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$$\begin{aligned}
 & \frac{\sqrt{X^3} \sqrt[5]{y^7 \cdot X^4}}{\sqrt[3]{X^5 \cdot y^4} \sqrt{X^3 \cdot y}} = \frac{X^{\frac{3}{2}} y^{\frac{7}{10}} X^{\frac{4}{10}}}{X^{\frac{5}{3}} y^{\frac{4}{3}} X^{\frac{3}{6}} y^{\frac{1}{6}}} = \\
 & = \frac{X^{\frac{3}{2} + \frac{4}{10}} y^{\frac{7}{10}}}{X^{\frac{5}{3} + \frac{3}{6}} y^{\frac{4}{3} + \frac{1}{6}}} = \frac{X^{\frac{15+4}{10}} y^{\frac{7}{10}}}{X^{\frac{10+3}{6}} y^{\frac{8+1}{6}}} = \\
 & = \frac{X^{\frac{19}{10}} y^{\frac{7}{10}}}{X^{\frac{13}{6}} y^{\frac{9}{6}}} = X^{\frac{19}{10} - \frac{13}{6}} y^{\frac{7}{10} - \frac{9}{6}} = \\
 & = X^{\frac{57-65}{30}} y^{\frac{21-45}{30}} = X^{-\frac{8}{30}} y^{-\frac{24}{30}} = \\
 & = X^{-\frac{4}{15}} y^{-\frac{4}{5}} = \frac{1}{X^{\frac{4}{15}} y^{\frac{4}{5}}}
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{2} \text{ a) } & 3 \cdot \sqrt{300} - 5\sqrt{48} + 2\sqrt{50} = \\
 & = 3 \cdot \sqrt{3 \cdot 5^2 \cdot 2^2} - 5\sqrt{3 \cdot 2^4} + 2\sqrt{2 \cdot 5^2} = \\
 & = 3 \cdot 5 \cdot 2 \sqrt{3} - 5 \cdot 2^2 \sqrt{3} + 2 \cdot 5 \sqrt{2} = \\
 & = 30\sqrt{3} - 20\sqrt{3} + 10\sqrt{2} = 10\sqrt{3} + 10\sqrt{2}
 \end{aligned}$$

$$\begin{aligned}
 \text{b) } & 12 \sqrt[3]{81} - 6 \sqrt[3]{24} = 12 \sqrt[3]{3^4} - 6 \sqrt[3]{2^3 \cdot 3} = \\
 & = 12 \cdot 3 \sqrt[3]{3} - 6 \cdot 2 \sqrt[3]{3} = 36 \sqrt[3]{3} - 12 \sqrt[3]{3} = \\
 & = \underline{\underline{24 \sqrt[3]{3}}}
 \end{aligned}$$

$$\textcircled{3} \text{ a) } \sqrt[5]{3} \cdot \sqrt[5]{4} \div \sqrt[5]{2} = \sqrt[5]{\frac{3 \cdot 4}{2}} = \sqrt[5]{6}$$

$$\text{b) } \sqrt[3]{729} - \sqrt{9} = \sqrt[6]{3^6} - \sqrt{3^2} = 0$$

$$\begin{aligned}
 \text{c) } & 0'006 \cdot 10^{-3} + 12'34 \cdot 10^{-5} - 0'00000004 = \\
 & = 0'6 \cdot 10^{-5} + 12'34 \cdot 10^{-5} - 0'04 \cdot 10^{-5} = \\
 & = 12'98 \cdot 10^{-5} = \underline{\underline{1'298 \cdot 10^{-4}}}
 \end{aligned}$$

$$\begin{aligned}
 \text{d) } & 40000 - 30 \cdot 10^4 - 0'005 \cdot 10^8 = \\
 & 4 \cdot 10^4 - 30 \cdot 10^4 - 50 \cdot 10^4 = -76 \cdot 10^4 = \underline{\underline{-7'6 \cdot 10^5}}
 \end{aligned}$$

$$9) a) \sqrt{129600} = \sqrt{2^6 \cdot 3^4 \cdot 5^2} = 2^3 \cdot 3^2 \cdot 5 = 360$$

$$\begin{array}{r|l} 129600 & 2 \\ 64800 & 2 \\ 32400 & 2 \\ 16200 & 2 \\ 8100 & 2 \\ 4050 & 2 \\ 2025 & 3 \\ 675 & 3 \\ 225 & 3 \\ 75 & 3 \\ 25 & 5 \\ 5 & 5 \\ 1 & \end{array}$$

$$b) \sqrt[5]{537824} = \sqrt[5]{2^5 \cdot 7^5} = 2 \cdot 7 = \underline{\underline{14}}$$

$$\begin{array}{r|l} 537824 & 2 \\ 268912 & 2 \\ 134456 & 2 \\ 67228 & 2 \\ 33614 & 2 \\ 16807 & 7 \\ 2401 & 7 \\ 343 & 7 \\ 49 & 7 \\ 7 & 7 \\ 1 & \end{array}$$

$$c) \sqrt[6]{15625} = \sqrt[6]{5^6} = \underline{\underline{5}}$$

$$\begin{array}{r|l} 15625 & 5 \\ 3125 & 5 \\ 625 & 5 \\ 125 & 5 \\ 25 & 5 \\ 5 & 5 \\ 1 & \end{array}$$

(5)

$$a) 3^{-2} \cdot 3^5 = 3^{-2+5} = 3^3$$

$$b) (7^4)^{-3} = 7^{-12} = \frac{1}{7^{12}}$$

$$c) \frac{16 \cdot 2^{-3}}{4^2} = \frac{2^4 \cdot 2^{-3}}{(2^2)^2} = \frac{2^1}{2^4} = 2^{1-4} = 2^{-3} = \frac{1}{2^3}$$

$$d) 27^3 \div 3^7 \div 9^{-1} = (3^3)^3 \div 3^7 \div (3^2)^{-1} = \\ = 3^9 \div 3^7 \div 3^{-2} = 3^2 \div 3^{-2} = 3^{2-(-2)} = 3^4$$