9 Gleichungen

9.21 Übungen Frommenwiler (noch korrigieren)

328. b) $\left(r-\frac{s}{1+x}\right)(p+q)=\left(r+\frac{s}{1+x}\right)(p-q)$

$D=\mathbf{R}\setminus\{-1\}$

$\left(r-\frac{s}{1+x}\right)(p+q)=\left(r+\frac{s}{1+x}\right)(p-q) \quad |\cdot(1+x)$

$\left[r(1+x)-s\right](p+q)=\left[r(1+x)+s\right](p-q) \quad |\text{ausmulti.}$

$r(1+x)(p+q)-s(p+q)=r(1+x)(p-q)+s(p-q) \quad |\text{TU}$

$r(1+x)(p+q)-r(1+x)(p-q)=s(p-q)+s(p+q)$

$r(1+x)[p+q-p+q]=s(p-q+p+q)$

$r(1+x)(2q)=2ps \quad |:(2qr)$

$1+x=\frac{2ps}{2qr}=\frac{ps}{qr} \quad |-1$

$x=\underline{\frac{ps}{qr}}-1\in D \quad \underline{q\neq 0} \quad \wedge \quad \underline{r\neq 0}$

$L=\left\{x\in\mathbf{R}\,\middle|\,x=\frac{ps}{qr}-1\right\}$

d) $\frac{a-\frac{1}{x}}{a+\frac{1}{x}}-\frac{x-\frac{1}{a}}{x+\frac{1}{a}}=0$

$\underline{x\neq 0} \quad \wedge \quad a+\frac{1}{x}\neq 0\rightarrow \frac{1}{x}\neq -a\rightarrow \underline{x\neq -\frac{1}{a}} \quad \wedge \quad x+\frac{1}{a}\neq 0\rightarrow \underline{x\neq -\frac{1}{a}}$

$D=\mathbf{R}\setminus\left\{-\frac{1}{a};0\right\}$

$$\frac{a-\frac{1}{x}}{a+\frac{1}{x}}\cdot\frac{x}{x}-\frac{x-\frac{1}{a}}{x+\frac{1}{a}}\cdot\frac{a}{a}=0 \qquad |\text{Brüche weg}$$

$$\frac{ax-1}{ax+1}-\frac{ax-1}{ax+1}=0 \qquad |\cdot(ax+1)$$

$$ax-1-ax+1=0$$

$$0=0\,(w)$$

$$L=D=\mathbf{R}\setminus\left\{-\frac{1}{a};0\right\} \qquad \underline{a\neq 0}$$

e) $$\frac{bc}{x(a+b)}-\frac{a^2+b^2}{2b(a+b)}=\frac{c(a-b)}{2bx}-\frac{a^2x-b^2c}{bx(a+b)}$$

$\underline{x\neq 0} \quad \wedge \quad \underline{a\neq -b} \quad \wedge \quad \underline{b\neq 0}$

$$D=\mathbf{R}\setminus\{0\}$$

$$\frac{bc}{x(a+b)}\cdot\frac{2b}{2b}-\frac{a^2+b^2}{2b(a+b)}\cdot\frac{x}{x}=\frac{c(a-b)}{2bx}\cdot\frac{a+b}{a+b}-\frac{a^2x-b^2c}{bx(a+b)}\cdot\frac{2}{2} \qquad |\cdot HN$$

$$2b^2c-a^2x-b^2x=c\left(a^2-b^2\right)-2a^2x+2b^2c \qquad |+2a^2x-2b^2c$$

$$a^2x-b^2x=a^2c-b^2c \qquad |\text{faktorisieren}$$

$$x\left(a^2-b^2\right)=c\left(a^2-b^2\right) \qquad |:\left(a^2-b\right)$$

$x=\underline{c}\in D \quad \underline{a\neq b} \quad \wedge \quad \underline{a\neq -b}$

$$L=\{x\in\mathbf{R}\,|\,x=c\}$$

339. a)

