

Potenzen mit rationalen Exponenten

Aufgaben:

1. Schreibe als Potenzen mit rationalen Exponenten.

a) \sqrt{x} | b) $\sqrt{5}$ | c) $\sqrt[4]{k}$ | d) $\sqrt[3]{c}$ | e) $\sqrt[5]{a-b}$

2. Schreibe als Potenzen mit rationalen Exponenten.

a) $\sqrt[5]{x^4}$ | b) $\sqrt[7]{a^3}$ | c) $\sqrt[6]{b^5}$ | d) $\sqrt[4]{k^3}$ | e) $\sqrt[3]{(x+y)^4}$
f) $\frac{1}{\sqrt[3]{x}}$ | g) $\frac{1}{\sqrt[5]{x^2}}$ | h) $\frac{1}{\sqrt[5]{a^3}}$ | i) $\frac{1}{\sqrt[5]{x^6}}$ | k) $\frac{1}{\sqrt[4]{b^5}}$

3. Schreibe als Wurzel.

a) $3^{\frac{1}{2}}$ | b) $4^{\frac{1}{3}}$ | c) $5^{\frac{1}{8}}$ | d) $4^{\frac{2}{3}}$ | e) $3^{\frac{5}{6}}$
f) $x^{\frac{3}{4}}$ | g) $b^{\frac{2}{5}}$ | h) $(3x)^{\frac{2}{3}}$ | i) $a^{\frac{x}{y}}$ | k) $x^{\frac{2}{y}}$
l) $x^{-\frac{1}{3}}$ | m) $6^{-\frac{3}{5}}$ | n) $c^{-\frac{3}{7}}$ | o) $k^{-\frac{2}{3}}$ | p) $p^{-\frac{a}{b}}$

4. Schreibe mit Wurzelzeichen und berechne.

a) $16^{\frac{1}{2}}$ | b) $9^{\frac{1}{2}}$ | c) $27^{\frac{1}{3}}$ | d) $1^{\frac{1}{5}}$ | e) $81^{\frac{1}{4}}$
f) $125^{\frac{1}{3}}$ | g) $\left(\frac{9}{16}\right)^{\frac{1}{2}}$ | h) $8^{\frac{2}{3}}$ | i) $64^{\frac{2}{3}}$ | k) $100^{\frac{3}{2}}$
l) $\left(\frac{27}{64}\right)^{\frac{2}{3}}$ | m) $\left(\frac{1}{81}\right)^{\frac{1}{2}}$ | n) $\left(\frac{16}{81}\right)^{\frac{1}{4}}$ | o) $\left(\frac{25}{49}\right)^{\frac{3}{2}}$ | p) $\left(\frac{27}{125}\right)^{\frac{2}{3}}$

Viel Erfolg beim Lösen

Lösungen:

1. Schreibe als Potenzen mit rationalen Exponenten.

$$\begin{aligned} \text{a) } \sqrt{x} \\ = x^{\frac{1}{2}} \end{aligned}$$

$$\begin{aligned} \text{b) } \sqrt{5} \\ = 5^{\frac{1}{2}} \end{aligned}$$

$$\begin{aligned} \text{c) } \sqrt[4]{k} \\ = k^{\frac{1}{4}} \end{aligned}$$

$$\begin{aligned} \text{d) } \sqrt[3]{c} \\ = c^{\frac{1}{3}} \end{aligned}$$

$$\begin{aligned} \text{e) } \sqrt[5]{a-b} \\ = (a-b)^{\frac{1}{5}} \end{aligned}$$

2. Schreibe als Potenzen mit rationalen Exponenten.

$$\begin{aligned} \text{a) } \sqrt[5]{x^4} \\ = x^{\frac{4}{5}} \end{aligned}$$

$$\begin{aligned} \text{b) } \sqrt[7]{a^3} \\ = a^{\frac{3}{7}} \end{aligned}$$

$$\begin{aligned} \text{c) } \sqrt[6]{b^5} \\ = b^{\frac{5}{6}} \end{aligned}$$

$$\begin{aligned} \text{d) } \sqrt[4]{k^3} \\ = k^{\frac{3}{4}} \end{aligned}$$

$$\begin{aligned} \text{e) } \sqrt[3]{(x+y)^4} \\ = (x+y)^{\frac{4}{3}} \end{aligned}$$

$$\begin{aligned} \text{f) } \frac{1}{\sqrt[3]{x}} \\ = x^{-\frac{1}{3}} \end{aligned}$$

$$\begin{aligned} \text{g) } \frac{1}{\sqrt[5]{x^2}} \\ = x^{-\frac{2}{5}} \end{aligned}$$

$$\begin{aligned} \text{h) } \frac{1}{\sqrt[5]{a^3}} \\ = a^{-\frac{3}{5}} \end{aligned}$$

$$\begin{aligned} \text{i) } \frac{1}{\sqrt[5]{x^6}} \\ = x^{-\frac{6}{5}} \end{aligned}$$

$$\begin{aligned} \text{k) } \frac{1}{\sqrt[4]{b^5}} \\ = b^{-\frac{5}{4}} \end{aligned}$$

