Berufliches Bildungszentrum am Nord-Ostsee-Kanal

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Vorkurs – Mathematik Lösungen

1)

$8\frac{3}{5}+7\frac{19}{25}+\frac{1}{10}$	$9\frac{1}{4}+2\frac{7}{12}+\frac{8}{24}$	$5\frac{1}{3}-\left(\frac{50}{51}+\frac{5}{17}\right)$	$1\frac{3}{8}-1\frac{1}{3}+2\frac{1}{2}$	$1\frac{3}{5}+\frac{2}{9}-1\frac{1}{3}$	
$=16\frac{23}{50}$	$=12\frac{1}{6}$	$=4\frac{1}{17}$	$=2\frac{13}{24}$	$=\frac{22}{45}$	
$1\frac{1}{2}\cdot\frac{5}{6}$	$\frac{5}{8}\cdot\left(2\frac{2}{3}+\frac{3}{8}\right)$	$\frac{9}{14}\cdot\frac{16}{25}\cdot\frac{35}{48}$	$11\frac{7}{10}:7\frac{4}{5}$	$36:7\frac{1}{5}$	$6\frac{1}{2}-\frac{1}{2}:\left(\frac{2}{3}+1\frac{1}{6}\right)$
$=1\frac{1}{4}$	$=\frac{365}{192}=1\frac{173}{192}$	$=\frac{3}{10}$	$=1\frac{1}{2}$	$=5$	$=6\frac{5}{22}$

2.1)

a) $7a-(3b+4c)+(2a-5b)$	e) $(x+3)(y-2)$
$=9a-8b-4c$	$=xy-2x+3y-6$
b) $2x+(3y-x)+9x-(8x+y)$	f) $(9a-3b)(2c-8d)$
$=2x+2y$	$=18ac-72ad-6bc+24bd$
c) $[-14x-(3x-2y-4z)-(5x+3z)]$	g) $(6x+3)(4x+y+3)$
$=-22x+2y+z$	$=24x^2+6xy+30x+3y+9$
d) $-(-a^2b+3ab^2-1)-(7a^2-ab^2+2a^2b)$	h) $2a(-a^2+5ab-12b^2)$
$=-a^2b-2ab^2-7a^2+1$	$=-2a^3+10a^2b-24ab^2$

2.2)

a) $5b(4b+6a)=20b^2+30ab$

b) $20r(-4s-7rs)=-80rs-140r^2s$

c) $(5a^2+8ab)\cdot 6b=30a^2b+48ab^2$

d) $(-4y)(-25xy+0{,}5y)=100xy^2-2y^2$

2.3)

a) $8ab+4ac$	c) $6ab+18b-2b$
$=4a(2b+c)$	$=2b(3a+9-1)$
b) $12a^2b^2-4ac$	d) $3ab+9a-ax$
$=4a(3ab^2-c)$	$=a(3b+9-x)$

2.4)

a) $(x+2y)^2$	e) $(3x+4y)(3x-4y)-(3x+4y)^2$
$=x^2+4xy+4y^2$	$=-32y^2-24xy$
b) $(5v+3w)(5v-3w)$	f) $(3x+5y)^2-(2x-4y)^2$
$=25v^2-9w^2$	$=5x^2+46xy+9y^2$
c) $(2m^2-3n^2)^2$	g) $(4x+1)^2-(3x+1)(3x-1)-(7x-3y)(3y+7x)$
$=4m^4-12m^2n^2+9n^4$	$=-42x^2+8x+2+9y^2$
d) $(a+2b)^2-2\cdot(a+b)^2$	
$=-a^2+2b^2$	

2.5)

a) $\frac{5}{7d}+\frac{8}{14d}$	g) $\frac{12p}{33q}\cdot\frac{44q}{24p}$
$=\frac{10}{14d}+\frac{8}{14d}$ $=\frac{18}{14d}=\frac{9}{7d}$	$=\frac{2}{3}$
b) $\frac{5}{4x}+\frac{3}{5x}-\frac{7}{20x}$	h) $\frac{12a^2}{17b}:\frac{6a}{34b^2}$
$=\frac{25}{20x}+\frac{12}{20x}-\frac{7}{20x}$ $=\frac{30}{20x}=\frac{3}{2x}$	$=4ab$
c) $\frac{4}{8d}-\frac{2}{6d}+\frac{9}{24d^2}$	i) $\frac{5x+10y}{3}\cdot\frac{5}{3x+6y}$
$=\frac{12d}{24d^2}-\frac{8d}{24d^2}+\frac{9}{24d^2}$ $=\frac{12d-8d+9}{24d^2}=\frac{4d+9}{24d^2}$	$=\frac{25}{9}=2\frac{7}{9}$
d) $\frac{a}{x+1}-\frac{b}{x-1}$	j) $\frac{5(x^2-y^2)}{2a^2}:\frac{5x+5y}{a}$
$=\frac{a(x-1)}{x^2-1}-\frac{b(x+1)}{x^2-1}$ $=\frac{ax-a-bx-b}{x^2-1}$	$=\frac{x-y}{2a}$
e) $\frac{12rs}{pq}\cdot 2p^2q$	k) $\frac{m+4n}{5x-6y}\cdot\frac{10ax-12ay}{m^2+4mn}$
$=24prs$	$=\frac{2a}{m}$
f) $\frac{3x+4y}{2a-b}-\frac{5x+y}{a+3b}$	l) $\frac{5x}{3(a-2)}:\frac{x}{4(a-2)}$
$=\frac{(3x+4y)(a+3b)}{(2a-b)(a+3b)}-\frac{(5x+y)(2a-b)}{(2a-b)(a+3b)}$ $=\frac{-7ax+14bx+2ay+13by}{2a^2+5ab-3b^2}$	$=\frac{20}{3}$