340. a) $4 = 40 - 6\sqrt{y}$ $\quad |-40$

$D = \{y \in \mathbf{R} | y \geq 0\}$

$4 - 40 = -6\sqrt{y}$ $\quad |:(-6)$

$\frac{-36}{-6} = \sqrt{y}$ $\quad |(\ )^2$

$y = \underline{36} \in D$

Kontrolle: $4 = \underbrace{40 - 6\sqrt{36}}_{4}$ $\quad$ (w)

somit: $L = \underline{\underline{\{36\}}}$

b) $4 + \sqrt{100z} = 24$ $\quad |-4$

$D = \{z \in \mathbf{R} | z \geq 0\}$

$\sqrt{100z} = 20$ $\quad |:(\ )^2$

$100z = 400$ $\quad |:100$

$z = \underline{4} \in D$

Kontrolle: $4 + \underbrace{\sqrt{100 \cdot 4}}_{10 \cdot 2} = 24$ $\quad$ (w)

somit: $L = \underline{\underline{\{4\}}}$

c) $21 = 6 + 3\sqrt{-u}$ $\quad |-6$

$D = \{u \in \mathbf{R} | u \leq 0\}$

$15 = 3\sqrt{-u}$ $\quad |:3$

$5 = \sqrt{-u}$ $\quad |(\ )^2$

$25 = -u$

$u = \underline{-25} \in D$

Kontrolle: $21 = \underbrace{6 + 3\sqrt{-(-25)}}_{6+3\sqrt{25}}$ $\quad$ (w)

somit: $L = \underline{\underline{\{-25\}}}$

d) $2+2\sqrt{\frac{25}{t}}=12 \qquad |-2$

$\underset{\text{Nenner}\neq 0}{t\neq 0} \quad \wedge \quad \underset{\text{Radikand}\geq 0}{t\geq 0} \quad \rightarrow \quad D=\{t\in\mathbf{R}\,|\,t>0\}$

$2\sqrt{\frac{25}{t}}=10 \qquad |:2$

$\sqrt{\frac{25}{t}}=5 \qquad |(\;)^2$

$\frac{25}{t}=25 \qquad |\cdot t$

$25=25t \qquad |:25$

$t=\underline{1}\in D$

Kontrolle: $2+2\sqrt{\frac{25}{1}}=12 \quad (w)$

somit: $L=\underline{\underline{\{1\}}}$

e) $6.5-\sqrt{1+4w}=\frac{3}{2} \qquad \left|-\frac{3}{2}+\sqrt{1+4w}\right.$

$1+4w\geq 0 \quad \rightarrow \quad 4w\geq -1 \quad \rightarrow \quad w\geq -\frac{1}{4} \quad \rightarrow \quad D=\left\{w\in\mathbf{R}\,\middle|\,w\geq -\frac{1}{4}\right\}$

$6.5-\frac{3}{2}=\sqrt{1+4w} \qquad |(\;)^2$

$5^2=1+4w \qquad |-1$

$24=4w \qquad |:4$

$w=\underline{6}\in D$

Kontrolle: $\underbrace{6.5-\sqrt{1+4\cdot 6}}_{1.5}=\frac{3}{2} \quad (w)$

somit: $L=\underline{\underline{\{6\}}}$

f) $\sqrt{19+2\sqrt{\frac{4x+4}{x-4}}}=5$

Definitionsbereich festlegen:

Radikand ≥ 0: $\sqrt{19+2\sqrt{\frac{4x+4}{x-4}}}=5$

Fallunterscheidung: $\frac{+}{+}\geq 0$ oder $\frac{-}{-}\geq 0$

1. Fall: $\frac{+}{+}\geq 0$	2. Fall: $\frac{-}{-}\geq 0$
$4x+4\geq 0 \rightarrow x\geq -1$ $x-4 \underbrace{>}_{=0 \text{ ist verboten}} 0 \rightarrow x>4$ $\Rightarrow \underline{x>4}$	$4x+4\leq 0 \rightarrow x\leq -1$ $x-4 \underbrace{<}_{=0 \text{ ist verboten}} 0 \rightarrow x<4$ $\Rightarrow x\leq -1$

somit: $\underline{D=\left\{x\in\mathbb{R}\,\middle|\,x\leq -1 \underset{\text{oder}}{\vee} x>4\right\}}$

