

Lösungen Potenzen und Wurzeln II

Ergebnisse:

E1	Ergebnis
a)	$\frac{a^{\frac{1}{2}} \cdot a^{\frac{3}{4}} \cdot \sqrt[3]{a} \cdot 4 \cdot \sqrt[4]{a^2} \cdot \sqrt[3]{a^2} \cdot \sqrt[4]{a}}{a^{\frac{3}{4}} \cdot \sqrt[4]{16a}} = 2a^3$

E2	Ergebnis
a)	$\left(\frac{4a^2}{9b^2}\right)^{\frac{1}{2}} = \frac{2a}{3b}$
b)	$\left(\frac{16x^6}{81y^4}\right)^{\frac{1}{2}} = \frac{4x^3}{9y^2}$
c)	$\sqrt{x^2-1} \cdot \sqrt{\frac{x+1}{x-1}} = x+1$

E3	Ergebnisse
a)	$(x-1) \cdot \sqrt[3]{\frac{x^2+2x+1}{x^2-1}} = \sqrt[3]{(x^2-1)(x-1)}$
b)	$\sqrt{a^2-b^2} \cdot \sqrt{\frac{5a+5b}{a-b}} = (a+b)\sqrt{5}$
c)	$\sqrt{5a^2-5b^2} \cdot \sqrt{\frac{5a+5b}{a-b}} = 5(a+b)$

E4	Ergebnisse
a)	$\left(\frac{x-1}{x+1}\right) \cdot \sqrt[3]{\frac{(x^2+2x+1)^2}{(x^2-1)^2}} = \sqrt[3]{\frac{x-1}{x+1}}$
b)	$(x+y) \cdot \sqrt{\frac{x^2-y^2}{(x^2+2xy+y^2)(x+y)}} = \sqrt{x-y}$
c)	$\sqrt[3]{x^2+2xy+y^2} \cdot \sqrt[3]{x^2-y^2} = \sqrt[3]{\frac{x+y}{x-y}}$
d)	$(x+y) \cdot \sqrt{\frac{x^2+y^2}{x^2+2xy+y^2}} = \sqrt{x^2+y^2}$

E5	Ergebnisse
a)	$\sqrt[n]{\frac{b^{-3}c^{-3}a^{2n}}{b^{-3n}dc^{-5}a^{-2}}} : \frac{a^2c^2b^n}{a^{-n}da^nb^3} = (ab)^2$
b)	$\sqrt[a]{\frac{y^{3b}y^{-2}x^{2a}z^3}{y^{-2}x^{-3b}z^{-a}}} : \frac{z^3x^{3b}}{y^{-3b}x^{-2a}} = z$

E6	Ergebnisse
a)	$\sqrt{\sqrt{16}} = 2$
b)	$\sqrt[3]{\sqrt{216}} = \sqrt{6}$
c)	$\sqrt[3]{\sqrt[3]{4096}} = 4$
d)	$\sqrt[3]{\sqrt{x^6}} = x$
e)	$\sqrt[3]{\sqrt{z^3}} = \sqrt{z}$
f)	$\sqrt[4]{\sqrt[3]{a^8}} = \sqrt[3]{a^2}$
g)	$\sqrt[3]{\sqrt{x^4y^6}} = \sqrt[3]{x^2 \cdot y}$
h)	$\sqrt[3]{\sqrt[4]{81x^{12}}} = x \cdot \sqrt[3]{3}$