2.6)

a) $x^4\cdot(x^2+x^3)$
$=x^6+x^7$

b) $4x^5\cdot 3x^{-2}$
$=12x^3$

c) $a^3\cdot b^2\cdot a^2\cdot b^3$
$=a^5\cdot b^5$

d) $\frac{12a^6\cdot b^5}{2a^3b}$
$=6a^3b^4$

e) $(3x)^3\cdot(2y)^3$
$=6^3\cdot x^3\cdot y^3$

f) $(x^4y^5-x^3y^4+x^5y^3):(xy)^2$
$=x^2y^3-xy^2+x^3y$

g) $\left((3x)^3\right)^2$
$=(3x)^6=3^6x^6$

h) $\sqrt[3]{x}\cdot\sqrt{x}$
$=x^{\frac{1}{3}}\cdot x^{\frac{1}{2}}=x^{\frac{5}{6}}=\sqrt[6]{x^5}$

i) $\sqrt[5]{8}:\sqrt[5]{2}$
$=\sqrt[5]{4}$

j) $\sqrt{\sqrt[3]{64}}$
$=\sqrt[6]{64}=2$

3. Gleichungen

3.1)

a) $\frac{1}{3}\cdot x = -\frac{2}{5}$

$x = -\frac{6}{5}$

b) $\frac{x}{5} - \frac{1}{2} = \frac{3}{4}$

$x = \frac{25}{4}$

c) $8x + 2x - 3 = 9 - 2x + 4$

$x = \frac{4}{3}$

d) $14x + 2x = 4x + 48$

x = 4

e) $3x - 10x + 16 = 9 - 12x - 28$

x = -7

f) $\frac{3x-1}{5} + \frac{x-1}{3} = 6$

x = 7

g) $\frac{x}{9} - \frac{2}{5} = \frac{1}{10}$

$x = \frac{9}{2}$

h) $7x - [12 - (3x - 4)] = 5x - [-(2x - 2) - 3]$

$x = \frac{17}{3}$

i) $8(3x - 5) = 60 + 20x$

$x = 25$

j) $3x - 4(2x - 2) + 6 = -2(x + 5)$

x = 8

k) $5(x - 7) - 15 = 36 - 7{,}5x - 4(3{,}5x - 5)$

x = 4

l) $(20 + x)(20 - x) = (x + 2)(46 - x)$

x = 7

m) $(x - 5)(3x + 2) = 3(x - 2)(x - 4) + 1$

x = 7

3.2)

a) $\frac{12}{x+4} = 1$ D = Q \ { –4 } HN: x + 4 12 = x + 4 L = { 8 }	b) $\frac{12}{x+5} + 3 = 4$ D = Q \ { –5 } HN: x + 5 12 = x + 5 L = { 7 }	c) $\frac{4}{x-2} = \frac{6}{x+1}$ D = Q \ { 2; –1 } HN: (x– 2)(x + 1) 4x + 4 = 6x – 12 L = { 8 }
d) $3 - \frac{3}{x-2} = 2$ D = Q \ { 2 } HN: x – 2 3 = x – 2 L = { 5 }	e) $\frac{2}{3x} + \frac{1}{2x} + 1 = \frac{1}{6x}$ D = Q \ { 0 } HN: 6x 4 + 3 + 6x = 1 L = { -1 }	f) $\frac{1}{x-1} + \frac{1}{x+2} = \frac{2}{x}$ D = Q \ { 1; –2; 0 } HN: x(x – 1)(x + 2) L = { 4 }

3.3)

a) I. $9x - y = 41$ II. $y = 3x - 11$ L = { (5/4) }	b) I. $15x + 13y = 17$ II. $x = 5y + 7$ L = { (2/–1) }	c) I. $2x + 3y = -18$ II. $2x = y - 2$ L = { (–3/–4) }
d) I. $2x + y = 36$ II. $x - y = 9$ L = { (15/6) }	e) I. $5x - 2y = 1$ II. $7x - 3y = 1$ L = { (1/2) }	f) I. $7x - 15y = 6$ II. $9x - 10y = 17$ L = { (3/1) }