

3 Operationen 2. Stufe

3.9 Übungen, Frommenwiler

21. a. $(4y + 6x)(3a - 5b) - (2x - 6y)(2a + 3b) =$
 $12ay - 20by + 18ax - 30bx - (4ax + 6bx - 12ay - 18by) =$
 $12ay - 20by + 18ax - 30bx - 4ax - 6bx + 12ay + 18by =$
 $24ay - 2by + 14ax - 36bx$
- b. $(4x + 2b)(6x^2 - b^2) =$
 $24x^3 - 4b^2x + 12bx^2 - 2b^3$
- d. $6ax(6d - c)(4b + 4y)3n =$
 $18anx(6d - c)(4b + 4y) =$
 $18anx(24bd + 24dy - 4bc - 4cy) =$
 $432abdnx + 432adnxy - 72abcnx - 72acnxy$
- f. $(3a - 2b)(2c - 4d)(5x - 2y) =$
 $(6ac - 12ad - 4bc + 8bd)(5x - 2y) =$
 $30acx - 12acy - 60adx + 24ady - 20bcx + 8bcy + 40bdx - 16bdy$
- h. $(a - 1)(4a^2 + 3a - 1) =$
 $4a^3 + 3a^2 - a - 4a^2 - 3a + 1 =$
 $4a^3 - a^2 - 4a + 1$
22. a) $(5x + 3y)^2 = \underline{\underline{25x^2 + 30xy + 9y^2}}$
- b) $(a - 9b)(9b + a) = (a - 9b)(a + 9b) = \underline{\underline{a^2 - 81b^2}}$
- c) $(-5x^2 - 2y)^2 = [-(5x^2 + 2y)]^2 = (5x^2 + 2y)^2 = \underline{\underline{25x^4 + 20x^2y + 4y^2}}$

$$d) (4m^2 - 9n^2)^2 = \underline{\underline{16m^4 - 72m^2n^2 + 81n^4}}$$

$$\begin{aligned} e) (2-a)^2 - (a+2)(2-a) + (a+2)^2 &= \\ (2-a)^2 - (2+a)(2-a) + (a+2)^2 &= \\ 4 - 4a + a^2 - (4 - a^2) + a^2 + 4a + 4 &= \\ 4 - 4a + a^2 - 4 + a^2 + a^2 + 4a + 4 &= \\ \underline{\underline{3a^2 + 4}} \end{aligned}$$

$$f) (a+1)(a-1)^2 = (a+1)(a^2 - 2a + 1) = a^3 - 2a^2 + a + a^2 - 2a + 1 = \underline{\underline{a^3 - a^2 - a + 1}}$$

$$g) (2+3k)^2(2-3k)^2 = [(2+3k)(2-3k)]^2 = [4-9k^2]^2 = \underline{\underline{16-72k^2+81k^4}}$$

$$\begin{aligned} h) (4r+3s)(3s-4r)(2r-3s) &= \\ (4r+3s)(3s-4r)(2r-3s) &= \\ (3s+4r)(3s-4r)(2r-3s) &= (9s^2 - 16r^2)(2r-3s) = \underline{\underline{18rs^2 - 27s^3 - 32r^3 + 48r^2s}} \end{aligned}$$

$$23. a) (1+a+b)(1+a-b) = [(1+a)+b][(1+a)-b] = (1+a)^2 - b^2 = \underline{\underline{1+2a+a^2-b^2}}$$

$$\begin{aligned} b) (2x-y-2)(2x-y+2) &= \\ [(2x-y)-2][(2x-y)+2] &= (2x-y)^2 - 4 = \underline{\underline{4x^2 - 4xy + y^2 - 4}} \end{aligned}$$

$$\begin{aligned} c) (4+z-w^2)(4+z+w^2) &= \\ [(4+z)-w^2][(4+z)+w^2] &= (4+z)^2 - w^4 = \underline{\underline{16+8z+z^2-w^4}} \end{aligned}$$

$$\begin{aligned} d) (x^2+x-1)(x^2-x-1) &= \\ [(x^2-1)+x][(x^2-1)-x] &= (x^2-1)^2 - x^2 = x^4 - 2x^2 + 1 - x^2 = \underline{\underline{x^4 - 3x^2 + 1}} \end{aligned}$$

$$24. \quad a) \quad (x+1)^3 = \underline{\underline{x^3 + 3x^2 + 3x + 1}}$$

$$b) \quad (b-3)^3 = b^3 - 3 \cdot b^2 \cdot 3 + 3 \cdot b \cdot 3^2 - 3^3 = \underline{\underline{b^3 - 9b^2 + 27b - 27}}$$

$$c) \quad (3m-4n)^3 = (3m)^3 - 3 \cdot (3m)^2 \cdot 4n + 3 \cdot (3m) \cdot (4n)^2 - (4n)^3 = \underline{\underline{27m^3 - 108m^2n + 144mn^2 - 64n^3}}$$

$$25. \quad a) \quad (2a+3b+1)^2 = (2a)^2 + (3b)^2 + 1^2 + 2 \cdot (2a) \cdot (3b) + 2 \cdot (2a) \cdot (1) + 2 \cdot (3b) \cdot (1) = \underline{\underline{4a^2 + 9b^2 + 1 + 12ab + 4a + 6b}}$$

$$b) \quad \underbrace{(u-v-w)^2}_{\text{Formel gilt nur bei Summanden!}} = \underbrace{(u+[-v]+[-w])^2}_{\text{Den Term innerhalb der runden Klammer als Summe schreiben!}} =$$

$$u^2 + [-v]^2 + [-w]^2 + 2 \cdot u \cdot [-v] + 2 \cdot u \cdot [-w] + 2 \cdot [-v] \cdot [-w] =$$

$$\underline{\underline{u^2 + v^2 + w^2 - 2uv - 2uw + 2vw}}$$

$$c) \quad \underbrace{(4a-3b+2c)^2}_{\text{Formel gilt nur bei Summanden!}} = \underbrace{(4a+[-3b]+2c)^2}_{\text{Den Term innerhalb der runden Klammer als Summe schreiben!}} =$$

$$(4a)^2 + [-3b]^2 + (2c)^2 + 2 \cdot (4a) \cdot [-3b] + 2 \cdot (4a) \cdot (2c) + 2 \cdot [-3b] \cdot (2c) =$$

$$\underline{\underline{16a^2 + 9b^2 + 4c^2 - 24ab + 16ac - 12bc}}$$