

$$11. g) \frac{(3xy)^3 \cdot (4xy)^2}{(2xy)^2 \cdot 3(xy)^3} = \frac{\cancel{3^3}^3 \cdot \cancel{x^3}^3 \cdot \cancel{y^3}^3 \cdot \cancel{4^2}^2 \cdot \cancel{x^2}^2 \cdot \cancel{y^2}^2}{\cancel{2^2}^2 \cdot \cancel{y^2}^2 \cdot \cancel{3}^3 \cdot \cancel{x^3}^3 \cdot \cancel{y^3}^3} = \underline{36}$$

$$(x+y)^2 \neq x^2 + y^2$$

Wurzeln

$$10. f) \sqrt[5]{4 \cdot \sqrt{2}} = \sqrt[5]{4 \cdot 2^{\frac{1}{2}}} = (4 \cdot 2^{\frac{1}{2}})^{\frac{1}{5}} = 4^{\frac{1}{5}} \cdot (2^{\frac{1}{2}})^{\frac{1}{5}} \\ = 4^{\frac{1}{5}} \cdot 2^{\frac{1}{2} \cdot \frac{1}{5}} = 4^{\frac{1}{5}} \cdot 2^{\frac{1}{10}} = 4^{\frac{2}{10}} \cdot 2^{\frac{1}{10}} = \sqrt[10]{4^2} \cdot \sqrt[10]{2} \\ = \sqrt[10]{4^2 \cdot 2} = \underline{\sqrt[10]{32}}$$

$$11. f) \frac{10}{3 \cdot 3 \sqrt{5}} = \frac{10 \cdot 3^{-1}}{5^{\frac{1}{3}}} = 10 \cdot 3^{-1} \cdot 5^{-\frac{1}{3}}$$

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

$$\stackrel{?}{=} 10 \cdot (3 \cdot 5^{\frac{1}{3}})^{-1}$$

Bruchterme

$$6. i) \frac{\cancel{3}^3}{t-1} \cdot \frac{1}{3t+3} \cdot \frac{1-t^2}{-\cancel{3}^3} \\ = \frac{\cancel{3}^3}{t-1} \cdot \frac{1}{\cancel{3}^3 \cdot (t+1)} \cdot \frac{(1+t)(1-t)}{-1} \\ = \frac{1-t}{(t-1) \cdot (-1)} = \frac{\cancel{1-t}^1}{\cancel{1-t}^1} = \underline{1}$$

$$D = \mathbb{R} \setminus \{-1, 1\}$$

$$7. j) \frac{\frac{2}{5} \cdot t + \frac{1}{5}}{\frac{1}{10} + t} = \frac{\frac{2t}{5} + \frac{1}{5}}{\frac{1}{10} + \frac{10t}{10}} = \frac{\frac{2t+1}{5}}{\frac{1+10t}{10}} = \frac{\cancel{10}^2 \cdot (2t+1)}{\cancel{5}^1 \cdot (1+10t)} = \underline{\frac{2 \cdot (2t+1)}{1+10t}}$$

$$1 + 10t = 0$$

$$10t = -1$$

$$t = -\frac{1}{10}$$

Gleichungen

eindeutige Lösung: $x = \dots$ $L = \{\dots\}$

allgemeingültig: $0=0$ $L = \mathbb{R}$

unlösbar: $0=1$ $L = \emptyset$

4. f) $3 \cdot \frac{x-3}{4} = \frac{13}{18} - x \quad | \cdot 2$

$$3 \cdot \frac{x-3}{4} = 2 \left(\frac{13}{18} - x \right)$$

$$3 \cdot \frac{x-3}{4} = \frac{13}{9} - 2x \quad | \cdot 4$$

$$3(x-3) = \frac{52}{9} - 8x$$

$$3x - 9 = \frac{52}{9} - 8x \quad | +8x$$

$$11x - 9 = \frac{52}{9} \quad | +9$$

$$11x = \frac{52}{9} + 9$$

$$11x = \frac{52+81}{9}$$

$$11x = \frac{133}{9} \quad | :11$$

$$x = \frac{\frac{133}{9}}{\frac{11}{1}}$$

$$\underline{x = \frac{133}{99}}$$

5. e) $\frac{2}{x-3} = \frac{1}{x+1} \quad | \cdot (x-3) \quad | \cdot (x+1) \quad D = \mathbb{R} \setminus \{3, -1\}$

