

VERSION 32

Note $32 = 2^5$

$$\sqrt{32 x^5 y^{-10}} = \sqrt{16} \sqrt{2} \sqrt{x^4} \sqrt{x^1} \sqrt{y^{-10}}$$

$$= 4 \sqrt{2} x^{4/2} \sqrt{x^1} y^{-10/2}$$

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

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

$$\sqrt{32 x^5 y^{-10}} = (2^5 x^5 y^{-10})^{1/2}$$

$$= 2^{5/2} x^{5/2} y^{-10/2} = 2^{2\frac{1}{2}} x^{2\frac{1}{2}} y^{-5}$$

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

$$= \frac{2^2 \sqrt{2} x^2 \sqrt{x}}{y^5} = \frac{2^2 x^2 \sqrt{2x}}{y^5}$$

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

$$\sqrt[3]{32x^5y^{-10}} = \sqrt[3]{8} \sqrt[3]{4} \sqrt[3]{x^5} \sqrt[3]{y^{-10}}$$

$$= 2 \sqrt[3]{4} \sqrt[3]{x^3} \sqrt[3]{x^2} \sqrt[3]{y^{-9}} \sqrt[3]{y^{-1}}$$

$$= 2 \sqrt[3]{4} x^{3/3} \sqrt[3]{x^2} y^{-9/3} \sqrt[3]{y^{-1}}$$

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

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

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

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

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

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

$$\sqrt[3]{32x^5y^{-10}} = \sqrt[3]{2^5x^5y^{-10}}$$

$$= 2^{\frac{5}{3}}x^{\frac{5}{3}}y^{-\frac{10}{3}} = 2^{1\frac{2}{3}}x^{1\frac{2}{3}}y^{-3\frac{1}{3}}$$

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

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

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

$$= \frac{2^1 x}{y^3} \frac{(2^2 x^2)^{\frac{1}{3}}}{y^{\frac{1}{3}}}$$

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

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

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

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

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$$20 = 2^2 s^1$$

$$\frac{1}{\sqrt{20}} = \frac{1}{\sqrt{20}} \frac{\sqrt{20}}{\sqrt{20}} = \frac{\sqrt{20}}{\sqrt{20^2}} = \frac{\sqrt{20}}{20^{2/2}} = \frac{\sqrt{20}}{20}$$

$$= \frac{\sqrt{20}}{20} = \frac{\sqrt{4} \sqrt{5}}{20} = \frac{2 \sqrt{5}}{20 \cdot 1} = \frac{1}{10} \sqrt{5}$$

$$= \left(\frac{\sqrt{5}}{10} \right)$$

$$\frac{1}{\sqrt{20}} = \frac{1}{\sqrt{4}} \frac{1}{\sqrt{5}} = \frac{1}{2} \frac{1}{\sqrt{5}} = \frac{1}{2\sqrt{5}} \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{5}}{2\sqrt{25}}$$

$$= \frac{\sqrt{5}}{2 \cdot 5} = \left(\frac{\sqrt{5}}{10} \right)$$

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

$$= \frac{\sqrt{s}}{2 \cdot \sqrt{2s}} = \frac{\sqrt{s}}{2 \cdot s} = \left(\frac{\sqrt{s}}{10} \right)$$

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$$24 = 2^3 \cdot 3^1$$

$$\frac{8}{\sqrt{24}} = \frac{8}{\sqrt{4}\sqrt{6}} = \frac{8}{2\sqrt{6}} = \frac{8}{2} \frac{1}{\sqrt{6}} = \frac{4}{1} \cdot \frac{1}{\sqrt{6}}$$

$$= \frac{4}{\sqrt{6}} \frac{\sqrt{6}}{\sqrt{6}} = \frac{4\sqrt{6}}{\sqrt{36}} = \frac{4\sqrt{6}}{6} = \frac{4}{6} \frac{\sqrt{6}}{1} = \frac{2\sqrt{6}}{3} \frac{1}{1}$$

$$= \left(\frac{2\sqrt{6}}{3} \right)$$

$$\frac{8}{\sqrt{24}} = \frac{8}{\sqrt{24}} \frac{\sqrt{24}}{\sqrt{24}} = \frac{8\sqrt{24}}{\sqrt{24^2}} = \frac{8\sqrt{24}}{24} = \frac{8}{24} \frac{\sqrt{24}}{1}$$

$$= \frac{1}{3} \frac{\sqrt{24}}{1} = \frac{1}{3} \frac{\sqrt{4}\sqrt{6}}{1} = \left(\frac{2\sqrt{6}}{3} \right)$$

$$\frac{8}{\sqrt{24}} = \frac{2^3}{\sqrt{2^3 3^1}} = \frac{2^3}{2^{3/2} 3^{1/2}} = \frac{2^{3-3/2}}{1} \cdot \frac{1}{3^{1/2}}$$

$$= \frac{2^{3/2}}{1} \cdot \frac{1}{3^{1/2}} = \frac{2^{1+1/2}}{1} \cdot \frac{1}{3^{1/2}} = \frac{2^{1+1/2}}{1} \cdot \frac{1}{3^{1/2}} = \frac{2^{1+1/2}}{3^{1/2}}$$

$$= \frac{2^{1+1/2}}{1} \cdot \frac{1}{\sqrt{3}} = \frac{2\sqrt{2}}{\sqrt{3}} = \frac{2\sqrt{2}\sqrt{3}}{\sqrt{3}\sqrt{3}} = \frac{2\sqrt{6}}{\sqrt{9}}$$

$$= \left(\frac{2\sqrt{6}}{3} \right)$$

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$$36 = 2^2 \cdot 3^3$$

$$\frac{6}{\sqrt[3]{36}} = \frac{6}{\sqrt[3]{6^2}} = \frac{6}{\sqrt[3]{6^2}} \frac{\sqrt[3]{6^1}}{\sqrt[3]{6^1}} = \frac{6 \sqrt[3]{6^1}}{\sqrt[3]{6^3}}$$

$$= \frac{6 \cdot \sqrt[3]{6^1}}{6^{3/3}} = \frac{6 \sqrt[3]{6^1}}{6^1} = \frac{6}{6} \cdot \sqrt[3]{6} = 1 \cdot \sqrt[3]{6}$$

$$= \textcircled{\sqrt[3]{6}}$$

$$\frac{6}{\sqrt[3]{36}} = \frac{6}{\sqrt[3]{36}} \frac{\sqrt[3]{6}}{\sqrt[3]{6}} = \frac{6 \sqrt[3]{6}}{\sqrt[3]{216}} = \frac{6 \sqrt[3]{6}}{6} = \frac{6}{6} \cdot \frac{\sqrt[3]{6}}{1}$$

$$= 1 \cdot \sqrt[3]{6} = \textcircled{\sqrt[3]{6}}$$

$$\frac{6}{\sqrt[3]{36}} = \frac{2^1 3^1}{(2^2 3^2)^{1/3}} = \frac{2^1 3^1}{2^{2/3} 3^{2/3}} = 2^{1 - 2/3} \cdot 3^{1 - 2/3}$$

$$= 2^{1/3} \cdot 3^{1/3} = \sqrt[3]{2^1} \cdot \sqrt[3]{3^1} = \textcircled{\sqrt[3]{6}}$$