Lösung der Wurzelgleichung:	Kontrolle der Lösung:
$\sqrt{19+2\sqrt{\frac{4x+4}{x-4}}}=5 \quad \|(\ )^2$	$\sqrt{19+2\sqrt{\frac{4\cdot 8+4}{8-4}}}=5$
$19+2\sqrt{\frac{4x+4}{x-4}}=25 \quad \|-19$	$\sqrt{19+2\sqrt{\frac{36}{4}}}=5$
$2\sqrt{\frac{4x+4}{x-4}}=6 \quad \|:2$	$\sqrt{19+2\cdot\frac{6}{2}}=5$
$\sqrt{\frac{4x+4}{x-4}}=3 \quad \|(\ )^2$	$\sqrt{19+6}=5$
$\frac{4x+4}{x-4}=9 \quad \|\cdot(x-4)$	$\sqrt{25}=5$
$4x+4=9x-36 \quad \|-4x \quad \|+36$	$\underline{5=5} \quad (w)$
$40=5x$	somit: $L=\underline{\underline{\{8\}}}$
$x=\underline{8}\in D$	

341. a) $8-3\sqrt{2u-1}=2$

$2u-1\geq 0 \quad\rightarrow\quad u\geq\frac{1}{2} \quad\rightarrow\quad D=\left\{u\in\mathbf{R}\,\middle|\,u\geq\frac{1}{2}\right\}$

$6=3\sqrt{2u-1} \quad |:3$

$2=\sqrt{2u-1} \quad |(\ )^2$

$4=2u-1 \quad |+1$

$5=2u \quad |:2$

$u=\underline{\frac{5}{2}}\in D$

Kontrolle: $\underbrace{8-3\sqrt{2\cdot\frac{5}{2}-1}}_{2}=2 \quad (w)$

somit: $L=\underline{\underline{\left\{\frac{5}{2}\right\}}}$

b) $\sqrt{x+5}-3\sqrt{4-x}=0 \quad |+3\sqrt{4-x}$

$x+5\geq 0 \quad\wedge\quad 4-x\geq 0$

$x\geq -5 \quad\wedge\quad x\leq 4 \quad\rightarrow\quad D=\{x\in\mathbf{R}\,|\,-5\leq x\leq 4\}$

$\sqrt{x+5}=3\sqrt{4-x} \quad |(\ )^2$

$x+5=9(4-x)=36-9x \quad |+9x-5$

$10x=31 \quad |:10$

$x=\underline{3.1}\in D$

Kontrolle: $\underbrace{\sqrt{3.1+5}-3\sqrt{4-3.1}}_{0}=0 \quad (w)$

somit: $L=\underline{\underline{\{3.1\}}}$

c) $\sqrt{a^2+7a+6}-3=a \qquad |+3$

$a^2+7a+6\geq 0 \quad \rightarrow \quad (a+6)(a+1)\geq 0$

Fallunterscheidung: $(+)\cdot(+)\geq 0$ oder $(-)\cdot(-)\geq 0$

1. Fall $(+)\cdot(+)\geq 0$: $a\geq -6 \quad \wedge \quad a\geq -1 \quad \rightarrow \quad \underline{a\geq -1}$
2. Fall $(-)\cdot(-)\geq 0$: $a\leq -6 \quad \wedge \quad a\leq -1 \quad \rightarrow \quad \underline{a\leq -6}$

somit: $D=\{a\in R\geq |a\leq -6 \quad \vee \quad a\geq -1\}$

$\sqrt{a^2+7a+6}=a+3 \qquad |(\ )^2$

$\cancel{a^2}+7a+6=\cancel{a^2}+6a+9 \qquad |-6a-6$

$a=\underline{3}\in D$

Kontrolle: $\underbrace{\sqrt{3^2+7\cdot 3+6}}_{6}-3=3 \quad (w)$

somit: $L=\underline{\underline{\{3\}}}$

d) $3\sqrt{y+2}+2\sqrt{2y+11}=9\sqrt{y+2} \qquad |-3\sqrt{y+2}$

$y\geq -2 \quad \wedge \quad y\geq -\frac{11}{2} \quad \wedge \quad y\geq -2 \quad \rightarrow \quad D=\{y\in \mathbf{R}|y\geq -2\}$