$$2(x+1) = x-3$$

$$2x+2 = x-3 \quad | -x \quad | -2$$

$$\underline{x = -5}$$

$$6. c) \frac{1}{3-x} + \frac{1}{3+x} = \frac{6}{9-x^2} \quad \left| \begin{array}{l} \cdot (3-x) \\ \cdot (3+x) \end{array} \right. \quad D = \mathbb{R} \setminus \{3, -3\}$$

$$3+x + 3-x = 6$$

$$6 = 6$$

$$L = \mathbb{R} \setminus \{3, -3\}$$

$$1. N.: 3-x$$

$$2. N.: 3+x$$

$$3. N.: 9-x^2 = (3-x)(3+x)$$

$$9. n) r = \frac{a \cdot b \cdot c}{4A} \quad | \cdot 4A \quad a = ?$$

$$r \cdot 4A = a \cdot b \cdot c \quad | : b \quad | : c$$

$$a = \frac{r \cdot 4A}{b \cdot c}$$

$$r = \frac{a \cdot b \cdot c}{4A}$$

$$| \cdot 4A \quad A = ?$$

$$r \cdot 4A = a \cdot b \cdot c$$

$$| : 4r$$

$$A = \frac{a \cdot b \cdot c}{4r}$$

$$t) f = f_0 \cdot \frac{c}{c-v} \quad | \cdot (c-v) \quad v = ?$$

$$f \cdot (c-v) = f_0 \cdot c$$

$$f \cdot c - f \cdot v = f_0 \cdot c \quad | - f \cdot c$$

$$-f \cdot v = f_0 \cdot c - f \cdot c \quad | : (-f)$$

$$v = \frac{f_0 \cdot c - f \cdot c}{-f}$$

$$v = \frac{f \cdot c - f_0 \cdot c}{f} = \frac{c \cdot (f - f_0)}{f}$$

$$f = f_0 \cdot \frac{c}{c-v} \quad | \cdot (c-v) \quad c = ?$$

$$f \cdot (c-v) = f_0 \cdot c$$

$$f \cdot c - f \cdot v = f_0 \cdot c \quad | - f \cdot c$$

$$-f \cdot v = f_0 \cdot c - f \cdot c$$

$$-f \cdot v = c \cdot (f_0 - f) \quad | : (f_0 - f)$$

$$c = \frac{-f \cdot v}{f_0 - f} = \frac{f \cdot v}{-(f_0 - f)} = \frac{f \cdot v}{-f_0 + f} = \frac{f \cdot v}{f - f_0}$$

Maßeinheiten

$$\text{km} \quad \underbrace{\text{m}}_{1000} \quad \underbrace{\text{dm}}_{10} \quad \underbrace{\text{cm}}_{10} \quad \underbrace{\text{mm}}_{10}$$

$$\text{km}^2 \quad \underbrace{\text{m}^2}_{1000^2} \quad \underbrace{\text{dm}^2}_{10^2} \quad \underbrace{\text{cm}^2}_{10^2} \quad \underbrace{\text{mm}^2}_{10^2}$$

$$1 \text{ km}^2 = 1000^2 \text{ m}^2$$

$$\text{km}^3 \quad \underbrace{\text{m}^3}_{1000^3} \quad \underbrace{\text{dm}^3}_{10^3} \quad \underbrace{\text{cm}^3}_{10^3} \quad \underbrace{\text{mm}^3}_{10^3}$$

$$\boxed{1 \text{ l} = 1 \text{ dm}^3}$$

$$\text{t} \quad \underbrace{\text{kg}}_{1000} \quad \underbrace{\text{dag}}_{100} \quad \underbrace{\text{g}}_{10} \quad \underbrace{\text{mg}}_{1000}$$

3, 141582654 Jahre

= 3 Jahre 51,68131871 Tage

= 3 Jahre 51 Tage 16,35164804 St.

