2. Bez Gleichungen Lösungen AB 1

1. a)

$$\begin{aligned} 29 - 7 - 3x &= 31 \\ 22 - 3x &= 31 && / +3x \\ 22 &= 3x + 31 && / -31 \\ -9 &= 3x && / :3 \\ \underline{\underline{-3 &= x}} \end{aligned}$$

b)

$$\begin{aligned} 9x &= 13 + (6x - 13) \\ 9x &= 13 + 6x - 13 \\ 9x &= 6x && / -6x \\ 3x &= 0 && / :3 \\ \underline{\underline{x &= 0}} \end{aligned}$$

c)

$$\begin{aligned} 3\,(y - 2) &= 4\,(y - 3) \\ 3y - 6 &= 4y - 12 && / -3y \\ -6 &= y - 12 && / +12 \\ \underline{\underline{6 &= y}} \end{aligned}$$

d)

$$\begin{aligned} 8x - (3x + 5) + (2x + 7) - (5x - 9) &= 1 \\ 8x - 3x - 5 + 2x + 7 - 5x + 9 &= 1 \\ 2x + 11 &= 1 && / -11 \\ 2x &= -10 && / :2 \\ \underline{\underline{x &= -5}} \end{aligned}$$

e)

$$\begin{aligned} 38x - (103 + 7x) + (49 - 26x) &= 73 - (51x - 69) \\ 38x - 103 - 7x + 49 - 26x &= 73 - 51x + 69 \\ 5x - 54 &= 142 - 51x && / +51x \\ 56x - 54 &= 142 && / +54 \\ 56x &= 196 && / :56 \\ \underline{\underline{x &= 3{,}5}} \end{aligned}$$

f)

$$\begin{aligned} 7\,(z + 1) &= 6z - 5 \\ 7z + 7 &= 6z - 5 && / -6z \\ z + 7 &= -5 && / -7 \\ \underline{\underline{z &= -12}} \end{aligned}$$

