

Potenzgesetze

1) a) $a^3 \cdot a^4$

$$a^8 \cdot a^2 \cdot a^5$$

$$4a^3 \cdot 2b^3 \cdot a^5b^2$$

$$(-1) \cdot (-4) \cdot a^3b^5a^7$$

$$x^3 y^4 z^{10} x^9 z^3 \text{ (Es muss kein Malpunkt zwischen den Variablen stehen.)}$$

b) $\frac{a^8}{a^2}$ $\frac{a^4}{b^7} : \frac{a^2}{b^{12}}$

$$\frac{a^{10}}{a^{-4}}$$

$$\frac{a^3}{b^4} \cdot \frac{b^{10}}{a}$$

$$\frac{x^3 \cdot y^4}{x^2 y}$$

$$\frac{4a^8}{5b^3} \cdot \frac{15b^9}{2a^{10}}$$

$$\frac{10x^{10}y^{12}}{2x^3y^4}$$

$$\frac{a^4}{a^{-3}}$$

$$\frac{-12a^3b^{10}}{-3a^4b^{10}}$$

$$\frac{a^8b^{10}}{a^{-2}b^{-4}}$$

$$\frac{8a^7b^{12}}{16a^{10}b^{20}}$$

$$\frac{a^6}{a^6}$$

c) $(4a)^3$ $(a^2b^3)^4$ $\left(\frac{x^3y^4}{x^2y^{10}}\right)^{-2}$

$$(-a)^4$$

$$(a^2)^5$$

$$\left(\frac{10x^8y^8}{15xy^4}\right)^3$$

$$(a \cdot b)^8$$

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

$$(-3a)^4$$

$$\left(\frac{x}{y}\right)^4$$

$$\left(\frac{2a^3b^5}{c^6}\right)^2$$

$$(-2xy^3)^3$$

Lösungen

1)

a) $a^3 \cdot a^4 = a^7$

$a^8 \cdot a^2 \cdot a^5 = a^{15}$

$4a^3 \cdot 2b^3 \cdot a^5 b^2 = 8a^8 b^5$

$(-1) \cdot (-4) \cdot a^3 b^5 a^7 = 4a^{10} b^5$

$x^3 y^4 z^{10} x^9 z^3 = x^{12} y^4 z^{13}$

b) $\frac{a^8}{a^2} = a^6$ $\frac{a^4}{b^7} : \frac{a^2}{b^{12}} = \frac{a^4}{b^7} \cdot \frac{b^{12}}{a^2} = a^2 b^5$

$\frac{a^{10}}{a^{-4}} = a^{10 - (-4)} = a^{14}$ $\frac{a^3}{b^4} \cdot \frac{b^{10}}{a} = a^2 b^6$

$\frac{x^3 \cdot y^4}{x^2 y} = x y^3$ $\frac{4a^8}{5b^3} \cdot \frac{15b^9}{2a^{10}} = 2 \cdot 3 \cdot a^{-2} b^6 = 6 a^{-2} b^6$

$\frac{10x^{10}y^{12}}{2x^3y^4} = 5x^7 y^8$ $\frac{a^4}{a^{-3}} = a^7$

$\frac{-12a^3b^{10}}{-3a^4b^{10}} = 4a^{-1}$ $\frac{a^8b^{10}}{a^{-2}b^{-4}} = a^{10} b^{14}$

$\frac{8a^7b^{12}}{16a^{10}b^{20}} = \frac{1}{2} a^{-3} b^{-8}$ $\frac{a^6}{a^6} = a^0 = 1$

c) $(4a)^3 = 4^3 a^3 = 64a^3$ $(a^2 b^3)^4 = (a^2)^4 (b^3)^4$ $\left(\frac{x^3 y^4}{x^2 y^{10}}\right)^{-2} = x^{-2} y^{12}$
 $= a^8 b^{12}$

$(-a)^4 = a^4$ $(a^2)^5 = a^{10}$ $\left(\frac{10x^8 y^8}{15xy^4}\right)^3 = \frac{8}{27} x^{21} y^{12}$

$$\begin{aligned}(a \cdot b)^8 &= a^8 b^8 & \left(\frac{a^2}{b^3}\right)^4 &= \frac{a^8}{b^{12}} (= a^8 b^{-12}) & (-2xy^3)^3 &= -8x^3 y^9 \\ \left(\frac{x}{y}\right)^4 &= \frac{x^4}{y^4} (= x^4 y^{-4}) & \left(\frac{2a^3 b^5}{c^6}\right)^2 &= \frac{4a^6 b^{10}}{c^{12}} (= 4a^6 b^{10} c^{-12}) & (-3a)^4 &= 81a^4\end{aligned}$$