S 133 Nr. 1)

$$\sqrt[3]{\sqrt{a^4\sqrt{a^3\sqrt[3]{a}}}\,a^2} = \left((a^4)^{1/2}\right)^{1/3} \left(\left((a^3)^{1/2}\right)^{1/2}\right)^{1/3} \left(\left(a^{1/3}\right)^{1/2}\right)^{1/3} \left(a^1\right)^{1/3}$$

$$a^{2/3} \cdot a^{1/4} \cdot a^{1/18} \cdot a^{2/3} = a^{\frac{24+9+2+24}{36}}$$

$$= a^{59/36}$$

2) $$\frac{3\cdot(2x^{-2}y^{-3})^2}{4\cdot(3a^3b^{-2})^3} \cdot \frac{8\cdot(3a^4b^3)^2}{9\cdot(2x^{-1}y^{-2})^3} = \frac{3\cdot 2^2 2^3 3^2 \; x^{-4}y^{-6} a^8 b^{-6}}{2^2 3^3 3^2 2^3 \; a^9 b^{-6} x^{-3} y^{-6}}$$

$$\frac{a^8 b^6 x^3 y^6}{x^4 y^6 b^6 a^9}$$

$$\frac{1}{xa}$$

$$\sqrt[9]{\;} \quad \frac{1}{gax}$$

$$42 \cdot \frac{1}{\sqrt[4]{x^{10}}} \cdot \frac{\left(\sqrt[4]{x^2}\right)^{3-2n}}{\sqrt[2n]{x^{4n-6}}} \cdot \left(\frac{\left(\sqrt[4]{x}\right)^{2n+5}}{\sqrt[4/2]{x^{6-n}}} \right)^2$$

$$42 \cdot x^{-10/4} \cdot \frac{x^{\frac{6-4n}{4}}}{x^{\frac{4n-6}{2n}}} \cdot \frac{x^{\frac{4n+10}{4}}}{x^{\frac{12-2n}{4/2}}} \cdot \left(\frac{2}{4}\right)$$

$$42 \cdot x^{\frac{-10+6-4n-(2n-3)+4n+10-(24-4n)}{4}}$$

$$42 \cdot x^{\frac{-15+2n}{4}}$$

S. 124

a) $\sqrt{x^3} = 125 \quad \Leftrightarrow \quad x^{3/2} = 5^3 \quad | \uparrow^{2/3}$

$x = (5^3)^{2/3} = 5^2 = 25$

b) $(\sqrt[3]{x^{-1}})^2 = 1024 \quad \Leftrightarrow \quad x^{-10/3} = 2^{10} \quad | \uparrow^{-3/10}$

$x = (2^{10})^{-3/10} = 2^{-3} = \frac{1}{8}$

c) $\sqrt[3]{\frac{16}{x^2}} = 0{,}25 \quad \Leftrightarrow \quad \sqrt[3]{2^4 \cdot x^{-2}} = 2^{-2} \quad | \uparrow^3$

$2^4 \cdot x^{-2} = 2^{-6} \qquad 1 \cdot x^2 \cdot 2^6$

$2^{10} = x^2 \qquad | \sqrt{\ } \qquad x = 2^5 = 32$

S/133) a) $\left(\sqrt[12]{x^6}\right)^3 = 64 \iff \left((x^6)^{1/12}\right)^3 = 2^6$

$x^{3/12} = 2^6 \quad \uparrow^{2/3} \qquad x = 2^{6\cdot\frac{2}{3}} = 2^4 = 16$

b) $\left(\sqrt[3]{x}\right)^{-4} = \frac{16}{81} \iff x^{-4/3} = \frac{2^4}{3^4} = \left(\frac{2}{3}\right)^4 \uparrow^{-3/4}$

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

c) $\sqrt{\sqrt[5]{x^4}} = \left(\frac{5}{\sqrt[5]{x^2}}\right)^2 \iff x^{4/10} = 5^2 \cdot x^{-8/5} \mid \cdot x^{8/5}$

$x^{20/10} = x^2 = 5^2 \qquad x = 5$

Exponentielles Wachstum / Zerfall

$$A_n = A_0 \cdot q^n$$

A_n: n → Zeit

A_0: Ausgangswert

q → Wachstumsfaktor

Situation I: $1\,m^2$ Algenkultur (jede Woche)
vermehrt sich um 5 % alle 7 Tage

=> Wachstumsgesetz (Tage)

$$A_n = 1\,m^2 \cdot 1{,}05^{n/7}$$

Situation II : Radioaktives Jod 10 kg

Halbwertszeit 100 Jahre

Wann sind unter 10 g vorhanden?

$$A_n = 10\,kg \cdot (1/2)^{n/100} = 1\,kg$$

$$(1/2)^{n/100} = 1/10 \quad | \log$$

$$\log(1/2) \cdot \frac{n}{100} = \log 1/10$$

$$n = 100 \cdot \frac{\log 1/10}{\log 1/2} = 100 \cdot \log_{1/2} 1/10$$

2) $2 \cdot \ln(2x) - 3 \cdot \ln 2 + 4 \cdot \ln \sqrt{x} + 2 \cdot \ln\left(\frac{4}{x^2}\right)$

$\ln(2x)^2 - \ln(2)^3 + \ln \sqrt{x^4} + \ln\left(\frac{4}{x^2}\right)^2$ — Fallleiter in der Exponente

$\ln(4x^2) - \ln 8 + \ln x^2 + \ln \frac{4^2}{x^4}$

$\ln \frac{4x^2 \; x^2 \; 4^2/x^4}{8} = \ln 8$ — Supa. Buch

4) $\ln\left(\frac{2 \cdot \sqrt{a-25}}{c^2 \cdot \sqrt[4]{d}}\right)^3 = \ln\left(\frac{2^3 \cdot (a-25)^{3/2}}{c^6 \; d^{3/4}}\right)$

$\ln 2^3 + \ln(a-25)^{3/2} - \ln c^6 - \ln d^{3/4}$

$3 \cdot \ln 2 + 3/2 \ln(a-25) - 6 \cdot \ln c - 3/4 \ln d$