Lösungen Terme III

Ergebnisse:

E1	Ergebnisse
a)	$-\dfrac{2x-7}{2}+\dfrac{5-4x}{5}=9\left(\dfrac{1}{2}-\dfrac{1}{5}x\right)$
b)	$3kx-(3-k)x=x(4k-3)$
c)	$\dfrac{8x-2}{2}-\dfrac{3}{8}(4x-4)=\dfrac{1}{2}(5x+1)$

E2	Ergebnisse
a)	$\dfrac{1}{3}(-2x+4)-\dfrac{4x-2}{3}=-2x+2$
b)	$x^2(x-6)-2x^2(x-2)=-x^3-2x^2$
c)	$x(2-x)+5(2-x)=(2-x)(x+5)$
d)	$(-x+2)(x-3)-\left(2-\dfrac{1}{2}x\right)(x-3)=-\dfrac{1}{2}x^2+\dfrac{3}{2}x$
e)	$6ax-3ay+4bx-2by=(3a+2b)(2x-y)$
f)	$30sx-5kx-6sy+ky=(5x-y)(6s-k)$

E3	Ergebnisse
a)	$(x-5)\left(x+\dfrac{3}{2}\right)=x^2-\dfrac{7}{2}x-\dfrac{15}{2}$
b)	$\left(\dfrac{2}{3}x-2\right)(x+3)=\dfrac{2}{3}x^2-6$
c)	$\left(\dfrac{1}{2}x-\dfrac{5}{2}\right)(x+5)=\dfrac{1}{2}x^2-\dfrac{25}{2}$
d)	$\dfrac{3}{2}(x+4)(x+4)=\dfrac{3}{2}x^2+12x+24$
e)	$(3-2x)(-2x+3)=9-12x+4x^2$
f)	$\dfrac{x-5}{2}(2x+8)=x^2-x-20$

E4	Ergebnisse
a)	$(x+8)\left(\dfrac{1}{4}x+1\right)=\dfrac{1}{4}x^2+3x+8$
b)	$\left(1-\dfrac{1}{5}x\right)\left(\dfrac{2}{5}x+2\right)=-\dfrac{2}{25}x^2+2$
c)	$\dfrac{x}{2}(2x-k)^2=2x^3-2kx^2+\dfrac{k^2}{2}x$
d)	$-\dfrac{1}{8}(4-2x)^2=-2+2x-\dfrac{1}{2}x^2$
e)	$x(x+3)(2x-5)=2x^3+x^2-15x$
f)	$(x-1)^3=x^3-3x^2+3x-1$

E5	Ergebnisse
a)	$x^2+14x+49=(x+7)^2$
b)	$4x^2-8x+4=4(x-1)^2$
c)	$\dfrac{1}{2}x^2-8=\dfrac{1}{2}(x-4)(x+4)$
d)	$1-2x+x^2=(1-x)^2$
e)	$-\dfrac{1}{4}+x^2=\left(x-\dfrac{1}{2}\right)\left(x+\dfrac{1}{2}\right)$
f)	$-x^2+6x-9=-(x-3)^2$
g)	$\dfrac{1}{5}x^2+2x+5=\dfrac{1}{5}(x+5)^2$
h)	$\dfrac{1}{4}x^2-3x+9=\dfrac{1}{4}(x-6)^2$
i)	$\dfrac{x^2}{2}-kx+\dfrac{k^2}{2}=\dfrac{1}{2}(x-k)^2$

E6	Ergebnisse		
a)	$a^2-4b^2=(a-2b)(a+2b)$	b)	$4k^2-4k+1=(2k-1)^2$
c)	$25x^2-9=(5x-3)(5x+3)$	d)	$x^4+2x^2+1=\left(x^2+1\right)^2$
e)	$u^4-4u^3+4u^2=u^2(u-2)^2$	f)	$x^3-7x^2=x^2(x-7)$

E7	Ergebnisse
a)	$3\left(\dfrac{2-3k}{3}\right)^2 - 2\dfrac{2-3k}{3} = 3k^2 - 2k$
b)	$7(b+1) + 5(b+1)^2 = (5b+12)(b+1)$
c)	$(k-1)^2 - (k+1)^2 - (k^2+4) = -(k+2)^2$
d)	$(1-x)^3 + 3(1-x)(1+x)^2 = -4(x-1)(x^2+x+1)$

