

Arithmetik – Quadratische Gleichungen mit einer Variablen

Lösungsblatt 1

Lösen Sie folgende Gleichungen über die Grundmenge $G = \mathbb{R}$!

$\begin{aligned} x^2 + 10x - 144 &= 0 & + 144 \\ x^2 + 10x &= 144 & + 25 \\ x^2 + 10x + 25 &= 169 \\ (x + 5)^2 &= 169 & \sqrt{} \\ x + 5 &= \pm 13 & - 5 \\ x_1 &= + 8 \\ x_2 &= - 18 \\ \mathbf{L} &= \{-18, + 8\} \end{aligned}$	$\begin{aligned} x^2 - 10x - 24 &= 0 & + 24 \\ x^2 - 10x &= 24 & + 25 \\ x^2 - 10x + 25 &= 49 \\ (x - 5)^2 &= 49 & \sqrt{} \\ x - 5 &= \pm 7 & + 5 \\ x_1 &= + 12 \\ x_2 &= - 2 \\ \mathbf{L} &= \{-2, + 12\} \end{aligned}$	$\begin{aligned} x^2 - 6x - 16 &= 0 & + 16 \\ x^2 - 6x &= 16 & + 9 \\ x^2 - 6x + 9 &= 25 \\ (x - 3)^2 &= 25 & \sqrt{} \\ x - 3 &= \pm 5 & + 3 \\ x_1 &= + 8 \\ x_2 &= - 2 \\ \mathbf{L} &= \{-2, + 8\} \end{aligned}$
$\begin{aligned} 2x^2 + 5x - 3 &= 0 \\ x_{1,2} &= \frac{-5 \pm \sqrt{(5)^2 - 4 \cdot 2 \cdot (-3)}}{2 \cdot 2} \\ x_{1,2} &= \frac{-5 \pm \sqrt{25 + 24}}{4} \\ x_{1,2} &= \frac{-5 \pm \sqrt{49}}{4} \\ x_{1,2} &= \frac{-5 \pm 7}{4} \\ x_1 &= \frac{-5 + 7}{4}; x_1 = \frac{+2}{4}; x_1 = + \frac{1}{2}; \\ x_2 &= \frac{-5 - 7}{4}; x_2 = \frac{-12}{4}; x_2 = - 3; \\ \mathbf{L} &= \{-3, + \frac{1}{2}\} \end{aligned}$	$\begin{aligned} (x - 3)^2 + x^2 - 9 &= 0 \\ x^2 - 6x + 9 + x^2 - 9 &= 0 \\ 2x^2 - 6x &= 0 & : 2 \\ x^2 - 3x &= 0 \\ x \cdot (x - 3) &= 0 \\ x_1 &= 0 \\ x_2 - 3 &= 0 & + 3 \\ x_2 &= + 3 \\ \mathbf{L} &= \{0, + 3\} \end{aligned}$	$\begin{aligned} x^2 + 6x - 16 &= 0 & + 16 \\ x^2 + 6x &= 16 & + 9 \\ x^2 + 6x + 9 &= 25 \\ (x + 3)^2 &= 25 & \sqrt{} \\ x + 3 &= \pm 5 & - 3 \\ x_1 &= + 2 \\ x_2 &= - 8 \\ \mathbf{L} &= \{-8, + 2\} \end{aligned}$
$\begin{aligned} (x - 4)^2 + 3 &= (3x - 13)^2 \\ x^2 - 8x + 16 + 3 &= 9x^2 - 78x + 169 & -(x^2 - 8x + 16 + 3) \\ 8x^2 - 70x + 150 &= 0 & : 2 \\ 4x^2 - 35x + 75 &= 0 \\ x_{1,2} &= \frac{35 \pm \sqrt{(35)^2 - 4 \cdot 4 \cdot 75}}{2 \cdot 4} \\ x_{1,2} &= \frac{35 \pm \sqrt{1225 - 600}}{8} \\ x_{1,2} &= \frac{35 \pm \sqrt{625}}{8} \\ x_{1,2} &= \frac{35 \pm 25}{8} \\ x_1 &= \frac{35 + 25}{8}; x_1 = \frac{60}{8}; x_1 = \frac{30}{4}; x_1 = + 7 \frac{1}{2}; \\ x_2 &= \frac{35 - 25}{8}; x_2 = \frac{10}{8}; x_2 = \frac{5}{4}; x_2 = + 1 \frac{1}{4}; \\ \mathbf{L} &= \{+ 1 \frac{1}{4}; + 7 \frac{1}{2}\} \end{aligned}$	$\begin{aligned} (3x - 5) \cdot (2x + 3) - (4x + 5) \cdot (x - 6) &= 35 \\ (6x^2 - 10x + 9x - 15) - (4x^2 + 5x - 24x - 30) &= 35 \\ 6x^2 - x - 15 - 4x^2 + 19x + 30 &= 35 \\ 2x^2 + 18x - 20 &= 0 & : 2 \\ x^2 + 9x - 10 &= 0 \\ x_{1,2} &= \frac{-9}{2} \pm \sqrt{\left(\frac{9}{2}\right)^2 + 10} \\ x_{1,2} &= - \frac{9}{2} \pm \sqrt{\frac{81}{4} + \frac{40}{4}} \\ x_{1,2} &= - \frac{9}{2} \pm \sqrt{\frac{121}{4}}; x_{1,2} = - \frac{9}{2} \pm \frac{11}{2}; \\ x_1 &= - \frac{9}{2} + \frac{11}{2}; x_1 = + \frac{2}{2}; x_1 = + 1; \\ x_2 &= - \frac{9}{2} - \frac{11}{2}; x_2 = - \frac{20}{2}; x_2 = - 10; \\ \mathbf{L} &= \{-10, + 1\} \end{aligned}$	