$2\sqrt{2y+11}=6\sqrt{y+2} \qquad |:2$

$\sqrt{2y+11}=3\sqrt{y+2} \qquad |(\ )^2$

$2y+11=9(y+2)=9y+18 \qquad |-2y-18$

$-7=7y$

$y=\underline{-1}\in D$

Kontrolle: $\underbrace{3\sqrt{-1+2}}_{3}+\underbrace{2\sqrt{2\cdot(-1)+11}}_{6}=\underbrace{9\sqrt{-1+2}}_{9} \quad (w)$

somit: $L=\underline{\underline{\{-1\}}}$

e) $3\sqrt{3p-5}-2=\sqrt{12p-20}+2$ |faktorisieren

$3p-5\geq 0 \;\rightarrow\; 3p\geq 5 \;\rightarrow\; p\geq\frac{5}{3} \;\rightarrow\; D=\left\{p\in\mathbf{R}\,\middle|\,p\geq\frac{5}{3}\right\}$

$3\sqrt{3p-5}-2=\sqrt{4(3p-5)}+2$ |teilweise radizieren

$3\sqrt{3p-5}-2=2\sqrt{3p-5}+2$ $\left|-2\sqrt{3p-5}+2\right.$

$\sqrt{3p-5}=4$ $|(\;)^2$

$3p-5=16$ $|+5$

$3p=21$ $|:3$

$p=\underline{7}\in D$

Kontrolle: $\underbrace{3\sqrt{3\cdot 7-5}-2}_{10}=\underbrace{\sqrt{12\cdot 7-20}+2}_{10}$ (w)

somit: $L=\underline{\underline{\{7\}}}$

f) $\sqrt{n}+\sqrt{2n}=1-\sqrt{3n}$ $D=\{n\in\mathbf{R}\,|\,n\geq 0\}$

$\sqrt{n}+\sqrt{2}\sqrt{n}+\sqrt{3}\sqrt{n}=1$

$\sqrt{n}\left(1+\sqrt{2}+\sqrt{3}\right)=1$

$\sqrt{n}=\frac{1}{1+\sqrt{2}+\sqrt{3}}$ $|(\;)^2$

$n=\frac{1}{\left(1+\sqrt{2}+\sqrt{3}\right)^2}=\underline{0.0582}\in D$

Kontrolle: $\underbrace{\sqrt{0.0582}+\sqrt{2\cdot 0.0582}}_{0.5823}=\underbrace{1-\sqrt{3\cdot 0.0582}}_{0.5823}$

somit: $L=\underline{\underline{\left\{\frac{1}{\left(1+\sqrt{2}+\sqrt{3}\right)^2}\right\}}}$

342. d) $\sqrt{a-2}-\sqrt{a-10}=2\sqrt{a-7}$

$a-2\geq 0 \quad \wedge \quad a-10\geq 0 \quad \wedge \quad a-7\geq 0 \quad \rightarrow \quad D=\{a\in\mathbf{R}|a\geq 10\}$

$$\sqrt{a-2}-\sqrt{a-10}=2\sqrt{a-7} \qquad |(\ )^2$$
$$a-2-2\sqrt{(a-2)(a-10)}+a-10=4(a-7) \qquad |\text{TU}$$
$$2a-12-4a+28=2\sqrt{(a-2)(a-10)} \qquad |:2$$
$$-a+8=\sqrt{(a-2)(a-10)} \qquad |(\ )^2$$
$$64-16a+\cancel{a^2}=\cancel{a^2}-12a+20 \qquad |\text{TU}$$
$$44=4a \qquad |:4$$
$$a=\underline{11}\in D$$

Kontrolle: $\underbrace{\sqrt{11-2}-\sqrt{11-10}}_{2}\neq 2\underbrace{\sqrt{11-7}}_{4}$ (f)

somit: $L=\underline{\underline{\{\ \}}}$

e) $\sqrt{4m}-3=\dfrac{2m-17}{\sqrt{m}-1} \qquad |\cdot(\sqrt{m}-1)$

$m\geq 0 \quad \wedge \quad \sqrt{m}\neq 1 \quad \rightarrow \quad D=\{m\in\mathbf{R}|m\geq 0 \quad \wedge \quad m\neq 1\}$

$$(\sqrt{4m}-3)\cdot(\sqrt{m}-1)=2m-17 \qquad |\text{TU}$$
$$\sqrt{4m^2}-\sqrt{4m}-3\sqrt{m}+3=2m-17 \qquad |\text{TU}$$
$$2m-2\sqrt{m}-3\sqrt{m}+3=2m-17 \qquad |\text{Wurzel isolieren}$$
$$-5\sqrt{m}=-20$$
$$\sqrt{m}=4 \qquad |(\ )^2$$
$$m=\underline{16}\in D$$