E7	Ergebnisse			
	a)	$\sqrt[4]{\sqrt[3]{625x^8}} = \sqrt[3]{5x^2}$	b)	$\sqrt{x^3 \cdot \sqrt[3]{x} \cdot \sqrt[4]{x}} \cdot \sqrt[3]{\sqrt{x^4} \cdot \sqrt[4]{x^3}} \cdot \sqrt[6]{x^2 \sqrt{x^4} \cdot \sqrt{x^{-4}}} = x^3$
	c)	$\sqrt{x^3 \sqrt{x^3}} \cdot \sqrt[3]{\sqrt{x^2}} = x^2 \cdot \sqrt[12]{x^7}$	d)	$\sqrt[3]{x^2 \cdot \sqrt[4]{x^3}} \cdot \sqrt{x \cdot \sqrt[3]{x^2} \cdot \sqrt[4]{x^{12}}} \cdot \sqrt{x^3 \cdot \sqrt[3]{x^4} \cdot \sqrt[12]{x^7}} = x^5$

E8	Ergebnisse			
	a)	$\sqrt[4]{\sqrt[3]{x^4}} \cdot \sqrt[3]{\sqrt[4]{x^3}} \cdot \sqrt[3]{x^4} \cdot \sqrt[12]{x} = x^2$	b)	$\sqrt[9]{\sqrt[5]{x^{11}}} \cdot \sqrt[3]{\sqrt[15]{x^{19}}} : \sqrt[3]{x} = x^{\frac{1}{3}}$
	c)	$\sqrt[4]{625a^3} \cdot \sqrt[3]{\sqrt[4]{a} \cdot \sqrt{a^4}} = 10a$	d)	$\sqrt[9]{a^6 \cdot \sqrt[4]{a^{12}}} + \sqrt[6]{b^{10}} \cdot \sqrt[3]{\sqrt[4]{b^2}} = a + b$

Potenz- und Wurzelgesetze

$a^m \cdot a^n = a^{m+n}$	$\frac{a^m}{a^n} = a^{m-n}$	$a^n \cdot b^n = (a \cdot b)^n$	$\frac{a^n}{b^n} = \left(\frac{a}{b}\right)^n$
$(a^n)^m = a^{n \cdot m}$	$\sqrt[n]{a^m} = a^{\frac{m}{n}}$	$a^0 = 1$	$\frac{1}{a^n} = a^{-n}$
$\sqrt{a} \cdot \sqrt{b} = \sqrt{a \cdot b}$	$\frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}$	$(\sqrt{a})^2 = a$	$\sqrt{a^{-1}} = \sqrt{\frac{1}{a}} = \frac{1}{\sqrt{a}}$

Da jede Wurzel als Potenz dargestellt werden kann, ist es in vielen Fällen vorteilhaft, Wurzeln in Potenzen zu verwandeln um dann die Rechnung durch anwenden der Potenzgesetze durchzuführen. Bei Bedarf kann ein Ergebnis mit gebrochenem Exponenten wieder in eine Wurzel verwandelt werden.

Ausführliche Lösungen :

