Übungsaufgaben: S. 6

1) a) $3x + y - (x + 2y)$

$3x + y - x - 2y$

$2x - y$

b) $3m + (m + 7n) - (2m + 5n)$

$3m + m + 7n - 2m - 5n$

$2m + 2n$

c) $(4a - b) - (a - 2b) + b$

$4a - b - a + 2b + b$

$3a + 2b$

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

$-2y + 3x - x - x - 2y$

$x - 4y$

e) $-\left(\frac{1}{2}x - y + \frac{1}{4}z\right) + \left(-x - \frac{1}{2}y - \frac{1}{2}z\right)$

$-\frac{1}{2}x + y - \frac{1}{4}z - x - \frac{1}{2}y - \frac{1}{2}z$

$-\frac{3}{2}x + \frac{1}{2}y - \frac{3}{4}z$

f) $3{,}25x^2 - \left(\frac{1}{5}xy + 0{,}25y^2\right) - \left(\frac{3}{4}x^2 - 0{,}8xy - \frac{1}{2}y^2\right)$

$3{,}25x^2 - \frac{1}{5}xy - 0{,}25y^2 - \frac{3}{4}x^2 + 0{,}8xy + \frac{1}{2}y^2$

$2{,}5x^2 + 0{,}6xy + 0{,}25y^2$

2) a) $4a(2 - 7b)$

$8a - 28ab$

b) $3x(2 - y) + y(1 - x)$

$6x - 3xy + 1y - xy$

$6x - 4xy + y$

c) $-3m(1 + 2n) - 4(m - n) + 6mn$

$-3m - 6mn - 4m + 4n + 6mn$

$-7m + 4n$ ✓

d) $(12s - t)(s + 12t)$

$12s^2 + 144st - st - 12t^2$

$12s^2 + 143st - 12t^2$ ✓

Übungsaufgaben

1)

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

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

b) $3m + (m + 7n) - (2m + 5n)$

$= 3m + m + 7n - 2m - 5n = 2m + 2n$

c) $(4a - b) - (a - 2b) + b$

$4a - b - a + 2b + b = 3a + 2b$

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

$= -2y + 3x - x - x - 2y =$ $-4y + x = x - 4y$

e) $-\left(\frac{1}{2}x - y + \frac{1}{4}z\right) + \left(-x - \frac{1}{2}y - \frac{1}{2}z\right)$

$= -\frac{1}{2}x + y - \frac{1}{4}z - x - \frac{1}{2}y - \frac{1}{2}z$

$= -\frac{3}{2}x + \frac{1}{2}y - \frac{3}{4}z$

f) $3{,}25x^2 - \left(\frac{1}{5}xy + 0{,}25y^2\right) - \left(\frac{3}{4}x^2 - 0{,}8xy - \frac{1}{2}y^2\right)$

$= 3{,}25x^2 - \frac{1}{5}xy - 0{,}25y^2 - \frac{3}{4}x^2 + 0{,}8xy + \frac{1}{2}y^2$

$= 2{,}5x^2 + 0{,}6xy + 0{,}25y^2$

2.) $4a(2 - 7b)$ $3x(2 - y) + y(1 - x)$

a) $8a - 28ab$ b) $6x - 3xy + y - xy = 6x - 4xy + y$

c) $-3m(1 + 2n) - 4(m - n) + 6mn$

$= -3m - 6mn - 4m - 4n + 6mn$

$= -7m - 4n$

d) $(12s - t)(s + 12t)$

$12s^2 + 144st - ts - 12t^2$

$= 12s^2 + 143st - 12t^2$

e) $2(x-2y)(2x-y) = 4x^2 - 2xy - 8xy + 4y^2$

$= 4x^2 - 10xy + 4y^2$

f) $-a(a-3b) - 3(3a-b)(a-b)$

$= -a^2 + 3ab + (-9a+3b)(a-b)$

$= -a^2 + 3ab \quad -9a^2 + 9ab + 3ab - 3b^2$

$= -10a^2 + 15ab - 3b^2$

3.)

a) $14xy - 28y$

$14y(x-2)$

b) $15x^2y - 25xy^2$

$5xy(3x-5y)$

c) $33a^2b + 77ab - 11ab^2$

$11ab(3a+7-b)$

d) $64x^2y - 48xy + 96xy^2$

$16xy(4x-3+6y)$

e) $81a^2bc - 54abc^2 - 135abc + 27ab^2c$

$27abc(3a-2c+b-5)$

c) $((3c-2d)\cdot 8 + 8c) : 16$

$= (24c - 16d + 8c) : 16$

$= (32c - 16d) : 16$

$= 2c - d$

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

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

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

$x - 2xy + 2x - 2x - 2y + 2xy$

$x - 2y$

f) $-a(a-3b)-3(3a-b)(a-b)$

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

$= -a^2 + 3ab - 9a^2 + 9ab + 3ab - 3b^2$

$= -10a^2 + 15ab - 3b^2$

Nr. 4

a) $3a + (b - (a + 2b))$

$= 3a + b - a - 2b$

$= 2a - b$

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

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

$= -x + y$

⑤ a) $(2a+3)^2$

$= 4a^2 + 2 \cdot 2a \cdot 3 + 9$

$= 4a^2 + 12a + 9$

b) $(x - 3y)^2$

$= x^2 - 2 \cdot x \cdot 3y + 9y^2 = x^2 - 6xy + 9y^2$

c) $(7s - 1)(7s + 1)$

$= 49s^2 - 1$ (V)

