VERSION 40 $\quad 40 = 2^3 \cdot 5^1$

$$\sqrt[3]{40x^5y^{-12}} = \sqrt[3]{8}\sqrt[3]{5}\sqrt[3]{x^5}\sqrt[3]{y^{-12}}$$

$$= 2^1\sqrt[3]{5}\sqrt[3]{x^3}\sqrt[3]{x^2}\,y^{-12/3}$$

$$= 2^1\sqrt[3]{5}\,x^{3/3}\sqrt[3]{x^2}\,y^{-4}$$

$$= 2^1x^1y^{-4}\sqrt[3]{5x^2}$$

$$= \boxed{\frac{2x\sqrt[3]{5x^2}}{y^4}}$$

$$\sqrt[3]{40x^5y^{-12}} = \sqrt[3]{2^3\cdot 5^1x^5y^{-12}} = 2^{3/3}5^{1/3}x^{\frac{5}{3}}y^{-\frac{12}{3}}$$

$$= 2^1 5^{1/3} x^{1\frac{2}{3}} y^{-4}$$

$$= 2^1 y^{-4} 5^{\frac{1}{3}} x^{1+\frac{2}{3}}$$

$$= 2^1 y^{-4} 5^{\frac{1}{3}} x^1 x^{\frac{2}{3}}$$

$$= \frac{2^1x^1 5^{\frac{1}{3}}x^{\frac{2}{3}}}{y^4} = \frac{2x\sqrt[3]{5^1x^2}}{y^4}$$

VERSION 40 $\quad 40 = 2^3 \cdot 5^1$

$$\sqrt{40x^5y^{-12}} = \frac{\sqrt{40x^5}}{\sqrt{y^{12}}} = \frac{\sqrt{4}\sqrt{10}\sqrt{x^4}\sqrt{x^1}}{y^{12/2}}$$

$$= \frac{2\sqrt{10}\, x^{4/2}\sqrt{x}}{y^6} = \frac{2\sqrt{10}\, x^2\sqrt{x}}{y^6}$$

$$= \boxed{\frac{2x^2\sqrt{10x}}{y^6}}$$

$$\sqrt{40x^5y^{-12}} = \sqrt{2^3 \cdot 5^1 x^5 y^{-12}} = 2^{\frac{3}{2}} 5^{1/2} x^{5/2} y^{-12/2}$$

$$= 2^{1\frac{1}{2}} 5^{\frac{1}{2}} x^{2\frac{1}{2}} y^{-6}$$

$$= 2^{1+\frac{1}{2}} 5^{\frac{1}{2}} x^{2+\frac{1}{2}} y^{-6}$$

$$= 2^1 2^{\frac{1}{2}} 5^{\frac{1}{2}} x^2 x^{\frac{1}{2}} y^{-6}$$

$$= 2^1 x^2 y^{-6}\, 2^{\frac{1}{2}} 5^{\frac{1}{2}} x^{\frac{1}{2}}$$

$$= \frac{2^1 x^2 \sqrt{2^1 \cdot 5^1 \cdot x^1}}{y^6} = \boxed{\frac{2x^2\sqrt{10x}}{y^6}}$$

VERSION 40

$$\frac{1}{\sqrt{10}} = \frac{1}{\sqrt{10}}\frac{\sqrt{10}}{\sqrt{10}} = \frac{\sqrt{10}}{\sqrt{10^2}} = \frac{\sqrt{10}}{10^1} = \boxed{\frac{\sqrt{10}}{10}}$$

$$\frac{1}{\sqrt{10}} = \frac{1}{\sqrt{10}}\frac{\sqrt{10}}{\sqrt{10}} = \frac{\sqrt{10}}{\sqrt{100}} = \boxed{\frac{\sqrt{10}}{10}}$$

$$\frac{6}{\sqrt{18}} = \frac{6}{\sqrt{9}\sqrt{2}} = \frac{6}{3\sqrt{2}} = \frac{6}{3}\frac{1}{\sqrt{2}} = \frac{2}{1}\frac{1}{\sqrt{2}}$$

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

$$= \boxed{\sqrt{2}}$$

$$\frac{6}{\sqrt{18}} = \frac{6}{\sqrt{18}}\frac{\sqrt{18}}{\sqrt{18}} = \frac{6\sqrt{18}}{\sqrt{18^2}} = \frac{6\sqrt{18}}{18^{2/2}} = \frac{6\sqrt{18}}{18^1}$$

$$= \frac{6}{18}\frac{\sqrt{18}}{1} = \frac{1}{3}\cdot\frac{\sqrt{18}}{1} = \frac{1}{3}\frac{\sqrt{9}}{1}\frac{\sqrt{2}}{1} = \frac{1}{3}\cdot\frac{3}{1}\cdot\frac{\sqrt{2}}{1}$$

$$= \frac{3}{3}\frac{\sqrt{2}}{1} = \boxed{1\sqrt{2}}$$

VERSION 40

$$\frac{6}{\sqrt{18}} = \frac{2^1 3^1}{\sqrt{2^1 3^2}} = \frac{2^1 3^1}{2^{1/2} 3^{2/2}} = \frac{2^1}{2^{1/2}} \cdot \frac{3^1}{3^1}$$

$$= \frac{2^1}{2^{1/2}} = 2^{1-1/2} = 2^{\frac{1}{2}} = \sqrt{2}$$

$$\frac{4}{\sqrt[3]{16}} = \frac{4}{\sqrt[3]{8}\sqrt[3]{2}} = \frac{4}{2\sqrt[3]{2}} = \frac{4}{2} \cdot \frac{1}{\sqrt[3]{2}} = \frac{2}{1} \cdot \frac{1}{\sqrt[3]{2}}$$

$$= \frac{2}{\sqrt[3]{2}} = \frac{2}{\sqrt[3]{2}} \cdot \frac{\sqrt[3]{2^2}}{\sqrt[3]{2^2}} = \frac{2\sqrt[3]{2^2}}{\sqrt[3]{2^3}} = \frac{2\sqrt[3]{2^2}}{2^{3/3}}$$

$$= \frac{2}{2}\sqrt[3]{2^2} = \sqrt[3]{2^2} = \sqrt[3]{4}$$

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

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

$$= \frac{1}{4}\frac{\sqrt[3]{256}}{1} = \frac{1}{4} \cdot \frac{\sqrt[3]{64}\sqrt[3]{4}}{1} = \frac{1}{4}\frac{4}{1}\sqrt[3]{4}$$

$$= 1 \cdot \sqrt[3]{4} = \sqrt[3]{4}$$