

IX Test-3

1) If $x = 4 + \sqrt{15}$, then find the value of $(x + \frac{1}{x})^2$

2) Find the value of $(16)^{0.16} \times (16)^{0.09}$

3) Find a and b if $\frac{\sqrt{11} - \sqrt{7}}{\sqrt{11} + \sqrt{7}} = a - b\sqrt{77}$; where a and b are rational no.s

4) Find the value of $\frac{6}{\sqrt{5} - \sqrt{3}}$, if $\sqrt{3} = 1.732$; $\sqrt{5} = 2.236$

5) Simplify: $\sqrt[3]{27} - 7\sqrt[3]{216} + 10\sqrt{64} + \sqrt{121}$

6) If $\sqrt{3} = 1.73205$, find the value of $\sqrt{\frac{2(\sqrt{3}-1)}{\sqrt{3}+1}}$

7) Simplify: $[9(64^{\frac{1}{3}} + 125^{\frac{1}{3}})^3]^{\frac{1}{4}}$

8) Simplify: $\left(\frac{3125}{243}\right)^{-\frac{4}{5}}$

9) Find the value of $\sqrt[4]{\sqrt[3]{2^2}}$

10) If $x = 7 + \sqrt{40}$, find the value of $\sqrt{x} + \frac{1}{\sqrt{x}}$

IX Test-3 (Answers)

1) $x = 4 + \sqrt{15}$

$$\frac{1}{x} = \frac{1}{(4+\sqrt{15})(4-\sqrt{15})} = \frac{4-\sqrt{15}}{16-15} = 4-\sqrt{15}$$

$$\therefore \left(x + \frac{1}{x}\right)^2 = (4 + \sqrt{15} + 4 - \sqrt{15})^2 = (8)^2 = \underline{\underline{64}}$$

2) $(16)^{0.16} \times (16)^{0.09} = (16)^{0.16+0.09} = (16)^{0.25} = (16)^{\frac{1}{4}} = 2^{4 \times \frac{1}{4}} = \underline{\underline{2}}$

3)
$$\frac{(\sqrt{11} - \sqrt{7})^2}{(\sqrt{11} + \sqrt{7})(\sqrt{11} - \sqrt{7})} = \frac{11+7-2\sqrt{77}}{11-7} = \frac{18-2\sqrt{77}}{4}$$
$$= \frac{2(9-\sqrt{77})}{4} = \frac{9-\sqrt{77}}{2}$$
$$= \frac{9}{2} - \frac{1}{2}\sqrt{77}$$

On comparing with $a - b\sqrt{77}$, $a = \underline{\underline{\frac{9}{2}}}$

$$b = \underline{\underline{\frac{1}{2}}}$$

4)
$$\frac{6(\sqrt{5} + \sqrt{3})}{(\sqrt{5} - \sqrt{3})(\sqrt{5} + \sqrt{3})} = \frac{6(\sqrt{5} + \sqrt{3})}{5-3} = \frac{6(\sqrt{5} + \sqrt{3})}{2}$$
$$= 3(\sqrt{5} + \sqrt{3}) = 3(2.236 + 1.732)$$
$$= 3 \times 3.968 = \underline{\underline{11.904}}$$

5)
$$\sqrt[3]{27} - 7\sqrt[3]{216} + 10\sqrt[3]{64} + \sqrt{121}$$
$$= 3 - 7 \times 6 + 10 \times (64)^{\frac{1}{3}} + 11$$

$$= 3 - 42 + 10 \times 2^{\frac{1}{3} \times \frac{3}{1}} + 11$$

$$= -28 + 20$$

$$= \underline{\underline{-8}}$$

6)
$$\sqrt{\frac{2(\sqrt{3}-1)^2}{(\sqrt{3}+1)(\sqrt{3}-1)}} = \sqrt{\frac{2(\sqrt{3}-1)^2}{3-1}} = \sqrt{\frac{2^1(\sqrt{3}-1)^2}{2^1}} = \sqrt{(\sqrt{3}-1)^2}$$
$$= \sqrt{3}-1 = 1.73205 - 1 = \underline{\underline{0.73205}}$$

$$\begin{aligned}
 7) & \left[9 (64^{\frac{1}{3}} + 125^{\frac{1}{3}})^3 \right]^{\frac{1}{4}} \\
 &= \left[9 (4^{3 \times \frac{1}{3}} + 5^{3 \times \frac{1}{3}})^3 \right]^{\frac{1}{4}} \\
 &= \left[9 (4+5)^3 \right]^{\frac{1}{4}} \\
 &= (9 \times 9^3)^{\frac{1}{4}} \\
 &= 9^{4 \times \frac{1}{4}} = \underline{9}
 \end{aligned}$$

$$\begin{aligned}
 8) \left(\frac{3125}{243} \right)^{-\frac{4}{5}} &= \frac{5^{5 \times -\frac{4}{5}}}{3^{5 \times -\frac{4}{5}}} = \frac{5^{-4}}{3^{-4}} \\
 &= \frac{3^4}{5^4} = \frac{81}{625}
 \end{aligned}$$

$$9) \sqrt[4]{\sqrt[3]{2^2}} = 2^{2 \times \frac{1}{3} \times \frac{1}{4}} = \underline{2^{\frac{1}{6}}}$$

$$\begin{aligned}
 10) x &= 7 + \sqrt{40} \\
 &= 7 + \sqrt{4 \times 10} \\
 &= 7 + 2\sqrt{10} \\
 &\quad \begin{matrix} \hat{5} \times 2 & \hat{\sqrt{5}} \times \sqrt{2} \end{matrix} \\
 &= (\sqrt{5})^2 + (\sqrt{2})^2 + 2 \times \sqrt{5} \times \sqrt{2} \\
 &= (\sqrt{5} + \sqrt{2})^2
 \end{aligned}$$

$$\therefore \sqrt{x} = \sqrt{5} + \sqrt{2}$$

$$\frac{1}{\sqrt{x}} = \frac{1 \times (\sqrt{5} - \sqrt{2})}{(\sqrt{5} + \sqrt{2})(\sqrt{5} - \sqrt{2})} = \frac{\sqrt{5} - \sqrt{2}}{5 - 2} = \frac{\sqrt{5} - \sqrt{2}}{3}$$

$$\therefore \sqrt{x} + \frac{1}{\sqrt{x}} = \frac{\sqrt{5} + \sqrt{2}}{1} + \frac{\sqrt{5} - \sqrt{2}}{3} = \frac{3\sqrt{5} + 3\sqrt{2} + \sqrt{5} - \sqrt{2}}{3} = \underline{\underline{\frac{4\sqrt{5} + 2\sqrt{2}}{3}}}$$