

# RECHENREGELN

① a)  $-3 + (-2) - (-10) = -3 - 2 + 10 = 5$

b)  $(-2) \cdot (7 - 10) = -14 + 20 = 6$

c)  $0 \cdot (1 - y) = 0$

d)  $(-4) \cdot (-y - 3) - 4y = 4y + 12 - 4y = 12$

② a)  $(x+y)(3y-x) = 3xy - x^2 + 3y^2 - xy = -x^2 + 2xy + 3y^2$

b)  $(x+y)^2 + (y+x) \cdot (x-y) - 2xy$

$$= x^2 + 2xy + y^2 + yx - y^2 + x^2 - xy - 2xy = 2x^2$$

c)  $(x-y) \cdot (x-1) \cdot (y-2)$

$$= (x^2 - x - yx + y) \cdot (y-2)$$

$$= x^2y - 2x^2 - xy + 2x - y^2x + 2yx + y^2 - 2y$$

$$= x^2y - 2x^2 + xy + 2x - xy^2 + y^2 - 2y$$

d)  $x - 2y - (2x - (y - 3x))$

$$= x - 2y - (2x - y + 3x) = x - 2y - 2x + y - 3x$$

$$= -4x - y$$

③ a)  $14xy + 7x - 21x^2 = x \cdot (14y + 7 - 21x) = 7x \cdot (2y + 1 - 3x)$

b)  $3a^3b + 3ab^3 - 6a^2b^2 = ab \cdot (3a^2 + 3b^2 - 6ab)$

$$= 3ab \cdot (a^2 - 2ab + b^2) = 3ab(a-b)^2$$

c)  $21x^2y^2 + 14x^2y = 7x^2 \cdot y \cdot (3y + 2)$

④ a)  $\left(\frac{1}{3}+x\right) \cdot \left(\frac{1}{3}-x\right) = \frac{1}{9} - x^2$  3. Binomische Formel

b)  $(2a-3b)^2 = 4a^2 - 12ab + 9b^2$  2. ——— " ———

c)  $(x-1)(x+1)(y-3)(y+3) = (x^2-1) \cdot (y^2-9)$   
 $= x^2y^2 - 9x^2 - y^2 + 9$  zwei mal 3. Bin. Formel

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

1. Term: 1. Bin. Formel

2. Term: 2. Bin. Formel

⑤ a)  $3x^2 + 12x + 12 = 3 \cdot (x^2 + 4x + 4) = 3 \cdot (x+2)^2$

b)  $36u^2 - 12u + 1 = (6u-1)^2$

c)  $16a^2b^2 - 25x^2 = (4ab-5x) \cdot (4ab+5x)$

d)  $2a^2 - 8ab + 8b^2 = 2 \cdot (a^2 - 4ab + 4b^2) = 2 \cdot (a-2b)^2$

## BRUCHRECHNEN

⑥ a)  $\frac{168}{224} = \frac{3}{4}$

b)  $\frac{3abz}{9ab} = \frac{z}{3}$

c)  $\frac{4x+8}{x+2} = \frac{4 \cdot (x+2)}{x+2} = 4$

d)  $\left(-\frac{-a}{12}\right) \cdot \left(\frac{3}{-b}\right) \cdot \left(-\frac{4b}{5}\right) = \frac{a}{12} \cdot \frac{3}{b} \cdot \frac{4 \cdot b}{5} = \frac{a}{5}$

e)  $\frac{x-1}{x+1}$  keine sinnvolle Vereinfachung möglich

$$f) \frac{5x-3}{20x-12} = \frac{5x-3}{4(5x-3)} = \frac{1}{4}$$

$$g) \left( \frac{14ax}{3by} = \frac{21by}{2a} \right) \cdot \frac{6by}{14x} = \frac{14ax}{3by} \frac{2a}{21by} \frac{6by}{14x} = \frac{4a^2}{21by}$$

$$h) \frac{(x-2y)(x+5)(x-y)}{(2y-2x)(10+2x)(y+x)} = \frac{(x-2y)(x+5)(y-x)(-1)}{2(y-x)2(5+x)(y+x)}$$

$$= \frac{2y-x}{4y+4x}$$

$$i) \frac{5ux+10uy-5vx-10yv}{5ux+5uv-5vx-5vy} = \frac{u(x+2y)-v(x+2y)}{u(x+y)-v(x+y)}$$

$$= \frac{u(x+2y)-v(x+2y)}{u(x+y)-v(x+y)} = \frac{(u-v)(x+2y)}{(u-v)(x+y)} = \frac{x+2y}{x+y}$$