= 3 Jahre 51 Tage 16 h 21 min 6 s

Winkelmaße

(Aer-)grad $360^\circ = \text{voller Winkel}$

Grad, Bogenminute, Bogensekunde

$\underbrace{\quad}_{60}$

$\underbrace{\quad}_{60}$

$$35^\circ 41' 22'' = 35 + \frac{41}{60} + \frac{22}{60 \cdot 60} = 35,6894^\circ$$

$$\begin{array}{ccc} 3 & \text{---} & 4,5 \\ \downarrow & \nearrow & \downarrow \\ 5 & \text{---} & x \end{array}$$

$$x = \frac{5 \cdot 4,5}{3}$$

$$3:5 = 4,5:x$$

$$\frac{3}{5} = \frac{4,5}{x}$$

$$3x = 4,5 \cdot 5$$

$$x = \frac{4,5 \cdot 5}{3}$$

$$\begin{array}{ccc} 5 & \text{---} & 2 \text{ h} \\ \downarrow & & \uparrow \\ 3 & \text{---} & x \end{array}$$

$$x = \frac{5 \cdot 2}{3} = \frac{10}{3}$$

$$5:3 = x:2$$

$$\frac{5}{3} = \frac{x}{2}$$

$$x = \frac{5 \cdot 2}{3}$$

$$6. \quad 5 \mu \dots \dots 36 \text{ min}$$

$$6 \mu \dots \dots x$$

$$x = \frac{5 \cdot 36}{6} = 30 \text{ Minuten}$$

Prozentrechnung

pro centum = Hundertstel

$$\% = \frac{1}{100}$$

Grundwert G = 100 %

Prozentwert P

$$\text{Prozentsatz } p = \frac{P}{G}$$

Rechnung 120 €, Skonto 2%

$$\text{Skonto: } 120 \cdot 2\% = 120 \cdot 0,02 = 2,4$$

$$120 \cdot 1 - 120 \cdot 0,02 = 120 \cdot (1 - 0,02)$$

$$= 120 \cdot 0,98$$

1.164 Zahlungseingang (3% Skonto abgezogen)

$$\begin{array}{r} 1.164 \dots \dots 97\% \\ - x \dots \dots 100\% \end{array}$$

$$x = \frac{1.164}{0,97}$$

$$\text{Skonto: } \frac{1.164}{0,97} \cdot 0,03$$

1.440 € 20% USt

$$\rightarrow \text{Netto} = 1.200$$

$$\begin{array}{r} 1.440 \dots \dots 120\% \\ x \dots \dots 100\% \\ \hline 1.440 \cdot \frac{100}{120} \end{array}$$

$$500 \overset{\text{w/o}}{+} 13\% \text{ USt} = \underset{\text{Glos}}{500} + \underset{\text{USt}}{500 \cdot 0,13} = 500 \cdot (1 + 0,13) = 500 \cdot 1,13$$

↳ Wachstumsfaktor

$$1440 \overset{20\%}{\text{bto}} \rightarrow \text{USt?}$$

↖
:6

$$1200 \overset{20\%}{\text{w/o}} \rightarrow \text{USt?}$$

↖
:5

$$\begin{array}{r} 1440 \dots 120\% \\ x \dots 20\% \\ \hline x = 1440 \cdot \frac{20}{120} \end{array}$$

$$\begin{array}{r} 1200 \dots 100\% \\ x \dots 20\% \\ \hline x = 1200 \cdot \frac{20}{100} \end{array}$$

$$1100 \overset{\text{bto } 10\%}{\rightarrow} \text{USt?}$$

↖
:11

$$1000 \overset{\text{w/o } 10\%}{\rightarrow} \text{USt?}$$

↖
:10

$$\begin{array}{r} 1100 \dots 110\% \\ x \dots 10\% \\ \hline x = 1100 \cdot \frac{10}{110} \end{array}$$

$$\begin{array}{r} 1000 \dots 100\% \\ x \dots 10\% \\ \hline x = 1000 \cdot \frac{10}{100} \end{array}$$

$$\begin{array}{r} 1130 \dots 113\% \\ x \dots 13\% \\ \hline x = 1130 \cdot \frac{13}{113} \end{array}$$

WF	WR
1,2	20%
1,005	0,5%
0,97	-3%

WT-Faktor = erhöhter Betrag

WT-Rate = Betrag um den es sich erhöht

$$1 + (-0,03) = 1 - 0,03 = 0,97$$