



# Lösungen

## Thema: Gleichungen und Formeln umstellen – Seite 1

### Gleichungen:

1. a)  $x = 44 - 17 = 27$ ;  $x = 27 + 5 = 32$ ;      b)  $3x = 12 \Rightarrow x = 4$ ;  $7x = 14 \Rightarrow x = 2$   
 c)  $2x = 2 \Rightarrow x = 1$ ;  $5x = -15 \Rightarrow x = -3$
2. a)  $3y = 45 \Rightarrow y = 15$ ;  $5y = 13 \cdot 15 \Rightarrow y = 39$   
 b)  $\frac{3y}{1} = \frac{5}{4} \Rightarrow y = \frac{5}{12}$ ;  $y = \frac{5}{4}$ ;      c)  $\frac{5y}{3} = \frac{7}{2} \Rightarrow y = \frac{21}{10}$ ;  $\frac{4y}{3} = \frac{2}{5} \Rightarrow y = \frac{3}{10}$
3. a)  $x + 7 = 10 \Rightarrow x = 3$ ;  $8 - x = 6 \Rightarrow x = 2$   
 b)  $5x + 4 = 24 \Rightarrow x = 4$ ;  $\frac{7 + 2x}{5} = 7 \Rightarrow 7 + 2x = 35 \Rightarrow x = 14$   
 c)  $\frac{2}{5} = \frac{2x + 3}{6} \Rightarrow 12 = 10x + 15 \Rightarrow x = -\frac{3}{10}$ ;  $\frac{5}{3} = \frac{7 - 2x}{5} \Rightarrow 25 = 21 - 6x \Rightarrow x = -\frac{2}{3}$
4. a)  $z^2 = 16 \Rightarrow z = \pm 4$ ;  $\frac{4z^2}{9} = 16 \Rightarrow z = \pm 6$   
 b)  $z^2 = 25 \Rightarrow z = \pm 5$ ;  $\frac{4z^2}{3} = 27 \Rightarrow z = \pm \frac{9}{2}$   
 c)  $75z^2 = 180 \Rightarrow 5z^2 = 12 \Rightarrow z = \pm \sqrt{\frac{12}{5}}$ ;  $\frac{3}{4z} = \frac{z}{3} \Rightarrow z = \pm \frac{3}{2}$
5. a)  $\frac{1}{x} = \frac{2 + 3}{6} \Rightarrow x = \frac{6}{5}$ ;  $\frac{1}{y} = \frac{1 + 2}{6} \Rightarrow y = 2$   
 b)  $\frac{1}{y} = \frac{6 + 4}{15} \Rightarrow y = \frac{3}{2}$ ;  $\frac{1}{x} = \frac{10 - 9}{24} \Rightarrow x = 24$   
 c)  $\frac{2}{z} = \frac{5 - 3}{15} \Rightarrow z = 15$ ;  $\frac{11}{z} = \frac{15 - 4}{10} \Rightarrow z = 10$   
 d)  $\frac{1}{x} = \frac{1}{5} - \frac{1}{4} = -\frac{1}{20} \Rightarrow x = -20$ ;  $\frac{1}{x} = \frac{1}{10} - \frac{1}{5} = -\frac{1}{10} \Rightarrow x = -10$   
 e)  $\frac{1}{x} = \frac{1}{3} - \frac{1}{6} = \frac{1}{6} \Rightarrow x = 6$ ;  $\frac{1}{x} = \frac{1}{7} - \frac{1}{2} = -\frac{5}{14} \Rightarrow x = -\frac{14}{5}$   
 f)  $\frac{3}{2x} = \frac{2}{5} - \frac{3}{10} = \frac{1}{10} \Rightarrow x = 15$ ;  $\frac{4}{5x} = \frac{2}{5} - \frac{5}{4} = -\frac{17}{20} \Rightarrow x = -\frac{16}{17}$
6. a)  $36 - 15z = 100 - 25z \Rightarrow 10z = 64 \Rightarrow z = 6,4$   
 b)  $5z + 105 = 63 - 9z \Rightarrow 14z = -42 \Rightarrow z = -3$   
 c)  $5z + 120 = 126 - 7z \Rightarrow 12z = 6 \Rightarrow z = 0,5$
7. a)  $x^2 = 16 \Rightarrow x = \pm 4$ ;      b)  $x^2 = 100 \Rightarrow x = \pm 10$   
 c)  $4x^2 = 64 \Rightarrow x^2 = 16 \Rightarrow x = \pm 4$ ;      d)  $27x^2 = 12 \Rightarrow 9x^2 = 4 \Rightarrow x = \pm \frac{2}{3}$
8. a)  $x = \ln 50 = 3,91$ ;  $x = \ln 5 = 1,609$ ;      b)  $x = \ln 2 = 0,693$ ;  $x = \ln 0,2 = -1,61$   
 c)  $x = \ln 10 = 2,30$ ;  $2x = \ln 10 \Rightarrow x = 0,5 \cdot \ln 10 = 1,15$   
 d)  $0,2x = \ln 8 \Rightarrow x = 5 \cdot \ln 8 = 10,4$ ;  $0,4x = \ln 8 \Rightarrow x = 2,5 \cdot \ln 8 = 5,20$
9. a)  $-x = \ln 4 \Rightarrow x = -\ln 4 = -1,39$ ;  $-x = \ln 16 \Rightarrow x = -\ln 16 = -2,77$   
 b)  $-x/2 = \ln 3 \Rightarrow x = -2 \cdot \ln 3 = -2,20$ ;  $-x/2 = \ln 9 \Rightarrow x = -2 \cdot \ln 9 = -4,39$   
 c)  $2 = 4 \cdot (1 - e^{-x/8}) \Rightarrow 1 - e^{-x/8} = 0,5 \Rightarrow -x/8 = \ln 0,5 \Rightarrow x = 5,55$   
 d)  $6,3 = 10 \cdot (1 - e^{-x/3}) \Rightarrow 1 - e^{-x/3} = 0,63 \Rightarrow -x/3 = \ln 0,37 \Rightarrow x = 2,98$