Ausführliche Lösungen:

A1	**Aufgabe**		
	Vereinfachen Sie.		
a)	$-\dfrac{2x-7}{2}+\dfrac{5-4x}{5}$	b) $\;3kx-(3-k)x$	c) $\;\dfrac{8x-2}{2}-\dfrac{3}{8}(4x-4)$

A1	**Ausführliche Lösung**
a)	$-\dfrac{2x-7}{2}+\dfrac{5-4x}{5}\quad HN=10$
	$-\dfrac{5(2x-7)}{5\cdot2}+\dfrac{2(5-4x)}{2\cdot5}=-\dfrac{10x-35}{10}+\dfrac{10-8x}{10}$
	$=\dfrac{-(10x-35)+10-8x}{10}=\dfrac{-10x+35+10-8x}{10}$
	$=\dfrac{-18x+45}{10}=\dfrac{9(-2x+5)}{10}=9\cdot\dfrac{5-2x}{10}=9\left(\dfrac{5}{10}-\dfrac{2x}{10}\right)=9\left(\dfrac{1}{2}-\dfrac{1}{5}x\right)$

A1	**Ausführliche Lösung**
b)	$3kx-(3-k)x=3kx-3x+kx=4kx-3x=x(4k-3)$

A1	**Ausführliche Lösung**
c)	$\dfrac{8x-2}{2}-\dfrac{3}{8}(4x-4)=\dfrac{8x-2}{2}-\dfrac{12x-12}{8}=\dfrac{8x-2}{2}-\dfrac{4(3x-3)}{8}$
	$=\dfrac{8x-2}{2}-\dfrac{3x-3}{2}=\dfrac{8x-2-(3x-3)}{2}=\dfrac{8x-2-3x+3}{2}=\dfrac{5x+1}{2}=\dfrac{1}{2}(5x+1)$

A2	**Aufgabe**		
	Vereinfachen Sie.		
a)	$\dfrac{1}{3}(-2x+4)-\dfrac{4x-2}{3}$	b)	$x^2(x-6)-2x^2(x-2)$
c)	$x(2-x)+5(2-x)$	d)	$(-x+2)(x-3)-\left(2-\dfrac{1}{2}x\right)(x-3)$
e)	$6ax-3ay+4bx-2by$	f)	$30sx-5kx-6sy+ky$

A2	**Ausführliche Lösung**
a)	$\dfrac{1}{3}(-2x+4)-\dfrac{4x-2}{3}=\dfrac{-2x+4}{3}-\dfrac{4x-2}{3}=\dfrac{-2x+4-(4x-2)}{3}$
	$=\dfrac{-2x+4-4x+2}{3}=\dfrac{-6x+6}{3}=\dfrac{3(-2x+2)}{3}=-2x+2$

A2	**Ausführliche Lösung**
b)	$x^2(x-6)-2x^2(x-2)=x^3-6x^2-2x^3+4x^2=x^3-2x^3-6x^2+4x^2=-x^3-2x^2$

A2	**Ausführliche Lösung**
c)	$x(2-x)+5(2-x)$ $(2-x)$ ausklammern
	$x(2-x)+5(2-x)=(2-x)(x+5)$

A2	**Ausführliche Lösung**
d)	$(-x+2)(x-3)-\left(2-\dfrac{1}{2}x\right)(x-3)=-x^2+3x+2x-6-\left[2x-6-\dfrac{1}{2}x^2+\dfrac{3}{2}x\right]$
	$=-x^2+5x-6-2x+6+\dfrac{1}{2}x^2-\dfrac{3}{2}x=-x^2+\dfrac{1}{2}x^2+3x-\dfrac{3}{2}x=\dfrac{1}{2}x^2+\dfrac{3}{2}x$

A2	**Ausführliche Lösung**
e)	$\underbrace{6ax-3ay}_{\text{3a ausklammern}}+\underbrace{4bx-2by}_{\text{2b ausklammern}}=\underbrace{3a(2x-y)+2b(2x-y)}_{\text{(2x−y) ausklammern}}$
	$=(2x-y)(3a+2b)=(3a+2b)(2x-y)$