d) $(-u + v)^2 = (v-u)^2 = v^2 - 2uv + u^2 = u^2 - 2uv + v^2$

e) $16x^2 + 40xy + 25y^2$

$= (4x + 5y)^2$

f) $100v^2 - 20v + 1$

$(10v - 1)^2$

g) $121a^2b^4 - 289a^4b^2$

$(11ab^2 + 17a^2b)(11ab^2 - 17a^2b)$

Nr. 6

a) $\frac{48x^2y}{64xy^2} = \frac{3x}{4y}$

b) $\frac{125\,abc^2}{25\,ab} = 5c$

c) $\frac{x^2-4x+4}{3x-6} \quad \frac{(x-2)^2}{3\cdot(x-2)} = \frac{x-2}{3}$

d) $\frac{49x^2-81y^2}{14x+18y} = \frac{(7x-9y)(7x+9y)}{2(7x+9y)} = \frac{7x-9y}{2}$

Nr. 7

a) $\frac{3}{8} + \frac{3}{4} - \frac{1}{2} - \frac{3}{8} + \frac{6}{8} - \frac{4}{8} = \frac{5}{8}$

b) $\frac{1}{2} - \frac{3}{5} \cdot \frac{5}{6} + \frac{1}{2} =$

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

c) $\frac{7ab}{36} \cdot \frac{54a}{14b} = \frac{3a^2}{4}$

d) $\frac{15u}{v+1} : \frac{30u^2}{v^2-1} = \frac{15u}{v+1} \cdot \frac{v^2-1}{30u^2} = \frac{(v+1)(v-1)}{v+1 \cdot 2}$

$= \frac{v-1}{2}$

Nr. 8

a) $5^3 \cdot 5^4 = 5^7$

b) $\frac{7^{11}}{7^8} = 7^3$

c) $3^{-5} \cdot 2^{-5} = 6^{-5} = \frac{1}{6^5}$

d) $(2^3)^4 = 2^{12}$

e) $\frac{(x+1)^4}{(x+1)^1} = (x+1)^3$

f) $3^a \cdot 3^{a+2} = 3^{a+a+2} = 3^{2a+2}$

g) $\frac{32x^5}{2^5} = \frac{32x^5}{32} = x^5$

h) $(a^{n+1})^{n-1} = a^{(n+1)(n-1)} = a^{n^2-1}$

Nr. 9

a) $835000000 = 8{,}35 \cdot 10^8$

$0{,}000000025 = 2{,}5 \cdot 10^{-8}$

$20130000000000 = 2{,}013 \cdot 10^{13}$

$3{,}650000000000 = 3{,}65 \cdot 10^{12}$

b) $2{,}8 \cdot 10^9 = 2800000000$

$3{,}28 \cdot 10^{-7} = 0{,}000000328$

$2{,}99732458 \cdot 10^8 = 299732458$

$\frac{1}{1000000000} = 10^{-9}$

c) $98765432 \cdot 12345678 = 1{,}22 \cdot 10^{17}$

$0{,}00000468 : 50000000000 = 9{,}36 \cdot 10^{-17}$

9)

a) $835\,006\,000 = 8{,}35 \cdot 10^8$ ✓

$0{,}000\,000\,002{,}5 = 2{,}5 \cdot 10^{-9}$

$20130\,000\,000\,000 = 2{,}013 \cdot 10^{13}$ ✓

$9{,}65$ Billionen $= 9{,}65 \cdot 10^{12}$ ✓

b) $2{,}8 \cdot 10^9 = 2\,800\,000\,000$ ✓

$3{,}28 \cdot 10^{-7} = 0{,}000\,000\,328$ ✓

$2{,}997\,924\,58 \cdot 10^8 = 299\,792\,458$ ✓

1 Milliardstel $= \frac{1}{1000000000} = 10^{-9}$

c) $98\,765\,321 \cdot 12\,345\,678 = 1{,}219\,326\,311 \cdot 10^{17}$ ✓ $1{,}22 \cdot 10^{17}$

$0{,}000\,004\,68 : 500\,000\,000\,000 = 9{,}36 \cdot 10^{-17}$

10)

a) $\sqrt{3} \cdot \sqrt{27} = \sqrt{3 \cdot 27} = \sqrt{81} = 9$

$\sqrt{\frac{35}{105}} \cdot \sqrt{12} = \sqrt{\frac{35}{105} \cdot 12} = \sqrt{4} = 2$

$\sqrt{32xy^2} : \sqrt{2x} = \sqrt{\frac{32xy^2}{2x}} = 4y$

$\frac{\sqrt{3x^3y} \cdot 2\sqrt{x^2}}{\sqrt{48xy}} = \frac{2\sqrt{3x^3y \cdot x^2}}{\sqrt{48xy}} = \frac{2\sqrt{3x^5y}}{\sqrt{48xy}}$

$= 2 \cdot \sqrt{\frac{3x^5y}{48xy}}$

$= 2 \cdot \sqrt{\frac{x^4}{16}}$

$= 2 \cdot \frac{x^2}{4_2} = \frac{x^2}{2}$

b) $\sqrt{32} = \sqrt{2 \cdot 16} = 4\sqrt{2}$

$\sqrt{128a^3} = \sqrt{64 \cdot 2a^3} = 8a\sqrt{2a}$