# Lösungen

## Thema: Gleichungen und Formeln umstellen – Seite 2

Formeln:

1. a)  $v = \frac{P}{F}$       b)  $F = \frac{M}{r}$       c)  $P = \frac{W}{t}$       d)  $R = \frac{U}{I}$   
e)  $v = \frac{s}{t}$       f)  $\omega = \frac{P}{M}$       g)  $\varrho = \frac{m}{V}$       h)  $d = \frac{u}{\pi}$
2. a)  $h = \frac{V}{l \cdot b}$       b)  $n = \frac{v}{d \cdot \pi}$       c)  $B = \frac{U}{v \cdot l}$       d)  $L = \frac{x_L}{2\pi \cdot f}$
3. a)  $U_2 = U - U_1$       b)  $U_0 = U + U_i$       c)  $t_0 = t_1 - \Delta t$       d)  $R_i = R - R_v$
4. a)  $Q = I \cdot t$       b)  $U = R \cdot I$       c)  $P_1 = \frac{P_2}{\eta}$       d)  $F = \frac{P \cdot t}{s}$   
e)  $A = \frac{l}{\gamma \cdot R}$       f)  $Q = \frac{F \cdot s}{U}$       g)  $R = \frac{\omega \cdot L}{Q}$       h)  $A = \frac{2I \cdot l}{\gamma \cdot \Delta U}$
5. a)  $U = \sqrt{\frac{2 \cdot W}{C}}$       b)  $L = \frac{U^2}{\omega \cdot Q_{bL}}$       c)  $I = \sqrt{\frac{Q}{X}}$       d)  $U = \sqrt{\frac{Q_{bC}}{\omega \cdot C}}$
6. a)  $X_L = \sqrt{Z^2 - R^2}$       b)  $L = \frac{T^2}{4\pi^2 \cdot C}$       c)  $I_{bL} = \sqrt{I^2 - I_w^2}$
7. a)  $R_i = \frac{U_0 - U}{I}$       b)  $n = \frac{R_v + R_m}{R_m}$       c)  $F_1 = \frac{F_2 \cdot v - P}{v}$
8. a)  $C_1 = \frac{C_2 \cdot C}{C_2 - C}$       b)  $R_1 = \frac{R_2 \cdot R}{R_2 - R}$       c)  $R_1 = \frac{(U - U_2) \cdot R_2}{U_2}$   
d)  $R_m = R_p \cdot (n - 1)$       e)  $U = U_0 - R_i \cdot I$       f)  $U = \frac{U_{20} \cdot (R_1 + R_2)}{R_2}$
9. a)  $e^{t/\tau} = \frac{U_0}{u_c} \Rightarrow t = \tau \cdot \ln\left(\frac{U_0}{u_c}\right)$       b)  $\frac{I_0}{i_L} = e^{t/\tau} \Rightarrow \tau = \frac{t}{\ln(I_0/i_L)}$   
c)  $I_0 \cdot e^{-t/\tau} = I_0 - i_L \Rightarrow e^{t/\tau} = \frac{I_0}{I_0 - i_L} \Rightarrow t/\tau = \ln\left(\frac{I_0}{I_0 - i_L}\right) \Rightarrow t = \tau \cdot \ln\left(\frac{I_0}{I_0 - i_L}\right)$