A2	**Ausführliche Lösung**
f)	$30sx-5tx-6sy+ty=\underbrace{30sx-6sy}_{\text{6s ausklammern}}-\underbrace{5tx+ty}_{\text{t ausklammern}}$
	$\underbrace{6s(5x-y)-t(5x-y)}_{\text{(5x−y) ausklammern}}=(5x-y)(6s-t)$

A3	**Aufgabe**
	Multiplizieren Sie aus.

a)	$(x-5)\left(x+\dfrac{3}{2}\right)$	b)	$\left(\dfrac{2}{3}x-2\right)(x+3)$	c)	$\left(\dfrac{1}{2}x-\dfrac{5}{2}\right)(x+5)$
d)	$\dfrac{3}{2}(x+4)(x+4)$	e)	$(3-2x)(-2x+3)$	f)	$\dfrac{x-5}{2}(2x+8)$

A3	**Ausführliche Lösung**
a)	$(x-5)\left(x+\dfrac{3}{2}\right)=x^2+\dfrac{3}{2}x-5x-5\cdot\dfrac{3}{2}=x^2-\dfrac{7}{2}x-\dfrac{15}{2}$

A3	**Ausführliche Lösung**
b)	$\left(\dfrac{2}{3}x-2\right)(x+3)=\dfrac{2}{3}x^2+3\cdot\dfrac{2}{3}x-2x-6=\dfrac{2}{3}x^2+2x-2x-6=\dfrac{2}{3}x^2-6$

A3	**Ausführliche Lösung**
c)	$\left(\dfrac{1}{2}x-\dfrac{5}{2}\right)(x+5)=\dfrac{1}{2}x^2+5\cdot\dfrac{1}{2}x-\dfrac{5}{2}x-5\cdot\dfrac{5}{2}=\dfrac{1}{2}x^2+\dfrac{5}{2}x-\dfrac{5}{2}x-\dfrac{25}{2}=\dfrac{1}{2}x^2-\dfrac{25}{2}$

A3	**Ausführliche Lösung**
	d) $\frac{3}{2}\underbrace{(x+4)(x+4)}_{\text{1. bin. Formel}} = \frac{3}{2}(x^2+8x+16) = \frac{3}{2}x^2 + \frac{3}{2}\cdot 8x + \frac{3}{2}\cdot 16 = \underline{\underline{\frac{3}{2}x^2 + 12x + 24}}$

A3	**Ausführliche Lösung**
	e) $(3-2x)(-2x+3) = -6x + 9 + 4x^2 - 6x = \underline{\underline{4x^2 - 12x + 9}}$

A3	**Ausführliche Lösung**
	f) $\dfrac{x-5}{2}(2x+8) = \dfrac{(x-5)(2x+8)}{2} = \dfrac{2x^2 + 8x - 10x - 40}{2}$ $= \dfrac{2x^2 - 2x - 40}{2} = \dfrac{2(x^2 - x - 20)}{2} = \underline{\underline{x^2 - x - 20}}$

A4	**Aufgabe**
	Multiplizieren Sie aus.

a) $(x+8)\left(\dfrac{1}{4}x+1\right)$	b) $\left(1-\dfrac{1}{5}x\right)\left(\dfrac{2}{5}x+2\right)$	c) $\dfrac{x}{2}(2x-k)^2$
d) $-\dfrac{1}{8}(4-2x)^2$	e) $x(x+3)(2x-5)$	f) $(x-1)^3$

A4	**Ausführliche Lösung**
	a) $(x+8)\left(\dfrac{1}{4}x+1\right) = \dfrac{1}{4}x^2 + x + \dfrac{8}{4}x + 8 = \dfrac{1}{4}x^2 + x + 2x + 8 = \underline{\underline{\dfrac{1}{4}x^2 + 3x + 8}}$

A4	**Ausführliche Lösung**
	b) $\left(1-\dfrac{1}{5}x\right)\left(\dfrac{2}{5}x+2\right) = \dfrac{2}{5}x + 2 - \dfrac{1}{25}x^2 - \dfrac{2}{5}x = \underline{\underline{-\dfrac{2}{25}x^2 + 2}}$