3. Schreibe als Wurzel.

$$\begin{aligned} \text{a) } 3^{\frac{1}{2}} \\ = \sqrt{3} \end{aligned}$$

$$\begin{aligned} \text{b) } 4^{\frac{1}{3}} \\ = \sqrt[3]{4} \end{aligned}$$

$$\begin{aligned} \text{c) } 5^{\frac{1}{8}} \\ = \sqrt[8]{5} \end{aligned}$$

$$\begin{aligned} \text{d) } 4^{\frac{2}{3}} \\ = \sqrt[3]{4^2} \end{aligned}$$

$$\begin{aligned} \text{e) } 3^{\frac{5}{6}} \\ = \sqrt[6]{3^5} \end{aligned}$$

$$\begin{aligned} \text{f) } x^{\frac{3}{4}} \\ = \sqrt[4]{x^3} \end{aligned}$$

$$\begin{aligned} \text{g) } b^{\frac{2}{5}} \\ = \sqrt[5]{b^2} \end{aligned}$$

$$\begin{aligned} \text{h) } (3x)^{\frac{2}{3}} \\ = \sqrt[3]{(3x)^2} \end{aligned}$$

$$\begin{aligned} \text{i) } a^{\frac{x}{y}} \\ = \sqrt[y]{a^x} \end{aligned}$$

$$\begin{aligned} \text{k) } x^{\frac{2}{y}} \\ = \sqrt[y]{x^2} \end{aligned}$$

$$\begin{aligned} \text{l) } x^{-\frac{1}{3}} \\ = \frac{1}{\sqrt[3]{x}} \end{aligned}$$

$$\begin{aligned} \text{m) } 6^{-\frac{3}{5}} \\ = \frac{1}{\sqrt[5]{6^3}} \end{aligned}$$

$$\begin{aligned} \text{n) } c^{-\frac{3}{7}} \\ = \frac{1}{\sqrt[7]{c^3}} \end{aligned}$$

$$\begin{aligned} \text{o) } k^{-\frac{2}{3}} \\ = \frac{1}{\sqrt[3]{k^2}} \end{aligned}$$

$$\begin{aligned} \text{p) } p^{-\frac{a}{b}} \\ = \frac{1}{\sqrt[b]{p^a}} \end{aligned}$$

4. Schreibe mit Wurzelzeichen und berechne.

$$\begin{aligned} \text{a) } 16^{\frac{1}{2}} \\ = \sqrt{16} = 4 \end{aligned}$$

$$\begin{aligned} \text{b) } 9^{\frac{1}{2}} \\ = \sqrt{9} = 3 \end{aligned}$$

$$\begin{aligned} \text{c) } 27^{\frac{1}{3}} \\ = \sqrt[3]{27} = 3 \end{aligned}$$

$$\begin{aligned} \text{d) } 1^{\frac{1}{5}} \\ = \sqrt[5]{1} = 1 \end{aligned}$$

$$\begin{aligned} \text{e) } 81^{\frac{1}{4}} \\ = \sqrt[4]{81} = 3 \end{aligned}$$

$$\begin{aligned} \text{f) } 125^{\frac{1}{3}} \\ = \sqrt[3]{125} = 5 \end{aligned}$$

$$\begin{aligned} \text{g) } \left(\frac{9}{16}\right)^{\frac{1}{2}} \\ = \sqrt{\frac{9}{16}} = \frac{3}{4} \end{aligned}$$

$$\begin{aligned} \text{h) } 8^{\frac{2}{3}} \\ = \sqrt[3]{8^2} = 4 \end{aligned}$$

$$\begin{aligned} \text{i) } 64^{\frac{2}{3}} \\ = \sqrt[3]{64^2} = 16 \end{aligned}$$

$$\begin{aligned} \text{k) } 100^{\frac{3}{2}} \\ = \sqrt{100^3} = 1000 \end{aligned}$$

$$\begin{aligned} \text{l) } \left(\frac{27}{64}\right)^{\frac{2}{3}} \\ = \sqrt[3]{\left(\frac{27}{64}\right)^2} = \frac{9}{16} \end{aligned}$$

$$\begin{aligned} \text{m) } \left(\frac{1}{81}\right)^{\frac{1}{2}} \\ = \sqrt{\frac{1}{81}} = \frac{1}{9} \end{aligned}$$

$$\begin{aligned} \text{n) } \left(\frac{16}{81}\right)^{\frac{1}{4}} \\ = \sqrt[4]{\frac{16}{81}} = \frac{2}{3} \end{aligned}$$

$$\begin{aligned} \text{o) } \left(\frac{25}{49}\right)^{\frac{3}{2}} \\ = \sqrt{\left(\frac{25}{49}\right)^3} = \frac{125}{343} \end{aligned}$$

$$\begin{aligned} \text{p) } \left(\frac{27}{125}\right)^{\frac{2}{3}} \\ = \sqrt[3]{\left(\frac{27}{125}\right)^2} = \frac{9}{25} \end{aligned}$$

Quelle: [https://www.marienberg-](https://www.marienberg-boppard.de/images/content/matheprogramme/wurzel_und_potenzgesetze/Potenzen%20mit%20rationalen%20Exponenten.pdf)

[boppard.de/images/content/matheprogramme/wurzel_und_potenzgesetze/Potenzen%20mit%20rationalen%20Exponenten.pdf](https://www.marienberg-boppard.de/images/content/matheprogramme/wurzel_und_potenzgesetze/Potenzen%20mit%20rationalen%20Exponenten.pdf) (abgerufen am 28. 10. 2021)