Kontrolle: $\underbrace{\sqrt{4\cdot 16}-3}_{5}=\underbrace{\dfrac{2\cdot 16-17}{\sqrt{16}-1}}_{5}$ (w)

somit: $L=\underline{\underline{\{16\}}}$

f) $\frac{5}{\sqrt{u+3}} - \sqrt{u+3} = \sqrt{u-1}$ $\quad |\cdot\sqrt{u+3}$

$u > -3 \quad \wedge \quad u \geq 1 \quad \rightarrow \quad D = \{u \in \mathbf{R} | u \geq 1\}$

$5 - (u+3) = \sqrt{u-1} \cdot \sqrt{u+3}$ $\quad$ |Klammer aufl.

$2 - u = \sqrt{(u-1)(u+3)}$ $\quad |(\ )^2$

$4 - 4u + u^2 = u^2 + 2u - 3$ $\quad |-u^2 + 4u + 3$

$7 = 6u$ $\quad |:6$

$u = \underline{\frac{7}{6}} \in D$

Kontrolle: $\underbrace{\frac{5}{\sqrt{\frac{7}{6}+3}} - \sqrt{\frac{7}{6}+3}}_{\frac{1}{\sqrt{6}}} = \underbrace{\sqrt{\frac{7}{6}-1}}_{\frac{1}{\sqrt{6}}}$ (w)

somit: $L = \underline{\underline{\left\{\frac{7}{6}\right\}}}$

344. b) $D = \{x \in \mathbf{R} | x \geq 0\}$

$\sqrt{m+\sqrt{x}} = \sqrt{\frac{m+n}{2}} + \sqrt{\frac{m-n}{2}} = \frac{\sqrt{m+n} + \sqrt{m-n}}{\sqrt{2}}$ $\quad |(\ )^2$

$m + \sqrt{x} = \frac{m+n+2\cdot\sqrt{(m+n)(m-n)} + m-n}{2}$ $\quad$ |TU

$m + \sqrt{x} = \frac{2m + 2\cdot\sqrt{m^2-n^2}}{2} = \frac{\cancel{2}\left(m+\sqrt{m^2-n^2}\right)}{\cancel{2}}$ $\quad |-m$

$\sqrt{x} = \sqrt{m^2-n^2}$

$x = \underline{m^2 - n^2}$

Kontrolle: $m = 5$ und $n = 3 \rightarrow x = 5^2 - 3^2 = 25 - 9 = 16$

$\sqrt{5+\sqrt{16}} = \sqrt{\frac{5+3}{2}} + \sqrt{\frac{5-3}{2}}$

$\underbrace{\sqrt{5+4}}_{3} = \underbrace{\sqrt{4}+\sqrt{1}}_{3}$ (w)

$L = \underline{\underline{\{x \in \mathbf{R} | x = m^2 - n^2\}}}$

345. a) $\sqrt{2z+\sqrt{z+31}}+\sqrt{2z-\sqrt{z+31}}=6$

$z \geq -2.66 \quad \wedge \quad z \geq 2.91 \quad \rightarrow \quad D=\{z \in \mathbf{R} \mid z \geq 2.91\}$ mit TI-89 berech.

$\sqrt{2z+\sqrt{z+31}}+\sqrt{2z-\sqrt{z+31}}=6$ $|(\ )^2$

$2z+\cancel{\sqrt{z+31}}+\underbrace{2\sqrt{2z+\sqrt{z+31}}\sqrt{2z-\sqrt{z+31}}}_{\text{doppeltes Produkt}}+2z-\cancel{\sqrt{z+31}}=36$ |zusammenfassen

$4z+2\sqrt{4z^2-(z+31)}=36$ |Wurzel isolieren

$2\sqrt{4z^2-z-31}=36-4z$ $|:2$

$\sqrt{4z^2-z-31}=18-2z$ $|(\ )^2$

$\cancel{4z^2}-z-31=324-72z+\cancel{4z^2}$ $|+72z+31$

$71z=355$ $|:71$

$z=\underline{5} \in D$

Kontrolle: $\sqrt{2\cdot 5+\sqrt{5+31}}+\sqrt{2\cdot 5-\sqrt{5+31}}=6$

$\underbrace{\sqrt{10+\sqrt{36}}}_{4}+\underbrace{\sqrt{10-\sqrt{36}}}_{2}=6 \quad (w)$