A4	**Ausführliche Lösung**
	c) $\dfrac{x}{2}\underbrace{(2x-k)^2}_{\text{2. bin. Formel}} = \dfrac{x}{2}(4x^2 - 4kx + k^2) = \underline{\underline{2x^3 - 2kx^2 + \dfrac{k^2}{2}x}}$

A4	**Ausführliche Lösung**
	d) $-\dfrac{1}{8}\underbrace{(4-2x)^2}_{\text{2. bin. Formel}} = -\dfrac{1}{8}(16 - 16x + 4x^2) = -2 + 2x - \dfrac{1}{2}x^2 = \underline{\underline{-\dfrac{1}{2}x^2 + 2x - 2}}$

A4	**Ausführliche Lösung**
	e) $x(x+3)(2x-5) = x(2x^2 - 5x + 6x - 15) = x(2x^2 + x - 15) = \underline{\underline{2x^3 + x^2 - 15x}}$

A4	**Ausführliche Lösung**
f)	$(x-1)^3 = (x-1)(x-1)^2 = (x-1)(x^2-2x+1)$ $= x^3 - 2x^2 + x - x^2 + 2x - 1 = \underline{\underline{x^3 - 3x^2 + 3x - 1}}$

A5	**Aufgabe**		
	Schreiben Sie in Produktform.		
a)	$x^2 + 14x + 49$	b) $4x^2 - 8x + 4$	c) $\dfrac{1}{2}x^2 - 8$
d)	$1 - 2x + x^2$	e) $-\dfrac{1}{4} + x^2$	f) $-x^2 + 6x - 9$
g)	$\dfrac{1}{5}x^2 + 2x + 5$	h) $\dfrac{1}{4}x^2 - 3x + 9$	i) $\dfrac{x^2}{2} - kx + \dfrac{k^2}{2}$

A5	**Ausführliche Lösung**
a)	$\underbrace{x^2 + 14x + 49}_{\text{1. bin. Formel}} = \underline{\underline{(x+7)^2}}$

A5	**Ausführliche Lösung**
b)	$4x^2 - 8x + 4 = 4\underbrace{\left(x^2 - 2x + 1\right)}_{\text{2. bin. Formel}} = \underline{\underline{4(x-1)^2}}$

A5	**Ausführliche Lösung**
c)	$\dfrac{1}{2}x^2 - 8 = \dfrac{1}{2}\underbrace{\left(x^2 - 16\right)}_{\text{3. bin. Formel}} = \underline{\underline{\dfrac{1}{2}(x-4)(x+4)}}$

A5	**Ausführliche Lösung**
d)	$1 - 2x + x^2 = \underbrace{x^2 - 2x + 1}_{\text{2. bin. Formel}} = \underline{\underline{(x-1)^2}}$ Merke : $(1-x)^2 = (x-1)^2$ denn $(1-x)^2 = \left[(-1)\cdot(x-1)\right]^2 = (-1)^2 \cdot (x-1)^2 = 1\cdot(x-1)^2 = (x-1)^2$

A5	**Ausführliche Lösung**
e)	$-\dfrac{1}{4} + x^2 = \underbrace{x^2 - \dfrac{1}{4}}_{\text{3. bin. Formel}} = \underline{\underline{\left(x - \dfrac{1}{2}\right)\left(x + \dfrac{1}{2}\right)}}$

A5	**Ausführliche Lösung**
f)	$-x^2 + 6x - 9 = -\underbrace{\left(x^2 - 6x + 9\right)}_{\text{2. bin. Formel}} = \underline{\underline{-(x-3)^2}}$

A5	**Ausführliche Lösung**
g)	$\dfrac{1}{5}x^2 + 2x + 5 = \dfrac{1}{5}\underbrace{\left(x^2 + 10x + 25\right)}_{\text{1. bin. Formel}} = \dfrac{1}{5}\left(x+5\right)^2$

