7 teils kniffligere Aufgaben zum Rechnen mit Wurzeln.

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1. $\sqrt{2^3 \cdot \sqrt[4]{2^3}} =$

2. $\sqrt[3]{2} : \sqrt[5]{2} =$

3. $\sqrt{x\sqrt{x}} =$

4. $\sqrt[5]{2} : \sqrt[10]{2} =$

5. $\sqrt[3]{2} \cdot \sqrt[4]{2} \cdot \sqrt[5]{2} \cdot \sqrt[60]{2} =$

6. $\sqrt[n]{\frac{x}{\sqrt{x}}} =$

7. $\sqrt{2\sqrt{2\sqrt{2\sqrt{2}}}} =$

1. $\sqrt{2^3 \cdot \sqrt[4]{2^3}} =$

mit Potenzen: $\sqrt{2^3 \cdot \sqrt[4]{2^3}} = \left(2^3 \cdot 2^{\frac{3}{4}}\right)^{\frac{1}{2}} = 2^{\frac{3}{2}} \cdot 2^{\frac{3}{8}} = 2^{\frac{15}{8}} = 2^{1+\frac{7}{8}} = 2\sqrt[8]{2^7}$

mit Wurzeln: $\sqrt{\sqrt[4]{2^{3 \cdot 4}} \cdot \sqrt[4]{2^3}} = \sqrt{\sqrt[4]{2^{12+3}}} = \sqrt[8]{2^{15}}$

event. teilweise radizieren wie oben.

2. $\sqrt[3 \cdot 5]{2^5} : \sqrt[5 \cdot 3]{2^3} = \sqrt[15]{\frac{2^5}{2^3}} = \sqrt[15]{2^2} = \sqrt[15]{4}$

3. $\sqrt{x\sqrt{x}} = \sqrt{\sqrt{x^2}\sqrt{x}} = \sqrt{\sqrt{x^3}} = \sqrt[4]{x^3}$

Könnte auch mit Potenzen wie Nr. 1 berechnet werden

4. $\sqrt[5]{2} : \sqrt[10]{2} = \sqrt[5 \cdot 2]{2^2} : \sqrt[10]{2} = \sqrt[10]{2^2 : 2} = \sqrt[10]{2}$

5. $\sqrt[3]{2} \cdot \sqrt[4]{2} \cdot \sqrt[5]{2} \cdot \sqrt[60]{2} = \sqrt[3 \cdot 20]{2^{20}} \cdot \sqrt[4 \cdot 15]{2^{15}} \cdot \sqrt[5 \cdot 12]{2^{12}} \cdot \sqrt[60]{2} = \sqrt[60]{2^{48}} = \sqrt[5]{2^4} = \sqrt[5]{16}$

6. $\sqrt[n]{\frac{x}{\sqrt{x}}} = \sqrt[n]{\frac{\sqrt{x^2}}{\sqrt{x}}} = \sqrt[n]{\sqrt{\frac{x^2}{x}}} = \sqrt[n]{\sqrt{x}} = \sqrt[2n]{x}$

7. $\sqrt{2\sqrt{2\sqrt{2\sqrt{2}}}} = \sqrt{2\sqrt{2\sqrt{\sqrt{2^3}}}} = \sqrt{2\sqrt{2\sqrt[4]{2^3}}} = \sqrt{2\sqrt{\sqrt[4]{2^4 \cdot 2^3}}} = \sqrt{2\sqrt[8]{2^7}} = \sqrt{\sqrt[8]{2^8 \cdot 2^7}} = \sqrt[16]{2^{15}}$

Variante: in Potenzen umschreiben:

$$\sqrt{2\sqrt{2\sqrt{2\sqrt{2}}}} = \left(2\sqrt{2\sqrt{2\sqrt{2}}}\right)^{\frac{1}{2}} = \left(2\left(2\sqrt{2\sqrt{2}}\right)^{\frac{1}{2}}\right)^{\frac{1}{2}} = \left(2\left(2\left(2\sqrt{2}\right)^{\frac{1}{2}}\right)^{\frac{1}{2}}\right)^{\frac{1}{2}} = \left(2\left(2\left(2 \cdot 2^{\frac{1}{2}}\right)^{\frac{1}{2}}\right)^{\frac{1}{2}}\right)^{\frac{1}{2}}$$

von innen nach aussen berechnen:

$$\left(2\left(2\left(2^{\frac{3}{2}}\right)^{\frac{1}{2}}\right)^{\frac{1}{2}}\right)^{\frac{1}{2}} = \left(2\left(2 \cdot 2^{\frac{3}{4}}\right)^{\frac{1}{2}}\right)^{\frac{1}{2}} = \left(2\left(2^{\frac{7}{4}}\right)^{\frac{1}{2}}\right)^{\frac{1}{2}} = \left(2 \cdot 2^{\frac{7}{8}}\right)^{\frac{1}{2}} = \left(2^{\frac{15}{8}}\right)^{\frac{1}{2}} = 2^{\frac{15}{16}} = \sqrt[16]{2^{15}}$$