

S 96

$$a) (2x - \frac{1}{10}y)^2 = 4x^2 - 2 \cdot 2x \cdot \frac{1}{10}y + \frac{1}{100}y^2 = 4x^2 - \frac{2}{5}xy + \frac{1}{100}y^2$$

$$b) (ax + 3y)^2 = a^2x^2 + 6axy + 9y^2$$

$$c) (2x - \frac{1}{4}xy) \cdot (2x + \frac{1}{4}xy) = 4x^2 - \frac{1}{4}x^2y^2$$

$$d) (2cd - \frac{3}{c}d)^2 = (2cd)^2 - 2 \cdot 2cd \cdot \frac{3}{c}d + (\frac{3}{c}d)^2 = 4c^2d^2 - 12d^2 + 9 \frac{d^2}{c^2}$$

$$e) (\frac{x}{4} + 2xy)^2 = \frac{x^2}{16} + x^2y + 4x^2y^2$$

$$f) (\frac{1}{3}x - \frac{1}{10}y) \cdot (\frac{1}{3}x + \frac{1}{10}y) = \frac{1}{9}x^2 - \frac{1}{100}y^2$$

$$\begin{aligned} 1) & 3 \cdot (\frac{1}{3}x + 2y)(\frac{1}{3}x - 2y) - 4 \cdot (2\frac{x}{y} + 3y)^2 \\ & 3 \cdot (\frac{1}{9}x^2 - 4y^2) - 4 \cdot (4\frac{x^2}{y^2} + 12x + 9y^2) \\ & \frac{1}{3}x^2 - 12y^2 - 16\frac{x^2}{y^2} - 48x - 36y^2 \\ & \frac{1}{3}x^2 - 48y^2 - 16\frac{x^2}{y^2} - 48x \end{aligned}$$

$$2) (35 - a5) \cdot (35 + a5) - (a - 25)^2$$

$$96^2 - a^25^2 - a^2 + 4a5 - 45^2$$

$$g) \quad \underline{(2i-1)^4}$$

$$1(2i)^4(-1)^0 + 4(2i)^3(-1)^1 + 6(2i)^2(-1)^2 + 4(2i)^1(-1)^3 + 1(2i)^0(-1)^4$$

$$16 - 32i \underset{(-i)}{^3} + 24 \underset{(-1)}{i^2} - 8i + 1$$

$$-7 + 24i$$

$$h) \quad (0,4i + 8)^5 = \left(\frac{4}{10}i + 8\right)^5 = \left[4 \cdot \left(\frac{1}{10}i + 2\right)\right]^5 = 4^5 \cdot \underline{\left(\frac{1}{10}i + 2\right)^5}$$

$$4^5 \cdot \left[1\left(\frac{1}{10}i\right)^5 \cdot 2^0 + 5\left(\frac{1}{10}i\right)^4 \cdot 2^1 + 10\left(\frac{1}{10}i\right)^3 \cdot 2^2 + 10\left(\frac{1}{10}i\right)^2 \cdot 2^3 + 5\left(\frac{1}{10}i\right)^1 \cdot 2^4 + 1\left(\frac{1}{10}i\right)^0 \cdot 2^5\right]$$

$$4^5 \cdot \left[\frac{1}{10^5}i^5 + \frac{10}{10^4}i^4 + \frac{40}{10^3}i^3 + \frac{80}{10^2}i^2 + \frac{80}{10}i + 32\right]$$

$$4^5 \cdot \left[\frac{1}{10^5}i + \frac{1}{10^3} - \frac{4}{10^2}i - \frac{8}{10} + 8i + 32\right]$$

$$1024 \cdot \left(\frac{1 - 800 + 32000}{1000} + \frac{1 - 400 + 80.000}{10.000} i\right)$$

$$1024 \cdot \left(\frac{31201}{1000} + \frac{79601}{10.000} i\right) = 2^{10} \cdot (31,201 + 7,9601 i)$$

$$3) \frac{3\sqrt{x}+2}{1+\sqrt{3x}} \cdot \frac{1-\sqrt{3x}}{1-\sqrt{3x}} = \frac{(3\sqrt{x}+2)(1-\sqrt{3x})}{1-3x}$$

$$\times \frac{3 \cdot \sqrt{x} \cdot \sqrt{3x}}{\sqrt{3^2 \cdot x} \cdot \sqrt{3x}}$$

$$\frac{\sqrt{3^2 \cdot x \cdot 3x}}{\sqrt{27x^2}}$$

$$= \frac{3\sqrt{x} - 3\sqrt{x} \cdot \sqrt{3x} + 2 - 2\sqrt{3x}}{1-3x}$$

$$= \frac{3\sqrt{x} - \sqrt{27x^2} + 2 - \sqrt{12x}}{1-3x}$$

$$4) \frac{\sqrt{x} - 2\sqrt{1-x}}{2\sqrt{3x} - 4} \cdot \frac{2\sqrt{3x} + 4}{2\sqrt{3x} + 4} = \frac{(\sqrt{x} - 2\sqrt{1-x})(2\sqrt{3x} + 4)}{4 \cdot 3x - 16}$$

$$= \frac{\sqrt{x} \cdot 2\sqrt{3x} + 4\sqrt{x} - 4\sqrt{1-x} \cdot \sqrt{3x} - 8\sqrt{1-x}}{12x - 16}$$

$$= \frac{2x \cdot \sqrt{3} + 4\sqrt{x} - 4\sqrt{3x-3x^2} - 8\sqrt{1-x}}{12x - 16}$$

$$5) \quad x \rightarrow -3 : \frac{2x+6}{6-2\sqrt{3-2x}} \cdot \frac{6+2\sqrt{3-2x}}{6+2\sqrt{3-2x}}$$

$$\Downarrow \\ (x+3)$$

$$\frac{2 \cdot (x+3) \cdot (6+2\sqrt{3-2x})}{36 - 4(3-2x)}$$

$$36 - 12 + 8x = 8x + 24 = 8 \cdot (x+3)$$

$$\Rightarrow \frac{2 \cdot (6+2\sqrt{3-2x})}{8} = 3$$

$$6) \quad x \rightarrow 6 : \frac{x^2-4x-12}{2\sqrt{2x+4}-8} \cdot \frac{2\sqrt{2x+4}+8}{2\sqrt{2x+4}+8}$$

$$\Downarrow \\ (x-6)$$

$$\frac{(x-6)(x+2)(2\sqrt{2x+4}+8)}{4(2x+4) - 64}$$

$$4(2x+4) - 64 = 8x - 48 = 8(x-6)$$

$$\Rightarrow \frac{(x+2)(2\sqrt{2x+4}+8)}{8} = 16$$

$$x^2 - 4x - 12 = (x-6) \cdot (x+2)$$

Höhere Ausdrücke $\{ \text{Potenzen, EXP, Trigo., LOG} \}$

$$\sqrt{x-2} + 3 = 2x \quad | -3$$

$$\sqrt{x-2} = 2x - 3 \quad | \uparrow^2$$

$$x-2 = (2x-3)^2 = 4x^2 - 12x + 9 \quad | -x+2$$

$$4x^2 - 13x + 11$$

Isolation

Neutralisation

Nullfou-

Koeffizient \downarrow Parameter \downarrow Variable \leftarrow

$$f_a(x) = 2 \cdot a \cdot x^2$$

Variable \uparrow Parameter \uparrow

$$f_x(a) = 2 \cdot a \cdot x^2$$

$$f_a(x) = a \cdot x^2$$