

Exponent Laws + Order of Operations

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

$$\left(\frac{2}{5} \right)^{-6} \cdot \left(\frac{2}{5} \right)^9 = \left(\frac{2}{5} \right)^3 = \frac{8}{125}$$

$$\begin{aligned} (0.8)^{-5} \cdot (0.8)^3 &= \left(\frac{4}{5} \right)^{-5} \cdot \left(\frac{4}{5} \right)^3 = \left(\frac{4}{5} \right)^{-2} \\ &= \left(\frac{5}{4} \right)^2 = \frac{25}{16} \end{aligned}$$

$$4 \left(\frac{2}{3} \right)^{-3} = 4 \left(\frac{3}{2} \right)^3 = \frac{4}{1} \cdot \frac{27}{8} = \frac{27}{2}$$

Try: ① $3.5^4 \times 3.5^{-7} = \left(\frac{7}{2} \right)^4 \cdot \left(\frac{7}{2} \right)^{-7} = \left(\frac{7}{2} \right)^{-3} = \left(\frac{2}{7} \right)^3 = \frac{8}{343}$

$3\frac{1}{2}$

② $\left[\left(\frac{3}{4} \right)^3 \right]^5 \cdot \left[\left(\frac{3}{4} \right)^2 \right]^{-9} = \left(\frac{3}{4} \right)^{15} \cdot \left(\frac{3}{4} \right)^{-18} = \left(\frac{3}{4} \right)^{-3} = \left(\frac{4}{3} \right)^3 = \frac{64}{27}$

③ $5 \left(\frac{5}{6} \right)^{-2} = 5 \left(\frac{6}{5} \right)^2 = 5 \left(\frac{36}{25} \right) = \frac{36}{5}$

eg $16^{\frac{1}{2}} \cdot 16^{-\frac{3}{4}} = 16^{\frac{1}{2} + -\frac{3}{4}} = 16^{\frac{2}{4} + -\frac{3}{4}} = 16^{-\frac{1}{4}} = \frac{1}{16^{\frac{1}{4}}} = \frac{1}{\sqrt[4]{16}} = \frac{1}{2}$

$$\left(8^{\frac{-2}{3}} + 8^{\frac{1}{3}} \right)^{-2}$$

$$\begin{aligned} \left(\frac{1}{8^{\frac{2}{3}}} + \sqrt[3]{8} \right)^{-2} &= \left(\frac{1}{(\sqrt[3]{8})^2} + 2 \right)^{-2} \\ &= \left(\frac{1}{4} + 2 \right)^{-2} = \left(2\frac{1}{4} \right)^{-2} = \left(\frac{9}{4} \right)^{-2} \\ &= \left(\frac{4}{9} \right)^2 = \frac{16}{81} \end{aligned}$$

$$\begin{aligned} \left(\frac{4^{\frac{5}{8}}}{4^{\frac{5}{12}} \cdot 4^{\frac{1}{4}}} \right)^{12} &= \left(\frac{4^{\frac{15}{24}}}{4^{\frac{10}{24}} \cdot 4^{\frac{6}{24}}} \right)^{12} = \left(\frac{4^{\frac{15}{24}}}{4^{\frac{16}{24}}} \right)^{12} \\ &= \left(4^{-\frac{1}{24}} \right)^{12} \\ &= 4^{-\frac{1}{2}} = \frac{1}{4^{\frac{1}{2}}} = \frac{1}{\sqrt{4}} = \frac{1}{2} \end{aligned}$$

Try:

$$\textcircled{1} \left(\frac{36^{\frac{7 \cdot 3}{8 \cdot 3}}}{36^{\frac{4 \cdot 4}{6 \cdot 4}} \cdot 36^{\frac{11}{24}}} \right)^2 = \left(\frac{36^{\frac{21}{24}}}{36^{\frac{4}{4}} \cdot 36^{\frac{11}{24}}} \right)^2 = \left(\frac{36^{\frac{21}{24}}}{36^{\frac{17}{24}}} \right)^2 = \left(36^{\frac{6}{24}} \right)^2 = 36^{\frac{1}{2}} = \sqrt{36} = 6$$

$1^{\frac{2}{3}} = \frac{5}{3}$

$$\textcircled{2} \left(16^{\frac{1}{4}} - 9^{-\frac{1}{2}} \right)^3 = \left(\sqrt[4]{16} - \frac{1}{\sqrt{9}} \right)^3 = \left(2 - \frac{1}{3} \right)^3 = \left(\frac{5}{3} \right)^3 = \frac{125}{27}$$

$$\textcircled{3} \left(5^{\frac{1}{3}} \cdot 3^{-\frac{1}{2}} \right)^6 = 5^{\frac{6}{3}} \cdot 3^{-\frac{6}{2}} = 5^2 \cdot 3^{-3} = \frac{5^2}{3^3} = \frac{25}{27}$$

Eg $4(2x^3y^{-5})(3x^2y^6) = 24x^5y$

$$\frac{(4a^{\frac{1}{2}}b^{-2})^3}{1 \cdot 4 \cdot 4 \cdot 2} = \frac{64a^{\frac{3}{2}}b^{-6}}{9 \cdot 2 \cdot 4} = \frac{64a^{\frac{1}{2}}b^2}{9}$$

$$-(3\sqrt{a} - 4\sqrt{b})^2$$

$$= \frac{64b^2}{9a^{\frac{1}{2}}}$$

Page 69-76 # 3-7, 9-22