A1	Ausführliche Lösung
	<p>a)</p> $\frac{a^{\frac{1}{2}} \cdot a^{\frac{3}{4}} \cdot \sqrt[3]{a} \cdot 4 \cdot \sqrt[4]{a^2} \cdot \sqrt[3]{a^2} \cdot \sqrt[4]{a}}{a^4 \cdot \sqrt[4]{16a}} = \frac{a^{\frac{3}{2}} \cdot a^{\frac{3}{4}} \cdot a^{\frac{1}{3}} \cdot 4 \cdot a^{\frac{2}{4}} \cdot a^{\frac{2}{3}} \cdot a^{\frac{1}{4}}}{a^4 \cdot (2^4 a)^{\frac{1}{4}}}$ $= \frac{4a^{\frac{3}{2} + \frac{3}{4} + \frac{1}{3} + \frac{2}{4} + \frac{2}{3} + \frac{1}{4}}}{a^4 \cdot 2 \cdot a^{\frac{1}{4}}}$ <p style="text-align: center;">HN=12</p> $= \frac{4a^{\frac{18}{12} + \frac{9}{12} + \frac{4}{12} + \frac{6}{12} + \frac{8}{12} + \frac{3}{12}}}{2 \cdot a^{\frac{3}{4} + \frac{1}{4}}}$ <p style="text-align: center;">HN=12</p> $= \frac{4a^{\frac{48}{12}}}{2 \cdot a^1} = \frac{2a^4}{a} = \underline{\underline{2a^3}}$
A2	Ausführliche Lösung
	<p>a)</p> $\left(\frac{4a^2}{9b^2}\right)^{\frac{1}{2}} = \frac{4^{\frac{1}{2}} a^{\frac{2}{2}}}{9^{\frac{1}{2}} \cdot b} = \frac{2a}{3b}$
A2	Ausführliche Lösung
	<p>b)</p> $\left(\frac{16x^6}{81y^4}\right)^{\frac{1}{2}} = \frac{16^{\frac{1}{2}} x^{\frac{6}{2}}}{9^{\frac{1}{2}} y^{\frac{4}{2}}} = \frac{4x^3}{3y^2}$
A2	Ausführliche Lösung
	<p>c)</p> $\sqrt{x^2-1} \cdot \sqrt{\frac{x+1}{x-1}} = \sqrt{\frac{(x^2-1)(x+1)}{x-1}} = \sqrt{\frac{(x-1)(x+1)(x+1)}{x-1}}$ $= \sqrt{(x+1)^2} = \underline{\underline{x+1}}$
A3	Ausführliche Lösung
	<p>a)</p> $(x-1) \cdot \sqrt[3]{\frac{x^2+2x+1}{x^2-1}} = \sqrt[3]{\frac{(x-1)^3 (x+1)^2}{(x-1)(x+1)}} = \sqrt[3]{(x-1)^2 (x+1)}$ $= \sqrt[3]{(x-1)(x-1)(x+1)} = \sqrt[3]{\underbrace{(x-1)(x+1)}_{\text{3. bin. Formel}} (x-1)}$ $= \underline{\underline{\sqrt[3]{(x^2-1)(x-1)}}}$

A3	Ausführliche Lösung
b)	$\begin{aligned} \sqrt{a^2 - b^2} \cdot \sqrt{\frac{5a + 5b}{a - b}} &= \sqrt{\frac{(a^2 - b^2)(5a + 5b)}{a - b}} \\ &= \sqrt{\frac{5(a - b)(a + b)(a + b)}{a - b}} = \sqrt{5(a + b)(a + b)} \\ &= \sqrt{5(a + b)^2} = \underline{\underline{(a + b)\sqrt{5}}} \end{aligned}$

A3	Ausführliche Lösung
c)	$\begin{aligned} \sqrt{5a^2 - 5b^2} \cdot \sqrt{\frac{5a + 5b}{a - b}} &= \sqrt{\frac{(5a^2 - 5b^2)(5a + 5b)}{a - b}} \\ &= \sqrt{\frac{25(a^2 - b^2)(a + b)}{a - b}} \\ &= \sqrt{\frac{25(a - b)(a + b)(a + b)}{a - b}} \\ &= \sqrt{25(a + b)^2} = \underline{\underline{5(a + b)}} \end{aligned}$

A4	Ausführliche Lösung
a)	$\begin{aligned} \left(\frac{x-1}{x+1}\right) \cdot \sqrt[3]{\frac{(x^2+2x+1)^2}{(x^2-1)^2}} &= \left(\frac{x-1}{x+1}\right) \cdot \sqrt[3]{\frac{(x+1)^4}{(x-1)^2(x+1)^2}} \\ &= \sqrt[3]{\frac{(x-1)^3(x+1)^4}{(x+1)^3(x-1)^2(x+1)^2}} \\ &= \sqrt[3]{\frac{(x-1)^3(x+1)^4}{(x+1)^5(x-1)^2}} = \underline{\underline{\sqrt[3]{\frac{x-1}{x+1}}}} \end{aligned}$