A5	**Ausführliche Lösung**
h)	$\dfrac{1}{4}x^2 - 3x + 9 = \dfrac{1}{4}\underbrace{\left(x^2 - 12x + 36\right)}_{\text{2. bin. Formel}} = \dfrac{1}{4}\left(x-6\right)^2$

A5	**Ausführliche Lösung**
i)	$\dfrac{x^2}{2} - kx + \dfrac{k^2}{2} = \dfrac{1}{2}\underbrace{\left(x^2 - 2kx + k^2\right)}_{\text{2. bin. Formel}} = \dfrac{1}{2}\left(x-k\right)^2$

A6	**Aufgabe**		
	Schreiben Sie in Produktform		
a)	$a^2 - 4b^2$	b) $\ 4k^2 - 4k + 1$	c) $\ 25x^2 - 9$
d)	$x^4 + 2x^2 + 1$	e) $\ u^4 - 4u^3 + 4u^2$	f) $\ x^3 - 7x^2$

A6	**Ausführliche Lösung**
a)	$\underbrace{a^2 - 4b^2}_{\text{3. bin. Formel}} = \left(a - 2b\right)\left(a + 2b\right)$

A6	**Ausführliche Lösung**
b)	$\underbrace{4k^2 - 4k + 1}_{\text{2. bin. Formel}} = \left(2k - 1\right)^2$

A6	**Ausführliche Lösung**
c)	$\underbrace{25x^2 - 9}_{\text{3. bin. Formel}} = \left(5x - 3\right)\left(5x + 3\right)$

A6	**Ausführliche Lösung**
d)	$\underbrace{x^4 + 2x^2 + 1}_{\text{1. bin. Formel}} = \left(x^2 + 1\right)^2$

A6	**Ausführliche Lösung**
e)	$u^4 - 4u^3 + 4u^2 = u^2\underbrace{\left(u^2 - 4u + 4\right)}_{\text{2. bin. Formel}} = u^2\left(u - 2\right)^2$

A6	**Ausführliche Lösung**
f)	$x^3 - 7x^2 = x^2\left(x - 7\right)$

A7	**Aufgabe**
	Vereinfachen Sie.

a)	$3\left(\dfrac{2-3k}{3}\right)^2 - 2\dfrac{2-3k}{3}$	b)	$7(b+1) + 5(b+1)^2$
c)	$(k-1)^2 - (k+1)^2 - (k^2+4)$	d)	$(1-x)^3 + 3(1-x)(1+x)^2$

A7	**Ausführliche Lösung**
a)	

$$3\left(\frac{2-3k}{3}\right)^2 - 2\frac{2-3k}{3} = \frac{3\left[(2-3k)^2\right]}{9} - \frac{2(2-3k)}{3}$$

$$= \frac{(2-3k)^2}{3} - \frac{4-6k}{3} = \frac{4-12k+9k^2-(4-6k)}{3} = \frac{4-12k+9k^2-4+6k}{3}$$

$$= \frac{9k^2-6k}{3} = \frac{3(3k^2-2k)}{3} = \underline{\underline{3k^2-2k}}$$

A7	**Ausführliche Lösung**
b)	

$$7(b+1) + 5(b+1)^2 = (b+1)\left[7+5(b+1)\right]$$

$$= (b+1)\left[7+5b+5\right] = \underline{\underline{(b+1)(5b+12)}}$$

A7	**Ausführliche Lösung**
c)	

$$(k-1)^2 - (k+1)^2 - (k^2+4) = k^2-2k+1-(k^2+2k+1)-k^2-4$$

$$= k^2-2k+1-k^2-2k-1-k^2-4 = -k^2-4k-4 = -(k^2+4k+4) = \underline{\underline{-(k+2)^2}}$$

A7	**Ausführliche Lösung**
d)	

$$(1-x)^3 + 3(1-x)(1+x)^2 = (1-x)\left[(1-x)^2 + 3\cdot(1+x)^2\right]$$

$$= (1-x)\left[1-2x+x^2 + 3(1+2x+x^2)\right] = (1-x)\left[1-2x+x^2+3+6x+3x^2\right]$$

$$= (1-x)(4x^2+4x+4) = 4(1-x)(x^2+x+1) = \underline{\underline{-4(x-1)(x^2+x+1)}}$$