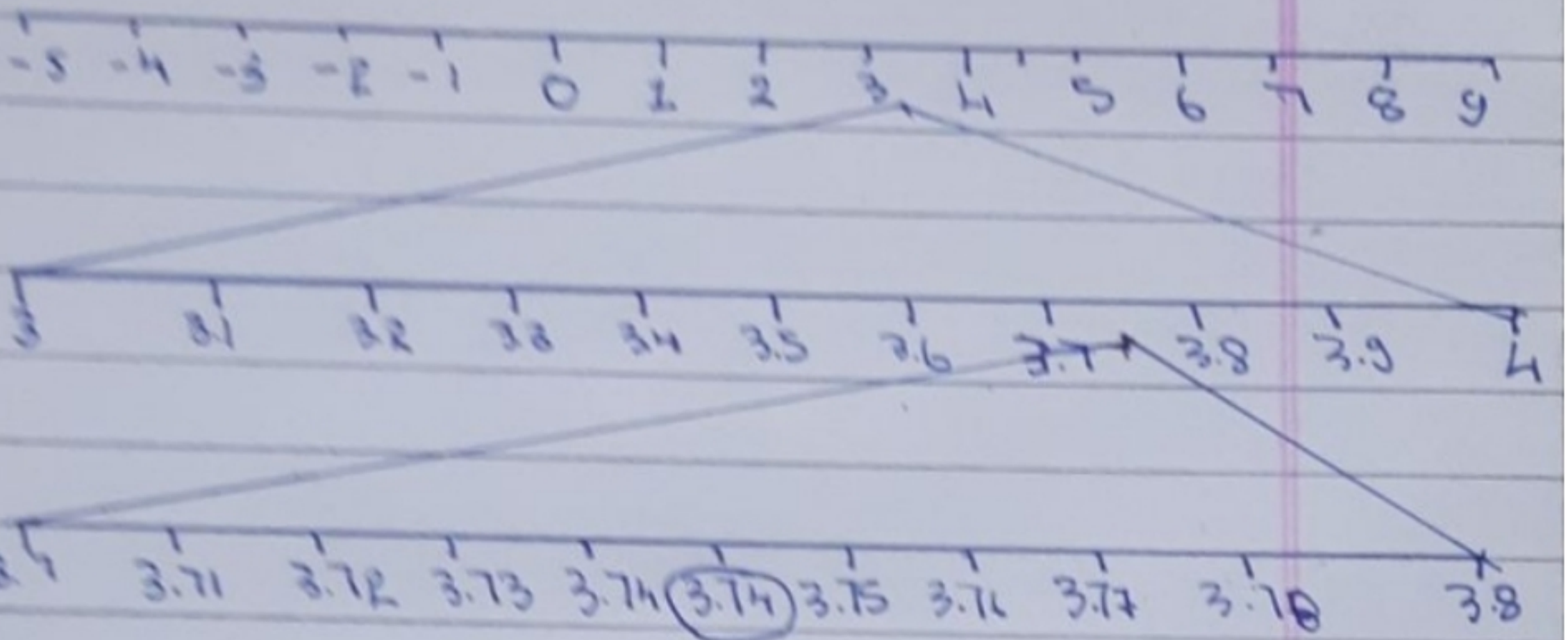
3.714



$\sqrt{7.6}$