

1.

$$\begin{aligned} \text{a) } & 5 - (2 - 3) + (-4 - 5) = \\ & 5 - 2 + 3 - 4 - 5 = \underline{\underline{-3}} \end{aligned}$$

$$\begin{aligned} \text{b) } & 1 - (-4 - (-5)) = 1 + 4 - 5 = \underline{\underline{0}} \\ & 1 - (\underbrace{-4 + 5}_{=1}) \quad (\text{in 2 Schritten}) \\ & 1 - 1 = \underline{\underline{0}} \end{aligned}$$

$$\begin{aligned} \text{c) } & -(-7a - 7) + (-3a - 5) - 2 \\ & = \underline{7a} + 7 - \underline{3a} - 5 - 2 = \underline{\underline{4a}} \end{aligned}$$

$$\begin{aligned} \text{d) } & -2a + 2 - (b - (-2 + 4a)) + 2b = \\ & -2a + 2 - (b + 2 - 4a) + 2b = \\ & -\underline{2a} + 2 - b - 2 + \underline{4a} \overset{+2b}{=} \underline{\underline{2a + b}} \end{aligned}$$

$$\begin{aligned} \text{e) } & x - (y - (z - x) + (-z + (-x))) = \\ & x - (y - z + x + (-z - x)) = \\ & \cancel{x} - \cancel{y} + z \\ & x - (y - z + x - z - x) = \\ & \underline{x} - \cancel{y} + z - \underline{x} + z + \underline{x} = \underline{\underline{x - y + 2z}} \end{aligned}$$

$$\begin{aligned} \text{f) } & a + b - (c - (a + b - (a - c)) + a) - 2b = \\ & a + b - (c - (a + b - a + c) + a) - 2b = \\ & a + b - (c - a - b + a - c + a) - 2b = \\ & \underline{a} + \underline{b} - \underline{c} + \underline{a} + \underline{b} - \underline{a} + \underline{c} - \underline{a} - \underline{2b} = \underline{\underline{0}} \end{aligned}$$

$$\textcircled{2} \quad a) \quad (-a)^3 = (-1 \cdot a)^3 = (-1)^3 \cdot a^3 = \underline{\underline{-a^3}}$$

$$b) \quad -x^2 \cdot (-x^2)^2 = -x^2 \cdot x^2 = \underline{\underline{-x^4}}$$

$$c) \quad (-2y)^2 (-2y^2) = 4y^2 \cdot (-2y^2) = \underline{\underline{-8y^4}}$$

$$d) \quad -(-z)^5 = -(-z^5) = \underline{\underline{z^5}}$$

$$\textcircled{3} \quad x = -2, \quad y = 3$$

$$\begin{aligned} a) \quad x^2y - xy^2 &= (-2)^2 \cdot 3 - (-2) \cdot 3^2 \\ &= 4 \cdot 3 - (-2) \cdot 9 = 12 - (-18) = \underline{\underline{30}} \end{aligned}$$

$$b) \quad (2x^3 + y - xy^2)^2 =$$

$$\begin{aligned} & (2(-2)^3 + 3 - (-2) \cdot 9)^2 \\ &= (-16 + 3 - (-18))^2 \\ &= (-16 + 3 + 18)^2 = 5^2 = \underline{\underline{25}} \end{aligned}$$

$$\textcircled{4} \quad a) \quad (1+x+x^2)(1-x) = \\ 1 + \underline{x} + \underline{x^2} - x - \underline{x^2} - x^3 = \underline{\underline{1-x^3}}$$

$$b) \quad (ab+bc+c)(ac+c) = \\ = a^2bc + \underline{abc} + ac^2 + \underline{abc} + bc + c^2 \\ = \underline{\underline{a^2bc + 2abc + ac^2 + bc + c^2}}$$

$$\textcircled{5} \quad a) \quad (ab+3c)^2 = (ab)^2 + 2ab \cdot 3c + (3c)^2 \\ = \underline{\underline{a^2b^2 + 6abc + 9c^2}}$$

$$b) \quad (2a^2+3)(2a^2-3) = (2a^2)^2 - 3^2 \\ = \underline{\underline{4a^4 - 9}}$$

$$c) \quad (x-3y^2)^2 = \\ x^2 - 2 \cdot x \cdot 3y^2 + (3y^2)^2 = \\ \underline{\underline{x^2 - 6xy^2 + 9y^4}}$$

$$\textcircled{6} (x-y)^2 - (x+y)^2 - 4y^2 = -2((x+y)^2 - (x+y)(x-y))$$

$$\cancel{PA} x^2 - 2xy + y^2 - (x^2 + 2xy + y^2) - 4y^2$$

=

$$-2(x^2 + 2xy + y^2 - (x^2 - y^2))$$

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

$$-4xy - 4y^2 = -2(2xy + 2y^2)$$

$$= -4xy - 4y^2$$

$$\underline{\underline{0 = 0}}$$