Mathematik * Klasse 9d * Lösungen zu Aufgaben aus dem Lehrbuch

S. 31/3

a, $\sqrt{5} = 5^{1/2}$ b, $\sqrt[3]{6} = 6^{\frac{1}{3}}$

e, $\sqrt[4]{3^3} = 3^{3/4}$ f, $\sqrt[8]{x^5} = x^{\frac{5}{8}}$

S. 31/4

a, $\sqrt[4]{3^2} = 3^{\frac{2}{4}} = 3^{\frac{1}{2}} = \sqrt{3}$ b, $\sqrt[6]{2^3} = 2^{3/6} = 2^{1/2} = \sqrt{2}$

e, $\frac{1}{\sqrt[10]{2^8}} = 2^{-\frac{8}{10}} = 2^{-\frac{4}{5}} = \frac{1}{\sqrt[5]{2^4}}$ f, $\frac{1}{\sqrt[3]{(-7)^6}} = \frac{1}{7^{6/3}} = \frac{1}{7^2} = \frac{1}{49}$

S. 33/3

a, $5^{1/2} \cdot 5^{\frac{1}{4}} = 5^{1/2 + \frac{1}{4}} = 5^{3/4} = \sqrt[4]{5^3}$

d, $2^{-\frac{2}{3}} : 2^{-0,5} = 2^{-2/3} \cdot 2^{1/2} = 2^{1/2 - 2/3} = 2^{-1/6} = \frac{1}{\sqrt[6]{2}}$

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

h, $x^{2/3} : (2x)^{2/3} = x^{2/3} : (2^{2/3} \cdot x^{2/3}) = 1 : 2^{2/3} = 2^{-2/3} = \frac{1}{\sqrt[3]{2^2}}$

m, $(4^{1/5})^{-3/4} = 4^{-\frac{1 \cdot 3}{5 \cdot 4}} = 4^{-\frac{3}{20}} = \frac{1}{\sqrt[20]{4^3}} = \frac{1}{\sqrt[20]{2^6}} = \frac{1}{\sqrt[10]{2^3}} = 2^{-3/10}$

q, $(\sqrt[3]{2^4})^{1/2} = (2^{\frac{4}{3}})^{1/2} = 2^{\frac{4 \cdot 1}{3 \cdot 2}} = 2^{\frac{2}{3}} = \sqrt[3]{2^2} = \sqrt[3]{4}$

S. 33/5

a, $\sqrt[3]{4} \cdot \sqrt[4]{4} = 4^{\frac{1}{3}} \cdot 4^{\frac{1}{4}} = 4^{1/3 + 1/4} = 4^{\frac{7}{12}} = 2^{\frac{2 \cdot 7}{12}} = 2^{\frac{7}{6}} = 2 \cdot \sqrt[6]{2} = \sqrt[6]{2^7}$

b, $\sqrt[5]{3} : \sqrt{3} = 3^{1/5} \cdot 3^{-1/2} = 3^{1/5 - 1/2} = 3^{-3/10} = \frac{1}{\sqrt[10]{3^3}}$ $\left(= \frac{1}{3} \cdot \sqrt[10]{3^7}\right)$

d, $\sqrt[3]{\sqrt{5}} = (5^{1/2})^{1/3} = 5^{1/6} = \sqrt[6]{5}$

e, $\sqrt{\frac{1}{\sqrt{3}}} = (3^{-1/2})^{1/2} = 3^{-1/4} = \frac{1}{\sqrt[4]{3}}$ $\left(= \frac{1}{3} \cdot \sqrt[4]{3^3}\right)$

f, $\sqrt[n]{\sqrt[3]{a}} = (a^{1/3})^{\frac{1}{n}} = a^{\frac{1}{3n}} = \sqrt[3n]{a}$

h, $\sqrt{x} \cdot \sqrt{4x} = \sqrt{4x^2} = 2|x| = 2x$ $(x \geq 0)$

S. 34/11

c, $\left(\sqrt[3]{5}\right)^6 = 5^{\frac{1}{3} \cdot 6} = 5^2 = 25$

d, $\frac{2}{\sqrt{12}} = \frac{2}{2 \cdot \sqrt{3}} = \frac{\sqrt{3}}{3}$

g, $\frac{\sqrt[3]{40}}{2} = \frac{\sqrt[3]{8 \cdot 5}}{2} = \frac{2 \cdot \sqrt[3]{5}}{2} = \sqrt[3]{5}$

h, $\frac{\sqrt[3]{54}}{6} = \frac{\sqrt[3]{2 \cdot 27}}{6} = \frac{\sqrt[3]{2 \cdot 3^3}}{6} = \frac{3 \cdot \sqrt[3]{2}}{6} = \frac{\sqrt[3]{2}}{2}$

e, $\left(\sqrt{y^{-4}}\right)^{-2} = \left((y^{-4})^{\frac{1}{2}}\right)^{-2} = y^{-4 \cdot \frac{1}{2} \cdot (-2)} = y^4$

m, $\frac{15}{\sqrt[3]{500}} = \frac{15}{\sqrt[3]{5 \cdot 10 \cdot 10}} = \frac{15}{\sqrt[3]{5^3 \cdot 4}} = \frac{15}{5 \cdot \sqrt[3]{4}} = \frac{3 \cdot \sqrt[3]{2}}{\sqrt[3]{4 \cdot 2}} = \frac{3 \cdot \sqrt[3]{2}}{2}$

p, $\left(\sqrt[n]{t^3}\right)^{2n} = \left((t^3)^{\frac{1}{n}}\right)^{2n} = t^{3 \cdot \frac{1}{n} \cdot 2n} = t^6$

q, $\sqrt[2n]{x^n} = (x^n)^{\frac{1}{2n}} = x^{n \cdot \frac{1}{2n}} = x^{\frac{1}{2}} = \sqrt{x}$