A4	Ausführliche Lösung
b)	$\begin{aligned} (x+y) \cdot \sqrt{\frac{x^2 - y^2}{(x^2 + 2xy + y^2)(x+y)}} &= \sqrt{\frac{(x+y)^2(x-y)(x+y)}{(x+y)^2(x+y)}} \\ &= \sqrt{\frac{(x+y)^3(x-y)}{(x+y)^3}} = \underline{\underline{\sqrt{x-y}}} \end{aligned}$

A4	Ausführliche Lösung
c)	$\sqrt[3]{x^2 + 2xy + y^2} : \sqrt[3]{x^2 - y^2} = \sqrt[3]{\frac{(x+y)(x+y)}{(x-y)(x+y)}} = \underline{\underline{\sqrt[3]{\frac{x+y}{x-y}}}}$

A4	Ausführliche Lösung
d)	$(x+y) \cdot \sqrt{\frac{x^2+y^2}{x^2+2xy+y^2}} = \sqrt{\frac{(x+y)^2(x^2+y^2)}{(x+y)^2}} = \underline{\underline{\sqrt{x^2+y^2}}}$

A5	Ausführliche Lösungen
a)	$\begin{aligned} & \sqrt[n]{\frac{b^{-3}c^{-3}a^{2n}}{b^{-3n}dc^{-5}a^{-2}} : \frac{a^2c^2b^n}{a^{-n}da^n b^3}} \\ &= \sqrt[n]{\frac{b^{-3}c^{-3}a^{2n} \cdot a^{-n}da^n b^3}{b^{-3n}dc^{-5}a^{-2} \cdot a^2c^2b^n}} \\ &= \sqrt[n]{\frac{a^{2n} \cdot a^{-n} \cdot a^n \cdot b^{-3} \cdot b^3 \cdot c^{-3} \cdot d}{a^{-2} \cdot a^2 \cdot b^{-3n} \cdot b^n \cdot c^{-5} \cdot c^2 \cdot d}} \\ &= \sqrt[n]{\frac{a^{2n} \cdot c^{-3}}{b^{-2n} \cdot c^{-3}}} = \sqrt[n]{a^{2n} \cdot b^{2n}} \\ &= \sqrt[n]{(ab)^{2n}} = (ab)^{\frac{2n}{n}} = \underline{\underline{(ab)^2}} \end{aligned}$
b)	$\begin{aligned} & \sqrt[a]{\frac{y^{3b}y^{-2}x^{2a}z^3}{y^{-2}x^{-3b}z^{-a}} : \frac{z^3x^{3b}}{y^{-3b}x^{-2a}}} \\ &= \sqrt[a]{\frac{y^{3b}y^{-2}x^{2a}z^3 \cdot y^{-3b}x^{-2a}}{y^{-2}x^{-3b}z^{-a} \cdot z^3x^{3b}}} \\ &= \sqrt[a]{\frac{x^{2a} \cdot x^{-2a} \cdot y^{3b} \cdot y^{-2} \cdot y^{-3b} \cdot z^3}{x^{-3b} \cdot x^{3b} \cdot y^{-2} \cdot z^{-a} \cdot z^3}} \\ &= \sqrt[a]{\frac{y^{-2} \cdot z^3}{y^{-2} \cdot z^{-a} \cdot z^3}} = \sqrt[a]{z^a} = \underline{\underline{z}} \end{aligned}$

A6	Ausführliche Lösungen
a)	$\begin{aligned} \sqrt{\sqrt{16}} &= \sqrt{\sqrt{2^4}} = \left[(2^4)^{\frac{1}{2}} \right]^{\frac{1}{2}} \\ &= (2^4)^{\frac{1}{4}} = 2^{\frac{4}{4}} \\ &= 2^1 = \underline{\underline{2}} \end{aligned}$
b)	$\begin{aligned} \sqrt[3]{\sqrt{216}} &= \sqrt[3]{\sqrt{6^3}} = \left[(6^3)^{\frac{1}{2}} \right]^{\frac{1}{3}} \\ &= (6^3)^{\frac{1}{6}} = 6^{\frac{3}{6}} \\ &= 6^{\frac{1}{2}} = \underline{\underline{\sqrt{6}}} \end{aligned}$

