

Aufgabe 8

a)

$$3x + 4y = 7$$

$$x - 4y = 1$$

Additionsverfahren:

$$(3x + 4y) + (x - 4y) = 7 + 1$$

$$3x + 4y + x - 4y = 8$$

$$4x = 8 \quad | : 4$$

$$x = 2$$

$$2 - 4y = 1 \quad | - 2$$

$$-4y = -1 \quad | : (-4)y = \frac{1}{4}$$

Die Lösung lautet

$$x = 2, \quad y = \frac{1}{4}$$

b)

$$a + b = 5$$

$$b = a - 4$$

Einsetzungsverfahren:

$$a + (a - 4) = 5$$

$$a + a - 4 = 5$$

$$2a - 4 = 5 \quad | + 4$$

$$2a = 9 \quad | : 2$$

$$a = \frac{9}{2} = 4\frac{1}{2}$$

$$b = 4\frac{1}{2} - 4 = \frac{1}{2}$$

Die Lösung lautet

$$a = 4\frac{1}{2}, \quad b = \frac{1}{2}$$

c)

$$y = x - 3$$

$$4x + 3 = y$$

Gleichsetzungsverfahren:

$$x - 3 = 4x + 3 \quad | + 3$$

$$x = 4x + 6 \quad | - 4x$$

$$-3x = 6 \quad | : (-3)$$

$$x = -2$$

$$y = -2 - 3 = -5$$

Die Lösung lautet

$$x = -2, \quad y = -5$$

d)

$$2m - 3n = -2$$

$$5m - 2n = 4$$

Additionsverfahren:

$$2m - 3n = -2 \quad | \cdot 2$$

$$5m - 2n = 4 \quad | \cdot 3$$

Wir erhalten:

$$\begin{array}{r} 4m - 6n = -4 \\ 15m - 6n = 12 \end{array} \quad | \cdot (-1)$$

Also:

$$\begin{array}{r} -4m + 6n = 4 \\ 15m - 6n = 12 \end{array}$$

Und damit:

$$\begin{array}{r} (-4m + 6n) + (15m - 6n) = 4 + 12 \\ -4m + 6n + 15m - 6n = 16 \\ 11m = 16 \end{array} \quad | : 11$$
$$m = \frac{16}{11} = 1\frac{5}{11}$$

$$\begin{array}{r} 2 \cdot \frac{16}{11} - 3n = -2 \\ \frac{32}{11} - 3n = -2 \end{array} \quad | - \frac{32}{11}$$
$$\begin{array}{r} -3n = -\frac{54}{11} \\ n = \frac{18}{11} = 1\frac{7}{11} \end{array} \quad | : (-3)$$

Die Lösung lautet

$$m = 1\frac{5}{11}, \quad n = 1\frac{7}{11}$$

e)

$$\begin{array}{r} 3u + 4v = 10 \\ 3u - v = 5 \end{array}$$

Additionsverfahren:

$$\begin{array}{r} 3u + 4v = 10 \\ 3u - v = 5 \end{array} \quad | \cdot (-1)$$

Wir erhalten:

$$\begin{array}{r} -3u - 4v = -10 \\ 3u - v = 5 \end{array}$$

Also:

$$\begin{array}{r} (-3u - 4v) + (3u - v) = -10 + 5 \\ -3u - 4v + 3u - v = -5 \\ -5v = -5 \quad | : (-5) \\ v = 1 \\ \\ 3u - 1 = 5 \quad | +1 \\ 3u = 6 \quad | : 3 \\ u = 2 \end{array}$$

Die Lösung lautet

$$u = 2, \quad v = 1$$

f)

$$\begin{array}{r} 7y + z = 3 \\ 2y - z = 1 \end{array}$$

Additionsverfahren:

$$\begin{array}{r} (7y + z) + (2y - z) = 3 + 1 \\ 7y + z + 2y - z = 4 \\ 9y = 4 \quad | : 9 \\ y = \frac{4}{9} \end{array}$$

$$\begin{aligned}
 2 \cdot \frac{4}{9} - z &= 1 \\
 \frac{8}{9} - z &= 1 && | - \frac{8}{9} \\
 -z &= \frac{1}{9} && | \cdot (-1) \\
 z &= -\frac{1}{9}
 \end{aligned}$$

Die Lösung lautet

$$y = \frac{4}{9}, \quad z = -\frac{1}{9}$$

g)

$$\begin{aligned}
 7y + z &= 3 \\
 z &= 2y - 15
 \end{aligned}$$

Einsetzungsverfahren:

$$\begin{aligned}
 7y + (2y - 15) &= 3 \\
 7y + 2y - 15 &= 3 \\
 9y - 15 &= 3 && | + 15 \\
 9y &= 18 && | : 9 \\
 y &= 2
 \end{aligned}$$

$$z = 2 \cdot 2 - 15 = 4 - 15 = -11$$

Die Lösung lautet

$$y = 2, \quad z = -11$$

h)

$$\begin{aligned}
 x - y &= 9 \\
 x + y &= 11
 \end{aligned}$$

Additionsverfahren:

$$(x - y) + (x + y) = 9 + 11$$

$$x - y + x + y = 20$$

$$2x = 20$$

| : 2

$$x = 10$$

$$10 - y = 9$$

| - 9

$$1 - y = 0$$

| + y

$$1 = y$$

Die Lösung lautet

$$x = 10, \quad y = 1$$