somit: $L=\underline{\underline{\{5\}}}$

348. a) $\sqrt{x+\frac{1}{a}}+\sqrt{x-\frac{1}{a}}=\frac{2}{a}$ $D=\left\{x\in R \middle| x\geq-\frac{1}{a} \quad \wedge \quad x\geq\frac{1}{a}\right\} \quad \wedge \quad a\neq 0$

$$\sqrt{\frac{ax+1}{a}}+\sqrt{\frac{ax-1}{a}}=\frac{2}{a} \qquad |(\ )^2$$

$$\frac{ax+1}{a}+2\cdot\sqrt{\ }\cdot\sqrt{\ }+\frac{ax-1}{a}=\frac{4}{a^2} \qquad |\text{Wurzel separieren}$$

$$2\cdot\sqrt{\ }\cdot\sqrt{\ }=\frac{4}{a^2}-\left(\frac{ax+1}{a}+\frac{ax-1}{a}\right) \qquad |\text{TU}$$

$$2\cdot\sqrt{\ }\cdot\sqrt{\ }=\frac{4}{a^2}-\frac{2ax}{a}\cdot\frac{a}{a}=\frac{4-2a^2x}{a^2} \qquad |:2$$

$$\sqrt{\ }\cdot\sqrt{\ }=\frac{2-a^2x}{a^2} \qquad |(\ )^2$$

$$\frac{ax+1}{a}\cdot\frac{ax-1}{a}=\frac{4-4a^2x+a^4x^2}{a^4} \qquad |\text{ausmultiplizieren}$$

$$\frac{a^2x^2-1}{a^2}\cdot\frac{a^2}{a^2}=\frac{4-4a^2x+a^4x^2}{a^4} \qquad |\text{erweitern}, \quad \cdot a^4$$

$$\cancel{a^4x^2}-a^2=4-4a^2x\cancel{+a^4x^2}$$

$$4a^2x=4+a^2$$

$$\underline{x=\frac{a^2+4}{4a^2}}$$

Kontrolle: sei $a=2 \rightarrow x=\frac{1}{2}$

$$\underbrace{\sqrt{\frac{1}{2}+\frac{1}{2}}}_{1}+\underbrace{\sqrt{\frac{1}{2}-\frac{1}{2}}}_{0}=\underbrace{\frac{2}{2}}_{1} \qquad (w)$$

somit: $\underline{\underline{L=\left\{x \middle| x=\frac{a^2+4}{4a^2}\right\}}}$

348. b) $4\sqrt{x+2a}-2\sqrt{x+a}=\frac{4(a-3x)}{\sqrt{4(x+a)}}$ $\qquad D=\{x\in R \mid x\geq -2a \quad \wedge \quad x>-a\} \quad \wedge \quad a\neq 0$

$$4\sqrt{x+2a}-2\sqrt{x+a}=\frac{4(a-3x)}{2\sqrt{x+a}}=\frac{2(a-3x)}{\sqrt{x+a}} \qquad |\cdot\sqrt{x+a}$$

$$4\sqrt{(x+2a)(x+a)}-2\sqrt{(x+a)^2}=2(a-3x) \qquad |\text{vereinfachen}$$

$$4\sqrt{(x+2a)(x+a)}-2(x+a)=2a-6x \qquad |\text{Wurzel separieren}$$

$$4\sqrt{(x+2a)(x+a)}=2a-6x+2x+2a=4a-4x \qquad |:4$$

$$\sqrt{(x+2a)(x+a)}=a-x \qquad |(\ )^2$$

$$\cancel{x^2}+ax+2ax+2a^2=a^2-2ax\cancel{+x^2} \qquad |\text{TU}$$

$$5ax=-a^2$$

$$x=-\frac{a^2}{5a}=\underline{-\frac{a}{5}}$$

Kontrolle: sei $a=5 \quad \rightarrow \quad x=-1$

$$\underbrace{4\sqrt{-1+10}}_{12}-\underbrace{2\sqrt{-1+5}}_{4}=\frac{\overbrace{4\cdot 5-12\cdot(-1)}^{32}}{\underbrace{\sqrt{-4+20}}_{4}} \qquad (w)$$

somit: $\underline{\underline{L=\left\{x \,\middle|\, x=-\frac{a}{5}\right\}}}$