A6	Ausführliche Lösungen
c)	$\begin{aligned} \sqrt[3]{\sqrt{4096}} &= \sqrt[3]{\sqrt{4^6}} = \left[(4^6)^{\frac{1}{3}} \right]^{\frac{1}{2}} \\ &= (4^6)^{\frac{1}{6}} = 4^{\frac{6}{6}} \\ &= 4^1 = \underline{\underline{4}} \end{aligned}$
d)	$\begin{aligned} \sqrt[3]{\sqrt{x^6}} &= \left[(x^6)^{\frac{1}{3}} \right]^{\frac{1}{2}} = (x^6)^{\frac{1}{6}} \\ &= x^{\frac{6}{6}} = x^1 = \underline{\underline{x}} \end{aligned}$

A6	Ausführliche Lösungen
e)	$\begin{aligned} \sqrt[3]{\sqrt{z^3}} &= \left[(z^3)^{\frac{1}{2}} \right]^{\frac{1}{3}} = (z^3)^{\frac{1}{6}} \\ &= z^{\frac{3}{6}} = z^{\frac{1}{2}} = \underline{\underline{\sqrt{z}}} \end{aligned}$
f)	$\begin{aligned} \sqrt[4]{\sqrt[3]{a^8}} &= \left[(a^8)^{\frac{1}{3}} \right]^{\frac{1}{4}} = (a^8)^{\frac{1}{12}} \\ &= a^{\frac{8}{12}} = a^{\frac{2}{3}} = \underline{\underline{\sqrt[3]{a^2}}} \end{aligned}$

A6 Ausführliche Lösungen	
g)	$\sqrt[3]{\sqrt{x^4 y^6}} = \left[(x^4 y^6)^{\frac{1}{2}} \right]^{\frac{1}{3}} = (x^4 y^6)^{\frac{1}{6}}$ $= x^{\frac{4}{6}} y^{\frac{6}{6}} = x^{\frac{2}{3}} y^1 = \underline{\underline{\sqrt[3]{x^2} \cdot y}}$
h)	$\sqrt[3]{\sqrt[4]{81x^{12}}} = \sqrt[3]{\sqrt[4]{3^4 x^{12}}}$ $= \left[(3^4 x^{12})^{\frac{1}{4}} \right]^{\frac{1}{3}} = (3^4 x^{12})^{\frac{1}{12}}$ $= 3^{\frac{4}{12}} x^{\frac{12}{12}} = 3^{\frac{1}{3}} x^1 = \underline{\underline{\sqrt[3]{3} \cdot x}}$

A7 Ausführliche Lösung	
a)	$\sqrt[4]{\sqrt[3]{625x^8}} = \sqrt[4]{\sqrt[3]{5^4 x^8}} = \left[(5^4 x^8)^{\frac{1}{3}} \right]^{\frac{1}{4}}$ $= (5^4 x^8)^{\frac{1}{12}} = 5^{\frac{4}{12}} x^{\frac{8}{12}} = 5^{\frac{1}{3}} x^{\frac{2}{3}} = \underline{\underline{\sqrt[3]{5x^2}}}$

