

$$1) \sqrt{x^3 \sqrt[4]{x^6 \sqrt[3]{x^2}}} = (x^3 \cdot x^{6/4} \cdot ((x^2)^{1/3})^{1/4})^{1/2}$$

$$(x^3 \cdot x^{3/2} \cdot x^{1/6})^{1/2} = (x^{\frac{18+9+1}{6}})^{1/2}$$

$$(x^{28/6})^{1/2} = x^{7/3} = 3\sqrt[3]{x^7}$$

$$2) \frac{(2^3 m^2 v^{-2} w)^4 \cdot (3^4 r^{-3} s^4 t^3)^2}{(3^4 r^{-3} s^{-2} t^3)^2 \cdot (2^4 m^3 v^{-4} w^{-2})^3}$$

$$\frac{2^{12} m^8 v^{-8} w^4 \cdot 3^8 r^{-6} s^8 t^6}{3^8 r^{-6} s^{-4} t^6 \cdot 2^{12} m^9 v^{-12} w^{-6}}$$

$$\frac{m^8 w^4 s^8 t^6 v^6 s^4 v^{12} w^6}{v^8 r^6 t^6 m^9} = \frac{v^4 s^{12} w^{10}}{m}$$

$$= m^{-1} v^4 w^{10} s^{12}$$

$$3) \frac{k\sqrt[k]{a^{2-k}}}{(k\sqrt[k]{a})^{3k+4}} \cdot \left(\frac{k\sqrt[k]{a}}{(k\sqrt[k]{a^2})^{k+3}} \right)^{-2}$$

$$a^{8/k} = k\sqrt[k]{a^{8k}}$$

$$\frac{a^{\frac{2-k}{k}}}{a^{\frac{3k+4}{k}}} \cdot \frac{a^{\frac{-2}{k}}}{a^{\frac{-4k-12}{k}}} = a^{\frac{2-k-(3k+4)+(-2)-(-4k-12)}{k}}$$

$$4) \left(\frac{y^{-2} x^5 z^{15}}{x^{-3} y^4 z^7} \right)^{1/2} = \left(\frac{x^8 z^8}{y^6} \right)^{1/2}$$

$$\frac{x^4 z^4}{y^3} = x^4 y^{-3} z^4$$

$$5) \frac{(5 \cdot a \cdot 5^{-3} \cdot c^2)^3}{(2^{-3} x^2)^{-2}} \cdot \frac{(5^2 x y^{-3})^{-2}}{((10^2)^{-1} a^{-2} c^3)^2}$$

$$\frac{5^3 a^3 5^{-9} c^6 5^{-4} x^{-2} y^6}{2^6 x^{-4} 2^{-4} a^{-4} c^6}$$

$$\frac{5^3 2^{+4}}{5^4 2^6} \frac{a^3 c^6 y^6 x^4 a^4}{5^9 x^2 c^6} = \frac{1}{20} \frac{a^7 y^6 x^2}{5^9}$$

$$6) \left(\frac{2x \sqrt[3]{h^{3x-2}}}{2x \sqrt[3]{h^{4x-4}}} \cdot \left(2x \sqrt[3]{h^{5x-2}} \right) \right)^3 = \left[\frac{h^{\frac{3x-2}{2x}}}{h^{\frac{4x-4}{2x}}} \cdot h^{\frac{5x-2}{2x}} \right]^3$$

$$\left(h^{\frac{3x-2 - (4x-4) + 5x-2}{2x}} \right)^3 = \left(h^{\frac{4x-4}{2x}} \right)^3 = h^6$$

Symmetrie $f(x)$

$$f(x) = f(-x) ?$$

↙

Achsen-sym.

↘

$$f(x) = -f(-x) ?$$

↙

Punktsym.

↘

{}

· (-1)

$$f(x) = \frac{2x}{x^4 - 5}$$

$$f(x) = \frac{2 \cdot (-x)}{(-x)^4 - 5}$$

$$\cdot (-1) = \frac{-2x}{x^4 - 5} \neq f(x)$$

$$-f(-x) = -\left(\frac{-2x}{x^4 - 5}\right)$$

$$= \frac{2x}{x^4 - 5} = f(x)$$

⇒ Punktsymmetrie

$$\text{I c) } \sqrt[3]{\frac{16}{x^2}} = 0,25^-$$

$$\text{II a) } f(x) = \sqrt[4]{x^2 - 9} \quad ; \quad \text{D} ; \text{W} ; \text{Symmetrie?}$$

$$\text{I} \quad \frac{16^{1/3}}{x^{2/3}} = \frac{(2^4)^{1/3}}{x^{2/3}} = \frac{2^{4/3}}{x^{2/3}} = 2^{-2} \quad | \cdot x^{2/3} : 2^{-2}$$

$$\frac{2^{4/3}}{2^{-2}} = 2^{4/3} \cdot 2^2 = 2^{10/3} = x^{2/3} \quad | \uparrow^{3/2} \Rightarrow x = 2^5 = 32$$

$$\text{II} \quad f(x) = f(-x) \quad f(-x) = \sqrt[4]{(-x)^2 - 9} = \sqrt[4]{x^2 - 9} = f(x) \\ \rightarrow \text{Achsen} \text{symmetrie}$$

$$\text{D} : x^2 - 9 = 0 \Leftrightarrow x^2 = 9 \Rightarrow x = \pm \sqrt{9} = \pm 3 \quad \begin{array}{c} \uparrow \\ \downarrow \\ \text{---} \\ \text{---} \\ \downarrow \\ -9 \end{array}$$
$$\{x \in \mathbb{R} \mid x \geq 3 \vee x \leq -3\}$$

$$\text{W} : \mathbb{R}_0^+$$