Potenzthemen:

x^q ; $q \in \mathbb{Q} \to \frac{a}{b}$

$\to x^{-\beta} = 1/x^{\beta}$

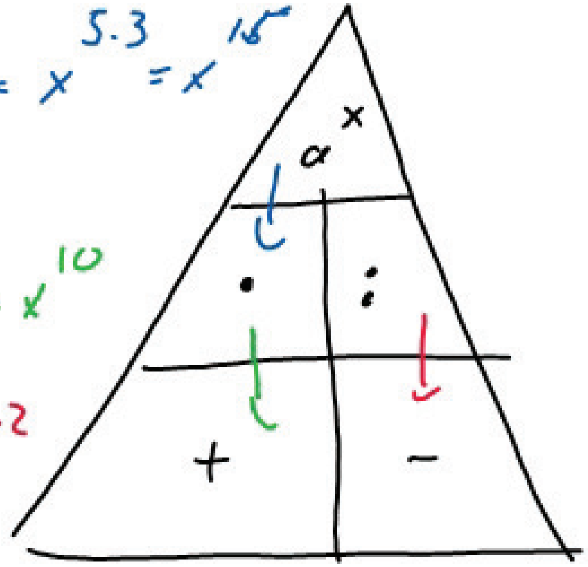
$\to x^{1/\beta} = \sqrt[\beta]{x}$

$(x^5)^3 = x^{5 \cdot 3} = x^{15}$

$x^3 \cdot x^7 = x^{10}$

$x^4 : x^6 = x^{-2}$

$1/x^2$



1) $\left(2x^2 - x^{1/2} \right)^4 - \left(\frac{1}{2} x^{-1} + x^3 \right)^2$

$\hookrightarrow 1(2x^2)^4 + 4(2x^2)^3(-x^{1/2})^1 + 6(2x^2)^2(-x^{1/2})^2 + 4(2x^2)^1(-x^{1/2})^3 + 1(-x^{1/2})^4$

$16x^8 - 32x^6 \cdot x^{1/2} + 24x^4 \cdot x - 8x^2 x^{3/2} + x^2$

$16x^8 - 32x^{13/2} + 24x^5 - 8x^{7/2} + x^2 - \left(1/4\, x^{-2} + x^2 + x^6 \right)$

$\left(1/2\, x^{-1} + x^3 \right)^2 = 1/4\, x^{-2} + x^2 + x^6$

$16x^8 - 32x^{13/2} - x^6 + 24x^5 - 8x^{7/2} - \frac{1}{4x^2}$

$\left(2x^2 - 2\sqrt{x} \right)^5 = \left[2 \cdot \left(x^2 - \sqrt{x} \right) \right]^5 = 32 \cdot \left(x^2 - \sqrt{x} \right)^5$

2) $y^{5/12} \cdot y^{6} : y^{2/3} \cdot y^{-2} = y^{\frac{5}{12}+6-\frac{2}{3}-2}$

$\hookrightarrow y \cdot \frac{1}{y^{2/3}} = y^{-2/3}$

$y^{\frac{5+72-8-24}{12}} = y^{45/12} = y^{15/4}$

3) $\left[x^{1/2} \left(x^{4} - x^{-2/3} \right) - x^{-2} \left(x^{6} + x^{6/5} \right) \right] \cdot x^{2}$

$\left(x^{9/2} - x^{-1/6} - x^{4} - x^{-4/5} \right) \cdot x^{2}$

$x^{13/2} - x^{11/6} - x^{6} - x^{6/5}$

4)

$$\frac{\frac{1}{x^2} \cdot (x^3)^2 \cdot \left(\sqrt[5]{x^4}\right)^{-2} \cdot \frac{1}{\sqrt[3]{x}}}{\sqrt{(x^2)^3} \cdot \frac{1}{\sqrt{\sqrt{x}}} \cdot \left(\sqrt[4]{x^3}\right)^{-6}}$$

$$\frac{x^{-2} \quad x^{6} \quad x^{-8/5} \quad x^{-1/3}}{x^{6/2} \quad x^{-1/4} \quad x^{-18/4}}$$

$$\underbrace{(x^{-2} \cdot x^{6} \cdot x^{-3})}_{x^1} \quad x^{-8/5} \quad x^{-1/3} \quad x^{1/4} \quad x^{9/2}$$

$$x^{1} \cdot x^{\frac{-96-20+15+270}{60}}$$

$$x^{1} \cdot x^{169/60} \Rightarrow x^{229/60}$$

Symmetrie

$$f(x) = \frac{x^2+1}{x^5}$$

$$f(x) = f(-x) \; ?$$ $\Rightarrow (-x)$ einsetzen

J $\rightarrow$ Achsensym.

N $\rightarrow$ $f(x) = -f(-x)$ $\quad \cdot(-1)$

J $\rightarrow$ Punktsym.

N $\rightarrow$ $\{\}$

$$f(-x) = \frac{(-x^2)+1}{(-x)^5}$$

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

$|\cdot(-1)$

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

$$= \frac{x^2+1}{x^5} = f(x)$$

$\Rightarrow$ Punktsymmetrie

1) $$\sqrt{x^3 \sqrt[4]{x^6 \cdot \sqrt[3]{x^2}}} = x^{3/2} \cdot x^{6/8 \; (3/4)} \cdot x^{2/24 \; (1/12)}$$

$$= x^{\frac{18+9+1}{12}} = x^{28/12} = x^{7/3}$$

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

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

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

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

$$\frac{a^{\frac{2-k}{k}}}{a^{\frac{3k+4}{k}}} \cdot \frac{a^{-2/k}}{a^{\frac{-4k-12}{k}}}$$

reine Potenzen $x^{a/b}$

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

Superbruch

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