S 124 Nr. 4)

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

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

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

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

$$\frac{1}{5} \cdot \frac{1}{2^2} \cdot \frac{a^7 x^6 x^2}{b^9} = \frac{1}{20} \cdot a^7 b^{-9} x^2 y^6$$

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

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

$$=\left(h^{4x/2x}\right)^3=\left(h^2\right)^3=h^6$$

a) $\sqrt{x^3}=125^{-}$ $\Leftrightarrow$ $x^{3/2}=125^{-}$ $\mid \cdot x^{-1/2}$ $\quad 3/2-1/2=1$

$x^1=125/\sqrt{x}$

$x^1=(125)^{2/3}=\left(\sqrt[3]{125}\right)^2=5^2=25$

b) $\left(\sqrt[3]{x^{-7}}\right)^2 = 1024 = 2^{10}$

$x^{10/3} = 2^{10} \quad \uparrow 3/10$

$x = \left(\sqrt[10]{2^{10}}\right)^3 = 2^3 = 8$

c) $\sqrt[3]{\frac{16}{x^2}} = 0{,}25^{-} = \frac{1}{4} \quad \left(2^4 \cdot x^{-2}\right)^{1/3} = 2^{-2} \quad \uparrow 3$

$2^4 \cdot x^{-2} = 2^{-6} \quad | \cdot x^2 \cdot 2^6$

$2^{10} = x^2 \quad | \sqrt{\ }$

$2^5 = 32 = x$

S 133

a) $\left(\sqrt[3]{x^6}\right)^3 = 64 \quad \Leftrightarrow \quad x^{18/12} = 2^6 \quad \uparrow^{2/3}$

$x = (2^6)^{2/3} = 2^4 = 16$

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

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

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

$x^{\frac{4}{10}+\frac{8}{5}} = x^2 = 5^2 \quad \Rightarrow x = 5$

Alge wächst um 5% je Woche.

Aquarium hat $100\,m^2$; $1\,m^2$ Startwert

Wann ist der See dicht?

Wachstum – Gesetz : $A_n = A_0 \cdot q^n$
Zerfall

$$A_{Tage} = A_0 \cdot q^{t/7} = 1\,m^2 \cdot 1{,}05^{t/7} = 100\,m^2$$

$$1{,}05^{t/7} = 100 \quad | \log$$

$$t/7 = \log_{1{,}05} 100 \qquad t = 7 \cdot \log_{1{,}05} 100$$

$$a^x = b \iff x = \log_a b = \frac{\log b}{\log a}$$

Radioaktives Jod hat eine Halbwertszeit $q = 1/2$ von 100 Jahren. Wann sind von 1kg Jod (→ A_0) weniger als 10 % vorhanden?

($A_n < 100g$)

$$A_n = A_0 \cdot (1/2)^{n/100}$$

$$1000g \cdot (1/2)^{n/100} = 100g$$

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

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

1) $3 \cdot \log(x-y) + \log(x+y) - \frac{1}{2}\log(x-y)^4$

$\log(x-y)^3 + \log(x+y) - \log(x-y)^2$

$\log \frac{(x-y)^3 \cdot (x+y)}{(x-y)^2} = \log[(x-y)(x+y)] = \log(x^2-y^2)$

3) $\log \sqrt[5]{\frac{x^3 y^2}{3\cdot(x+y^2)}} \quad \log \frac{x^{3/5} y^{2/5}}{3^{1/5}(x+y^2)^{1/5}}$

$\log x^{3/5} + \log y^{2/5} - \log 3^{1/5} - \log(x+y^2)^{1/5}$

$\frac{3}{5}\log x + \frac{2}{5}\log y - \frac{1}{5}\log 3 - \frac{1}{5}\log(x+y^2)$