A7 Ausführliche Lösung	
b)	$\sqrt{x^3} \cdot \sqrt[3]{x} \cdot \sqrt[4]{x} \cdot \sqrt[3]{\sqrt{x^4} \cdot \sqrt[4]{x^3}} \cdot \sqrt[6]{x^2 \sqrt{x^4} \cdot \sqrt{x^4}}$ $= \left\{ x^3 \cdot \left[x \cdot (x^4)^{\frac{1}{4}} \right]^{\frac{1}{3}} \right\} \cdot \left\{ x^4 \left(x^3 \right)^{\frac{1}{4}} \right\}^{\frac{1}{2}} \cdot \left\{ x^2 \left[x^4 \left(x^4 \right)^{\frac{1}{2}} \right]^{\frac{1}{2}} \right\}^{\frac{1}{6}}$ $= x^{\frac{3}{2}} \cdot \left[x \cdot x^4 \right]^{\frac{1}{6}} \cdot \left[x^4 \cdot x^4 \right]^{\frac{1}{6}} \cdot x^{\frac{2}{6}} \cdot \left[x^4 x^4 \right]^{\frac{1}{12}}$ $= x^{\frac{3}{2}} \cdot x^{\frac{1}{6}} \cdot x^{\frac{1}{24}} \cdot x^{\frac{4}{6}} \cdot x^{\frac{3}{24}} \cdot x^{\frac{2}{6}} \cdot x^{\frac{4}{12}} \cdot x^{\frac{4}{24}}$ $= x^{\frac{3}{2} + \frac{1}{6} + \frac{1}{24} + \frac{4}{6} + \frac{3}{24} + \frac{2}{6} + \frac{4}{12} + \frac{4}{24}} \stackrel{HN=24}{=} x^{\frac{36}{24} + \frac{4}{24} + \frac{1}{24} + \frac{16}{24} + \frac{3}{24} + \frac{8}{24} + \frac{8}{24} + \frac{4}{24}} = x^{\frac{72}{24}} = \underline{\underline{x^3}}$

A7 Ausführliche Lösung	
c)	$\sqrt{x^3 \sqrt{x^3}} \cdot \sqrt[3]{x^2} = \left[x^3 \left(x^3 \right)^{\frac{1}{2}} \right]^{\frac{1}{2}} \cdot \left[\left(x^2 \right)^{\frac{1}{3}} \right]^{\frac{1}{2}}$ $= x^{\frac{3}{2}} \cdot \left(x^3 \right)^{\frac{1}{4}} \cdot \left(x^2 \right)^{\frac{1}{6}} = x^{\frac{3}{2}} \cdot x^{\frac{3}{4}} \cdot x^{\frac{2}{6}}$ $= x^{\frac{3}{2} + \frac{3}{4} + \frac{2}{6}} \stackrel{HN=12}{=} x^{\frac{18}{12} + \frac{9}{12} + \frac{4}{12}}$ $= x^{\frac{31}{12}} = x^{2 + \frac{7}{12}} = \underline{\underline{x^2 \cdot \sqrt[12]{x^7}}}$

A7	Ausführliche Lösung
d)	$\sqrt[3]{x^2 \cdot \sqrt[4]{x^3}} \cdot \sqrt{x \cdot \sqrt[3]{x^2 \cdot \sqrt[4]{x^{12}}}} \cdot \sqrt{x^3 \cdot \sqrt[3]{x^4}} \cdot \sqrt[12]{x^7}$ $= \left[x^2 \left(x^3 \right)^{\frac{1}{4}} \right]^{\frac{1}{3}} \cdot \left\{ x \left[x^2 \left(x^{12} \right)^{\frac{1}{4}} \right]^{\frac{1}{3}} \right\}^{\frac{1}{2}} \cdot \left[x^3 \left(x^4 \right)^{\frac{1}{3}} \right]^{\frac{1}{2}} \cdot x^{\frac{7}{12}}$ $= x^{\frac{2}{3}} \cdot \left(x^3 \right)^{\frac{1}{12}} \cdot x^{\frac{1}{2}} \cdot \left[x^2 \cdot \left(x^{12} \right)^{\frac{1}{4}} \right]^{\frac{1}{6}} \cdot x^{\frac{3}{2}} \cdot \left(x^4 \right)^{\frac{1}{6}} \cdot x^{\frac{7}{12}}$ $= x^{\frac{2}{3}} \cdot x^{\frac{3}{12}} \cdot x^{\frac{1}{2}} \cdot x^{\frac{2}{6}} \cdot x^{\frac{12}{24}} \cdot x^{\frac{3}{6}} \cdot x^{\frac{4}{6}} \cdot x^{\frac{7}{12}}$ $= x^{\frac{3}{2} + \frac{3}{12} + \frac{1}{2} + \frac{2}{6} + \frac{12}{24} + \frac{3}{6} + \frac{4}{6} + \frac{7}{12}} \stackrel{\text{HN}=12}{=} x^{\frac{8}{12} + \frac{3}{12} + \frac{6}{12} + \frac{4}{12} + \frac{6}{12} + \frac{18}{12} + \frac{8}{12} + \frac{7}{12}} = x^{\frac{60}{12}} = \underline{\underline{x^5}}$

