

# Lösungen Potenzen D

## 1. Aufgabe

a)  $2^3 \cdot 2^2 = 2^5 = 32$

d)  $12^4 : 6^4 = 2^4 = 16$

b)  $(-3)^2 \cdot (-2)^2 = (+6)^2 = 36$

e)  $((-1)^5)^3 = (-1)^{15} = -1$

c)  $(-2)^5 : (-2)^4 = (-2)^1 = -2$

f)  $0^7 \cdot 3^0 = 0 \cdot 1 = 0$

## 2. Aufgabe

a)  $a^3 \cdot b^{-5} : a^4 \cdot b^3 = a^{-1} b^{-2}$

b)  $(z^2)^{k-m} = z^{2k-2m}$

c)  $a^{3-k} : a^{7-4k} \cdot (a^{5+k})^2 = a^{3-k-(7-4k)} \cdot a^{10+2k} = a^{3-k-7+4k+10+2k} = a^{6+5k}$

d)  $x^3 \cdot x^{-7} \cdot (x^{-2})^{-2} = x^{3-7} \cdot x^4 = x^{3-7+4} = x^0 = 1$

e)  $3(y^2)^{-3} + 5y^3 \cdot y^{-9} - 6y^2 \cdot (y^4)^{-2} = 3y^{-6} + 5y^{-6} - 6y^2 \cdot y^{-8} = 8y^{-6} - 6y^{-6} = 2y^{-6}$

f)  $(-2)^{-2} \cdot (-x)^3 \cdot (-4)^2 \cdot (-x)^{-2} = (-2)^{-2} \cdot (-4)^2 \cdot (-x)^1 = \frac{1}{4} \cdot 16 \cdot (-x) = -4x$

## 3. Aufgabe

a)  $14560000 = 1,456 \cdot 10^7$

c)  $0,0000201 = 2,01 \cdot 10^{-5}$

b)  $3,24 \cdot 10^3 = 3240$

d)  $6,528 \cdot 10^{-5} = 0,00006528$

## 4. Aufgabe

a)  $\frac{a^{-1}}{(a \cdot b)^{-1}} = \frac{a^{-1}}{a^{-1} b^{-1}} = \frac{1}{b^{-1}} = b^1 = b$  Ein Bruchstrich ist ein Divisionszeichen.

$$a^{-1} : a^{-1} = a^{-1-(-1)} = a^0 = 1$$

b)  $\left(\frac{xy}{a^2 b}\right)^4 \cdot \left(\frac{ab}{x^3 y^2}\right)^2 = \frac{x^4 y^4}{a^8 b^4} \cdot \frac{a^2 b^2}{x^6 y^4} = x^{-2} y^0 a^{-6} b^{-2} = x^{-2} a^{-6} b^{-2}$

c)  $\frac{\left(5^{\frac{1}{2}}\right)^{-4}}{\left(10 \cdot 5^{\frac{1}{2}}\right)^{-2}} = \frac{5^{-2}}{(10)^{-2} \cdot 5^{-1}} = \frac{10^2}{5^2 \cdot 5^{-1}} = \frac{10^2}{5^1} = \frac{100}{5} = 20$

## 5. Aufgabe

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

$$2x^3 - 4x^3 + x^0 = -2x^3 + 1$$

$$\text{b) } \frac{z^{a-2} \cdot z^{-2+b}}{z^{a-b} \cdot z^{-4}} = \frac{z^{a-2-2+b}}{z^{a-b-4}} = \frac{z^{a-4+b}}{z^{a-b-4}} = z^{a-4+b-(a-b-4)} = z^{a-4+b-a+b+4} = z^{2b}$$

## 6. Aufgabe

$$\text{a) } \sqrt[4]{256b^8} = 256^{\frac{1}{4}} \cdot b^{\frac{8}{4}} = 4b^2$$

$$\text{b) } \sqrt[5]{100000c^{-15}} = 100000^{\frac{1}{5}} \cdot c^{-\frac{15}{5}} = 10c^{-3}$$

$$\text{c) } \sqrt[3]{27x^3} = 27^{\frac{1}{3}} \cdot x^{\frac{3}{3}} = 3x$$

## 7. Aufgabe

$$\text{a) } \sqrt[4]{a^7} \cdot \sqrt[4]{a} = a^{\frac{7}{4}} \cdot a^{\frac{1}{4}} = a^2$$

$$\text{b) } \sqrt[5]{a^6} : \sqrt[5]{a^7} = a^{\frac{6}{5}} : a^{\frac{7}{5}} = a^{-\frac{1}{5}} = \frac{1}{a^{\frac{1}{5}}} = \frac{1}{\sqrt[5]{a}} \quad \text{oder} \quad a^{-\frac{1}{5}} = \sqrt[5]{a^{-1}} = \sqrt[5]{\frac{1}{a}}$$

$$\text{c) } \sqrt[2]{x^6} : \sqrt[3]{x^{12}} \cdot \sqrt[5]{x^{10}} = x^{\frac{6}{2}} : x^{\frac{12}{3}} \cdot x^{\frac{10}{5}} = x^3 : x^4 \cdot x^2 = x^{3-4+2} = x^1 = x$$

$$\text{d) } \sqrt[7]{b^{-1}} \cdot \sqrt[3]{b^{11}} = b^{-\frac{1}{7}} \cdot b^{\frac{11}{3}} = b^{\frac{74}{21}} = \sqrt[21]{b^{74}}$$

$$\text{e) } \left(24 \cdot \sqrt[5]{z^3}\right) : \left(8 \cdot \sqrt[10]{z^{-4}}\right) = 24 \cdot z^{\frac{3}{5}} : \left(8 \cdot z^{-\frac{4}{10}}\right) = 24 : 8 \left(z^{\frac{3}{5}} : z^{-\frac{4}{10}}\right) = 3z^1 = 3z$$

$$\text{f) } \sqrt[3]{2^3} \cdot \sqrt[6]{2^4} : \sqrt[15]{2^{19}} = 2^{\frac{3}{3}} \cdot 2^{\frac{4}{6}} : 2^{\frac{19}{15}} = 2^0 = 1$$

Probieren Sie es !!!

$$\frac{a^3 b^3 \cdot 2a^4 b^{-2} - (2a)^3 \cdot (a^{-2})^{-1} \cdot b}{ab^2 \cdot (a^3 b^{-1} - 2a^2 b^{-1})} - \frac{(4a^2)^2 \cdot a^{-4} \cdot a^5}{(2a)^2 \cdot a^2 \cdot a^{-1}} =$$

$$\frac{2a^7 b^1 - 8a^3 \cdot a^2 \cdot b^1}{a^4 b^1 - 2a^3 b^1} - \frac{16a^4 \cdot a^1}{4a^2 \cdot a^1} =$$

$$\frac{2a^7 b^1 - 8a^5 b^1}{a^4 b^1 - 2a^3 b^1} - \frac{16a^5}{4a^3} = \frac{a^3 b^1 (2a^4 - 8a^2)}{a^3 b^1 (a - 2)} - 4a^2 =$$

$$\frac{2a^4 - 8a^2}{a - 2} - 4a^2 = \frac{2a^2(a^2 - 4)}{a - 2} - 4a^2 = \frac{2a^2(a + 2)(a - 2)}{a - 2} - 4a^2 =$$

$$2a^2(a + 2) - 4a^2 = 2a^3 + 4a^2 - 4a^2 = 2a^3$$