### Aufgabe 7

$$a) \frac{7}{2} + \frac{3}{5} = \frac{41}{10}$$

$$b) \frac{x^2-1}{x-1} + \frac{x^2+1-2x}{x-1} - 2x = \frac{x^2-1+x^2+1-2x-2x(x-1)}{x-1}$$

$$= 0$$

$$c) 1 + \frac{1}{a-1} - \frac{1}{a+1} = \frac{(a-1)(a+1) + a+1 - (a-1)}{(a-1)(a+1)} = \frac{a^2+1}{a^2-1}$$

$$d) \frac{1}{x^2} + \frac{2}{xy} + \frac{1}{y^2} = \frac{y^2 + 2xy + x^2}{x^2 y^2} = \frac{(y+x)^2}{x^2 y^2}$$

$$e) \frac{x+b}{a-b} - \frac{y-a}{a-b} + \frac{b}{b-a} = \frac{x+b}{a-b} - \frac{y-a}{a-b} - \frac{b}{a-b}$$

$$= \frac{x+b - (y-a) - b}{a-b} = \frac{x+b-y+a-b}{a-b} = \frac{x-y+a}{a-b}$$

$$f) \frac{3}{cd} - \frac{5c}{cd+d^2} + \frac{7d}{c^2+cd} = \frac{3}{cd} - \frac{5c}{d \cdot (c+d)} + \frac{7d}{c \cdot (c+d)}$$

$$= \frac{3 \cdot (c+d) - 5c \cdot c + 7 \cdot d \cdot d}{c \cdot d \cdot (c+d)} = \frac{3c + 3d - 5c^2 + 7d^2}{c \cdot d \cdot (c+d)}$$

$$g) \frac{a}{x^2} - \frac{b}{2x} + \frac{c}{8x} = \frac{8a - 4bx + cx}{8x^2}$$

$$h) \frac{4a}{a+2b} + \frac{3b}{2a+4b} - \frac{2}{3} = \frac{4a}{a+2b} + \frac{3b}{2 \cdot (a+2b)} - \frac{2}{3}$$

$$= \frac{2 \cdot 3 \cdot 4 \cdot a + 3 \cdot 3 \cdot b - 2 \cdot (a+2b) \cdot 2}{2 \cdot 3 \cdot (a+2b)}$$

$$= \frac{24a + 9b - 4a - 8b}{2 \cdot 3 \cdot (a+2b)} = \frac{20a + b}{6 \cdot (a+2b)}$$

$$8. a) \frac{\frac{1}{5}}{2} = \frac{1}{10}$$

$$b) \frac{\frac{x+y}{2x+1}}{\frac{x}{2x+1}} = \frac{x+y}{2x+1} \cdot \frac{2x+1}{x} = \frac{x+y}{x}$$

$$c) \frac{\frac{2}{a+1} + \frac{1}{a}}{\frac{4}{a^2+a}} = \frac{\frac{2a+a+1}{a^2+a}}{\frac{4}{a^2+a}} = \frac{3a+1}{a^2+a} \cdot \frac{a^2+a}{4} = \frac{3a+1}{4}$$

$$d) \frac{\frac{1}{x}}{\frac{1}{x+1} - \frac{1}{x}} = \frac{\frac{1}{x}}{\frac{x - (x+1)}{x \cdot (x+1)}} = \frac{\frac{1}{x}}{\frac{-1}{x \cdot (x+1)}} = \frac{1}{x} \cdot \frac{x \cdot (x+1)}{-1}$$

$$= -(x+1)$$

$$e) \frac{\frac{1}{a} + \frac{1}{b}}{\frac{1}{a} - \frac{1}{b}} = \frac{\frac{b+a}{a \cdot b}}{\frac{b-a}{a \cdot b}} = \frac{b+a}{a \cdot b} \cdot \frac{a \cdot b}{b-a} = \frac{b+a}{b-a}$$

$$f) 1 - \frac{1 - \frac{2}{x}}{2} - \frac{1}{x} = 1 - \frac{\frac{x-2}{x}}{2} - \frac{1}{x}$$

$$= 1 - \frac{x-2}{2x} - \frac{1}{x} = \frac{2x - (x-2) - 2}{2x}$$

$$= \frac{2x - x + 2 - 2}{2x} = \frac{x}{2x} = \frac{1}{2}$$

## POTENZEN

$$9. a) x^t \cdot x^{3t} = x^{t+3t} = x^{4t}$$

$$b) \frac{x^3 y^4 z}{x y^3 z} = x^2 y$$

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

$$= x^{n+2} y^{2n}$$

$$d) (-1)^{2n} = ((-1)^2)^n = (1)^n = 1$$