g) $3(x-7)-(20+2x) = 1$

$3x-21-20-2x = 1$

$x-41 = 1 \quad / +41$

$\underline{\underline{x = 42}}$

h) $5(2-3x)-9x+5(3x-14)+7 = 1$

$10-15x-9x+15x-70+7 = 1$

$-9x-53 = 1 \quad / +53$

$-9x = 54 \quad / :(-9)$

$\underline{\underline{x = -6}}$

2. a) $4(3x-1)+3(x-2) = 5(6x-8)$

$12x-4+3x-6 = 30x-40$

$15x-10 = 30x-40 \quad / -15x$

$-10 = 15x-40 \quad / +40$

$30 = 15x$

$\underline{\underline{2 = x}}$

b) $5(4-x)-3(x-2)+12-6(5-x) = 0$

$20-5x-3x+6+12-30+6x = 0$

$-2x+8 = 0 \quad / +2x$

$8 = 2x \quad / :2$

$\underline{\underline{4 = x}}$

c) $50-2(y+21) = 56-2(3y+4)$

$50-2y-42 = 56-6y-8$

$-2y+8 = -6y+48 \quad / +6y$

$4y+8 = 40 \quad / -8$

$4y = 40 \quad / :4$

$\underline{\underline{y = 10}}$

d) $184-6(z-24)-213+2(2z-7) = 1$

$184-6z+144-213+4z-14 = 1$

$-2z+101 = 1 \quad / +2z$

$101 = 2z+1 \quad / -1$

$100 = 2z \quad / :2$

$\underline{\underline{50 = z}}$

e) $1 - 0{,}25\,(9x - 60) + 0{,}75\,(7x - 16) = 0{,}25$

$1 - 2{,}25x + 15 + 5{,}25x - 12 = 0{,}25$

$3x + 4 = 0{,}25 \quad / -4$

$3x = -3{,}75 \quad / :3$

$\underline{\underline{x = -1{,}25}}$

f) $9u + 6(u + 1) = 0{,}5\,(3 + 2u) - 6$

$9u + 6u + 6 = 1{,}5 + u - 6$

$15u + 6 = u - 4{,}5 \quad / -u$

$14u + 6 = -4{,}5 \quad / -6$

$14u = -10{,}5$

$\underline{\underline{u = -0{,}75}}$

g) $15\,(y + 1) - 4\,(y + 3) + 10\,(2 - y) - 12 = 0$

$15y + 15 - 4y - 12 + 20 - 10y - 12 = 0$

$y + 11 = 0 \quad / -11$

$\underline{\underline{y = -11}}$

h) $4\,(3z - 1) + z + 15 = 11\,(z - 7) + 2$

$12z - 4 + z + 15 = 11z - 77 + 2$

$13z + 11 = 11z - 75 \quad / -11z$

$2z + 11 = -75 \quad / -11$

$2z = -86 \quad / :2$

$\underline{\underline{z = -43}}$

i) $4z\,(6z + 7) = 86 - 3z\,(5 - 8z)$

$24z^2 + 28z = 86 - 15z + 24z^2 \quad / -24z^2$

$28z = 86 - 15z \quad / +15z$

$43z = 86 \quad / :43$

$\underline{\underline{z = 2}}$

j) $22 + 3x\,(2x + 9) - 2x\,(8 + 3x) = 0$

$22 + 6x^2 + 27x - 16x - 6x^2 = 0$

$11x + 22 = 0 \quad / -22$

$11x = -22 \quad / :11$

$\underline{\underline{x = -2}}$

3. a)

$$\begin{aligned} 15\,(t-3)+9-t &= 13\,(t-2)+t-10 \\ 15t-45+9-t &= 13t-26+t-10 \\ 14t-36 &= 14t-36 \quad \textit{(stimmt immer)} \\ \underline{\underline{L=\mathbb{Q}}} &\quad \textit{(alle Zahlen)} \end{aligned}$$

b)

$$\begin{aligned} -0{,}5x-7{,}5\,(3x+1)+3\,(2x-9)-7 &= 9{,}5-17x \\ -0{,}5x-22{,}5x-7{,}5+6x-27-7 &= 9{,}5-17x \\ -17x-41{,}5 &= 9{,}5-17x \quad / +17x \\ -41{,}5 &= 9{,}5 \quad \textit{(stimmt nie)} \\ \underline{\underline{L=\{\}}} &\quad \textit{(leere Menge)} \end{aligned}$$

c)

$$\begin{aligned} 2x-1 &= 12\,(x+1)-25\,(x-3)+15\,(x-3)-43 \\ 2x-1 &= 12x+12-25x+75+15x-45-43 \\ 2x-1 &= 2x-1 \quad \textit{(stimmt immer)} \\ \underline{\underline{L=\mathbb{Q}}} &\quad \textit{(alle Zahlen)} \end{aligned}$$

4. a)

$$\begin{aligned} 21-x-(3x-2\,(x-1)) &= 1 \\ 21-x-(3x-2x+2) &= 1 \\ 21-x-3x+2x-2 &= 1 \\ -2x+19 &= 1 \quad / +2x \\ 19 &= 2x+1 \quad / -1 \\ 18 &= 2x \quad / :2 \\ \underline{\underline{9 = x}} & \end{aligned}$$

b)

$$\begin{aligned} 9-9x+2\,(x-3\,(2-x))+x &= 0 \\ 9-9x+2\,(x-6+3x)+x &= 0 \\ 9-9x+2x-12+6x+x &= 0 \\ -3 &= 0 \quad \textit{(stimmt nie)} \\ \underline{\underline{L=\{\}}} &\quad \textit{(leere Menge)} \end{aligned}$$

c)

$$\begin{aligned} 3+3y-(3y-2(y-5)) &= -1 \\ 3+3y-(3y-2y+10) &= -1 \\ 3+3y-3y+2y-10 &= -1 \\ 2y-7 &= -1 \quad / +7 \\ 2y &= 6 \\ \underline{\underline{y = 3}} & \end{aligned}$$

d)

$$\begin{aligned} 5\,(3y-2\,(2y+5))+y+28 &= 0 \\ 5\,(3y-4y-10)+y+28 &= 0 \\ 15y-20y-50+y+28 &= 0 \\ -4y-22 &= 0 \quad / +4y \\ -22 &= 4y \quad / :4 \\ \underline{\underline{-5{,}5 = y}} & \end{aligned}$$