Aufgabenblatt
zu Potenzen - Potenzterme vereinfachen

Lösungen

Level 2 – Fortgeschritten – Blatt 2

Lösung A1

a) $a^{-2}+3a^2$ b) $\frac{9}{2}+\frac{3}{2}=6$ c) $x^2+\frac{1}{3}x^2=\frac{4}{3}x^2$

d) $a^3+4a^3=5a^3$ e) $a^{-2}-3$ f) $\frac{9}{x^3}$

g) -1 h) $-\frac{(1-x)^2}{1-x}=(x-1)$ i) e^{4x-1}

j) $\frac{1}{e^{2x}}+\frac{3}{e^{2x}}-\frac{4}{e^{2x}}=0$ k) $\frac{1}{e}$ l) $\frac{4}{k}$

Lösung A2

a) $-2x^2$ b) $\frac{(a^n-4a^{n-2}-2a^{-n})}{2}$

c) $4x^3-0{,}5x^3+\frac{1}{x^3}=4{,}5x^3+\frac{1}{x^3}$ d) $a^n+a^{n-3}+a^n=2a^n+a^{n+3}$

e) $k^4-k=k(k^3-1)$ f) $\left(\frac{x-y}{a-b}\right)^3\cdot\frac{25}{(x+y)(x-y)}=\frac{25(x-y)^2}{(a-b)^3\cdot(x+y)}$

g) $10\cdot 2^n-2^n+2\cdot 2^n-6\cdot 2^n=5\cdot 2^n$ h) $\frac{2^{2k}}{8}\cdot\frac{8}{2^k}+2^k=2^k+2^k=2^{k+1}$

i) $\frac{(e^{2x}-e^{-2x})\cdot e^{2x}}{(e^x-e^{-x})\cdot e^{2x}}=\frac{e^{4x}-1}{(e^{2x}-1)\cdot e^x}$ j) $1-\frac{2}{3}e^{-2x}$

Lösung A3

a) $\frac{8^3\cdot 27^4\cdot 15^2}{25^3\cdot 4^4\cdot 9^5}=\frac{(2^3)^3\cdot(3^3)^4\cdot(3\cdot 5)^2}{(5^2)^3\cdot(2^2)^4\cdot(3^2)^5}=\frac{2^9\cdot 3^{12}\cdot 3^2\cdot 5^2}{5^6\cdot 2^8\cdot 3^{10}}=\frac{2\cdot 3^4}{5^4}=2\cdot\left(\frac{3}{5}\right)^4$

b) $\frac{4^{2n+3}\cdot 2^{7n-5}}{8^{3n}\cdot 4^n}=\frac{(2^2)^{2n+3}\cdot 2^{7n-5}}{(2^3)^{3n}\cdot(2^2)^n}=\frac{2^{4n+6}\cdot 2^{7n-5}}{2^{9n}\cdot 2^{2n}}=\frac{2^{11n+1}}{2^{11n}}=2$

Lösung A4

a) $\frac{(6x^5y^{-3}z^2)^3}{(3x^3y^{-2}z^2)^4}=\frac{2^3\cdot 3^3x^{15}y^{-9}z^6}{3^4x^{12}y^{-8}z^8}=\frac{8\cdot x^3}{3yz^2}$

b) $\frac{b^{2n}}{c^{n-1}}:\left(\frac{a^2}{c^{n+1}}\cdot\frac{b^{3n}}{a^5}\right)=\frac{b^{2n}}{c^{n-1}}\cdot\frac{c^{n+1}}{a^2}\cdot\frac{a^5}{b^{3n}}=\frac{a^3c^2}{b^n}$

Lösung A5

a) $\frac{14a^3b^2-21a^2b^3}{28a^2b^2}=\frac{14a^2b^2(a-b)}{28a^2b^2}=\frac{a-b}{2}$

b) $\frac{x^n-x^{n+1}}{x^n-x^{n-1}}=\frac{x^n(1-x)}{x^n(1-x^{-1})}=\frac{1-x}{1-\frac{1}{x}}=\frac{1-x}{\frac{x-1}{x}}=\frac{x(1-x)}{x-1}$

Lösung A6

a) $\frac{4x^3+2}{x^{n+3}}+\frac{2x^{-2}-5}{x^{n-2}}-\frac{6x-5x^3+2x^{-2}}{x^{n+1}}=\frac{4x^3+2}{x^{n+3}}+\frac{x^5\cdot(2x^{-2}-5)}{x^{n-2}\cdot x^5}-\frac{x^2(6x-5x^3+2x^{-2})}{x^{n+1}\cdot x^2}$

$=\frac{4x^3+2+2x^3-5x^5-6x^3+5x^5-2}{x^{n+3}}=\frac{0}{x^{n+3}}=0$

Lösung A7

a) $\frac{3}{2}x^4+\frac{3}{4}x^3+\frac{1}{8}x^2=\frac{1}{8}x^2\cdot(12x^2+4x+1)$

b) $3^{2x}-3^x=3^x\cdot(3^2-1)$

c) $e^{3x}-2e^{-x}=e^{-x}\cdot(e^{4x}-2)$

d) $te^{2x}-2e^{x+1}=e^x\cdot(te^x-2e)$

Lösung A8

a) $-14b - 15a^{-4}b^{4} + 8a^{4}b^{-2}$

b) $14a + 42a^{6}b^{-6} - 6a^{-6}b^{5} - 18a^{-1}b^{-1}$

c) $4a^{10}b^{4} - 16a^{4} + 19a^{-2}b^{-4}$

d) $9a^{\frac{4}{5}}b^{\frac{3}{2}} + 12a^{-\frac{16}{15}}b^{-\frac{1}{20}} + 4a^{\frac{4}{3}}b^{-\frac{8}{5}}$

e) $25ab^{\frac{8}{3}} - 9a^{-6}b^{-\frac{5}{3}}$

Lösung A9

a) $\frac{4}{5}a^{5}b^{2}c^{-6}$

b) $\frac{3}{5}a^{\frac{9}{4}}b^{\frac{1}{8}}c^{-\frac{1}{8}}$

c) $\frac{1}{6}a^{12}c^{-1}$

d) $\frac{9}{8}a^{5}b^{5}c^{-2}$

e) $\frac{1}{6}a^{\frac{61}{8}}b^{\frac{11}{8}}c^{\frac{2}{5}}$

Lösung A10

a) $\left(\frac{2}{3}\right)^{4}$

b) $\left(\frac{9}{4}\right)^{\frac{3}{4}}$

c) $\left(\frac{10}{3}\right)^{\frac{2}{3}}$

d) $\left(\frac{10}{3}\right)^{\frac{2}{3}}$

e) $\left(\frac{3}{10}\right)^{\frac{2}{3}}$

Lösung A11

a) $\sqrt[4]{7^{3}}$

b) $\sqrt{5^{2}}$

c) $\sqrt[12]{2^{11}}$

d) $\frac{1}{\sqrt[3]{3^{4}}}$

e) $\frac{1}{2}$