A8	Ausführliche Lösung
a)	$\sqrt[4]{\sqrt[3]{x^4}} \cdot \sqrt[3]{\sqrt[4]{x^3}} \cdot \sqrt[3]{x^4} \cdot \sqrt[12]{x} = x^{\frac{4}{3} \cdot \frac{1}{4}} \cdot x^{\frac{3}{4} \cdot \frac{1}{3}} \cdot x^{\frac{4}{3}} \cdot x^{\frac{1}{12}}$ $= x^{\frac{4}{12}} \cdot x^{\frac{3}{12}} \cdot x^{\frac{4}{3}} \cdot x^{\frac{1}{12}}$ $= x^{\frac{4}{12} + \frac{3}{12} + \frac{16}{12} + \frac{1}{12}} = x^{\frac{24}{12}} = \underline{\underline{x^2}}$

A8	Ausführliche Lösung
b)	$\sqrt[9]{\sqrt[5]{x^{11}}} \cdot \sqrt[3]{\sqrt[15]{x^{19}}} : \sqrt[3]{x} = x^{\frac{11}{5} \cdot \frac{1}{9}} \cdot x^{\frac{19}{15} \cdot \frac{1}{3}} \cdot x^{\frac{1}{3}}$ $= x^{\frac{11}{45} + \frac{19}{45} + \frac{15}{45}} = x^{\frac{15}{45}} = x^{\frac{1}{3}} = \underline{\underline{\sqrt[3]{x}}}$

A8	Ausführliche Lösung
c)	$\sqrt[4]{625a^3} \cdot \sqrt[3]{4^6 a \cdot \sqrt{a^4}} = \left[5^4 \cdot a^3 \cdot \left(2^{12} \cdot a \cdot a^2 \right)^{\frac{1}{3}} \right]^{\frac{1}{4}}$ $= 5 \cdot a^{\frac{3}{4}} \cdot \left(2^{12} \cdot a^3 \right)^{\frac{1}{12}} = 5 \cdot a^{\frac{3}{4}} \cdot 2 \cdot a^{\frac{3}{4}}$ $= 10a^{\frac{3}{4}} \cdot a^{\frac{1}{4}} = 10a^{\frac{3}{4} + \frac{1}{4}} = \underline{\underline{10a}}$

A8	Ausführliche Lösung
d)	$\sqrt[9]{a^6 \cdot \sqrt[4]{a^{12}}} + \sqrt[6]{b^{10}} \cdot \sqrt[3]{\sqrt[4]{b^2}} = \left(a^6 + a^3 \right)^{\frac{1}{9}} + \left(b^{\frac{5}{3}} \right)^{\frac{1}{2}} \cdot \left(b^{\frac{1}{2}} \right)^{\frac{1}{3}}$ $= \left(a^9 \right)^{\frac{1}{9}} + b^{\frac{5}{6}} \cdot b^{\frac{1}{6}} = a^{\frac{9}{9}} + b^{\frac{6}{6}} = \underline{\underline{a+b}}$