Aufgaben zu den Potenzsätzen

Lösungen

Vereinfachen (Teil 1)

a) $a^2 \cdot a^3 = a^{2+3} = a^5$

b) $b^4 \cdot b^{-5} = b^{4-5} = b^{-1} = \frac{1}{b}$

c) $\frac{n^4}{n^3} = n^{4-3} = n^1 = n$

d) $(x^3)^2 = x^{3 \cdot 2} = x^6$

e) $\left(\frac{1}{a^4}\right)^3 = \frac{1^3}{(a^4)^3} = \frac{1}{a^{4 \cdot 3}} = \frac{1}{a^{12}}$

f) $(b^2 \cdot b^3)^2 = (b^{2+3})^2 = (b^5)^2 = b^{5 \cdot 2} = b^{10}$

g) $a^3 \cdot c^3 = (a\,c)^3$

h) $\left(\frac{x^2}{y^2}\right)^3 = \left(\left(\frac{x}{y}\right)^2\right)^3 = \left(\frac{x}{y}\right)^{2 \cdot 3} = \left(\frac{x}{y}\right)^6$

Faktorisieren (Teil 1)

a) $17a^3b^6 + 16a^5b^6 = a^3b^6(17 + 16a^2)$

b) $8y^6 + 36x^3y^2 = 4y^2(2y^4 + 9x^3)$

c) $6x^6y^5 + 32x^6y^4 = 2x^6y^4(3y + 16)$

d) $11b^3 - 11b^5 = 11b^3(1 - b^2)$

e) $4a^5b^4 - 22a^3 + 26a^7b^5 = 2a^3(2a^2b^4 - 11 + 13a^4b^5)$

f) $40n^7 + 9n^5 - 18n^4 = n^4(40n^3 + 9n - 18)$

g) $6p^2q^4r^7 + 39p^4q^4r^4 + 17p^6q^3r^3 = p^2q^3r^3(6qr^4 + 39p^2qr + 17p^4)$

h) $34x^5y^7z^8 + 18x^3y^5z^5 + 18x^7y^5z^7 = 2x^3y^5z^5(17x^2y^2z^3 + 9 + 9x^4z^2)$

Faktorisieren (Teil 2)

a) $\underline{-5}\,x^2 - 27x^{\underline{7}} = x^2(-5 - 27x^5)$

b) $\underline{32}\,x^4 + 34x^{\underline{6}} = 2x^4(16 + 17x^2)$

c) $5\underline{a^3}\,b^5 + 6a^5\underline{b^7} = a^3b^5(5 + 6a^2b^2)$

d) $21b^3c^3 + \underline{3a^4b^5c^2} - 3b = \underline{3}\,b(7b^2c^3 + a^4b^4c^2\underline{-1})$

e) $\underline{-x^4yz^7} + 18x^5y^5z^5 = x^4y\underline{z^5}(-z^2 + 18xy^{\underline{4}})$

Expandieren

a) $x y^5\left(22 x^3 y-9\right)=22 x^4 y^6-9 x y^5$

b) $4 a^3 b\left(-8 a^4+3 b\right)=-32 a^7 b+12 a^3 b^2$

c) $3 p^3 q^2 r^2\left(-3 p^3 r^5-11 q^6\right)=-9 p^6 q^2 r^7-33 p^3 q^8 r^2$

d) $4 m^4 n^2\left(-5 k^6+2 m n^2\right)=-20 k^6 m^4 n^2+8 m^5 n^4$

e) $a^4 b^3 c^6\left(-1-32 a c+34 a^3 b^4\right)=-a^4 b^3 c^6-32 a^5 b^3 c^7+34 a^7 b^7 c^6$

f) $2 a b^2 c\left(-6 a^6 b^2 c^6+4 c^3-15 b^6\right)=-12 a^7 b^4 c^7+8 a b^2 c^4-30 a b^8 c$

Vereinfachen (Teil 2)

a) $\frac{-16 b^2+3 b^4}{6 b^2-23 b^7}=\frac{b^2\left(-16+3 b^2\right)}{b^2\left(6-23 b^5\right)}=\frac{-16+3 b^2}{6-23 b^5}$

b) $\frac{-28 x^3 y^6-6 x^4 y^3}{31 x^5 y^2-27 x^3 y^7}=\frac{2 x^3 y^3\left(-14 y^3-3 x\right)}{x^3 y^2\left(31 x^2-27 y^5\right)}=\frac{2 y\left(-14 y^3-3 x\right)}{31 x^2-27 y^5}$

c) $\frac{-6 m^8 n^3-4 m n^4}{14 m^5 n^7-16 m^5 n^2}=\frac{2 m n^3\left(-3 m^7-2 n\right)}{2 m^5 n^2\left(7 n^5-8\right)}=\frac{n^2\left(-3 m^7-2 n\right)}{m^4\left(7 n^5-8\right)}$

d) $\frac{30 a^6 b^7 c^6+16 a^5 b^2 c^4-2 a^5 b^5 c^3}{26 b^3 c^8 d^5+2 b^2 c^7-34 b^3 c^4 d^3}=\frac{2 a^5 b^2 c^3\left(15 a b^5 c^3+8 c-b^3\right)}{2 b^2 c^4\left(13 b c^4 d^5+c^3-17 b d^3\right)}=\frac{a^5\left(15 a b^5 c^3+8 c-b^3\right)}{c\left(13 b c^4 d^5+c^3-17 b d^3\right)}$