

Sätze:

Produkte: $a^n \cdot a^m = a^{n+m}$

$$a^n \cdot b^n = (a \cdot b)^n$$

$$\sqrt[n]{a} \sqrt[n]{b} = \sqrt[n]{a \cdot b}$$

Quotienten: $a^n : a^m = a^{n-m}$

$$a^n : b^n = \left(\frac{a}{b}\right)^n$$

$$\sqrt[n]{a} : \sqrt[n]{b} = \sqrt[n]{\frac{a}{b}}$$

Klammern: $(a^n)^m = a^{nm} = (a^m)^n$

$$(\sqrt[n]{a})^m = \sqrt[n]{a^m} = \sqrt[kn]{a^{km}}$$

rationaler Exponent:

$$a^{-n} = \frac{1}{a^n}$$

$$a^{\frac{1}{n}} = \sqrt[n]{a}$$

$$a^{\frac{m}{n}} = \sqrt[n]{a^m}$$

1.1.3 Bruchrechnung

Definition:

$$\frac{a}{b} \quad \begin{array}{l} \text{Zähler} \\ \text{Nenner} \end{array} \quad (b \neq 0) \text{ Der Nenner ist stets ungleich Null!}$$

$$\frac{a}{b} = \frac{c}{d} \quad \text{ist wahr, wenn gilt:} \quad a \cdot d = b \cdot c.$$

Addition und Subtraktion

gleichnamige Brüche:

$$\frac{a}{b} + \frac{c}{b} = \frac{a+c}{b} \quad \frac{a}{b} - \frac{c}{b} = \frac{a-c}{b}$$

$$\frac{5}{3} + \frac{2}{3} = \frac{5+2}{3} = \frac{7}{3} \quad \frac{5}{3} - \frac{2}{3} = \frac{5-2}{3} = \frac{3}{3}$$

ungleichnamige Brüche:

$$\frac{a}{b} + \frac{c}{d} = \frac{a \cdot d + c \cdot b}{b \cdot d} \qquad \frac{a}{b} - \frac{c}{d} = \frac{a \cdot d - c \cdot b}{b \cdot d}$$

$b \cdot d$ ist der Hauptnenner der beiden Brüche

$$\frac{3}{5} + \frac{5}{6} = \frac{3 \cdot 6 + 5 \cdot 5}{5 \cdot 6} = \frac{43}{30}$$

Multiplikation

allgemein: $\frac{a}{b} \cdot \frac{c}{d} = \frac{a \cdot c}{b \cdot d}$

mit einer natürlichen Zahl: $\frac{a}{b} \cdot c = \frac{a \cdot c}{b}$

$$\frac{3}{5} \cdot 4 = \frac{3 \cdot 4}{5} = \frac{12}{5}$$

erweitern mit z : $\frac{a}{b} = \frac{a \cdot z}{b \cdot z}$

$$\frac{3}{8} = \frac{3 \cdot 2}{8 \cdot 2} = \frac{6}{16}$$

Division

allgemein: $\frac{a}{b} : \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c} = \frac{a \cdot d}{b \cdot c}$

mit einer natürlichen Zahl: $\frac{a}{b} : c = \frac{a}{b} \cdot \frac{1}{c} = \frac{a}{b \cdot c}$

kürzen durch z : $\frac{a}{b} = \frac{c \cdot z}{d \cdot z}$

$$\frac{6}{16} = \frac{3 \cdot 2}{8 \cdot 2} = \frac{3}{8} \cdot \frac{2}{2} = \frac{3}{8}$$

Reziproke Zahlen (Kehrzahlen, Kehrwert)

$\frac{a}{b}$ ist der Kehrwert von $\frac{b}{a}$ und umgekehrt $\frac{a}{b} \cdot \frac{b}{a} = 1$

$\frac{1}{n}$ ist der Kehrwert von n und umgekehrt $\frac{1}{n} \cdot n = 1$

1.1.4 Logarithmen

Definition:

Logarithmen sind die Umkehrfunktion von Potenzen.

$$x = \log_b a$$

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