

Lösung 1:

a)	$12a + 11b$	b)	$17x + 3y$	c)	$61x + 33y$	d)	$42u + 9v$
	$4x + 13y - 2z$		$17a + 3b - c$		$23a + 26b$		$22w - 83z$
	$5u + 6v$		$15u + 2v - 6r + 4t$		0		$54d$
	$6r$		$3 + 9a + b$		$100t - 97$		$80g - 100$
	$14s - 5t + 4$		$12x - 1$		$120x + 116y + 203z$		$45h$

Lösung 2:

a)	a^5b^2	b)	$40a^4b^2$	c)	$12a^2b^2$	d)	$120x^6y^3$
	x^7y^5		$12x^4y^8$		$35a^3b$		$6a^4b^5$
	r^5s^2		$63r^5s$		$36x^4y^2$		$360u^3v^3$
	$a^{10}b$		$18750ab^2$		$6x^5y^7$		$154x^3y^3$
	u^6v^8		$56x^9y$		$60x^2y^2$		$54r^7s^2$
	ab^2		$8t^{11}$		$48x^3y^3$		$32a^3x^5$

Lösung 3:

a)	$45x - 105$	b)	$7ab - ac$	c)	$12ax - 3ay$	d)	$48xy - 40xz$
	$12a - 60b$		$xy - 8xz$		$10rs - 20rt$		$7a - 84ab$
	$9 - 36r$		$20rs - r$		$63uv - 21uw$		$60rs - 15rt$
	$54t - 6q$		$ac - 18bc$		$2xy - 100xz$		$50ab - 70ac$
e)	$5x + 5y - 5z$	f)	$3a + 3b - 3c$	g)	$xy - xz + 5x$	h)	$16ab + 6ac - 10ad$
	$8a + 8b - 32$		$7x - 7y + 35$		$3r - rs + rt$		$15xy - 20xz - 55x$
	$ax + ay - a$		$ad + bd - cd$		$uv - uw - 3u$		$48a - 32b + 56c$
	$rs + r - rt$		$2x - 2y - 8$		$ab - ac - ad$		$9 - 108r - 9r$
i)	$x^2 + 7x$	j)	$16x - 64$	k)	$30x + 12x^2$	l)	$\frac{1}{2}x^2y + \frac{1}{2}x^2z$
	$5a - a^2$		$7a - 49b$		$12a^2 - 36ab$		$2.5ab^2 - 2.5ac^2$
	$r^2 + rs$		$4r^2 + 16$		$5t + 25t^2$		$xyab + xyc$
	$a^2 - ab$		$10 - 100x$		$21ab - 12ac$		$0.3r^2s^2 + 0.3r^2t^2$

Lösung 4:

a)	$9a(b + c)$	b)	$8v(u - w)$	c)	$5u(3v - t)$	d)	$24xy(z + 2)$
	$5r(r - s)$		$ab(3 + c)$		$6s(2r - 3t)$		$5rs(3r - 5s)$
	$7x(y + 1)$		$4y(x + 3z)$		$4x(5x + 6y)$		$20uv(2v - 3w)$

Lösung 5:

a)	$-2b$	b)	$2a - 8$	c)	$3a - 12b$
	$2y$		-11		$15x + 5y$
	$2u - 2v$		$-2a + 2b$		$2a - 2.2b$
	0		$-2y$		$-\frac{4}{3}a + 2b$

Lösung 6:

a)	$-(5 + a)$	b)	$-(r + 9)$	c)	$-(x - y)$	d)	$-(-a + b)$	e)	$-(-x + y)$	f)	$-(-u + 1.7 - v)$
	$-(x + y)$		$-(a - 20)$		$-(4 - q)$		$-(-a + x)$		$-(-a - b + c)$		$-(-\frac{4}{5} - x - y)$
	$-(b + 7)$		$-(c - 11)$		$-(q - 4)$		$-(-x + a)$		$-(-c + d - e)$		$-(+a - b + \frac{1}{2})$

Lösung 7:

a)	$-x + 12y$	d)	$-10x + 4y + 6z$
b)	$9a - 7b$	e)	$-32a$
c)	$x^2 + 3y - x^2y$	f)	$ay + az - bx - bz$

Lösung 8:

a) $x^2 + 4x - 21$	b) $-8a^2 + 22a - 15$	c) $-x^2 - 3xy - 2y^2$
$a^2 + 3a - 88$	$-28x^2 + 25x + 8$	$-a^2 + 12ab - 32b^2$
$-x^2 + 5x + 36$	$a^2 + ab - 2b^2$	$r^2 + rs - 2s^2$
$-a^2 + 15a - 50$	$3x^2 - 16xy + 5y^2$	$5u^2 + 4bu - 5uv - 4bv$
$r^2 - 3r + 2$	$45a^2 - 26ab - 8b^2$	$2a^2 + 23ab + 63b^2$
$64 - t^2$	$28x^2 - 54xy + 18y^2$	$2a^2 + 23ab + 63b^2$

Lösung 9: Löse die Klammern auf.

a) $7x + zx + tx + 7y + yz + ty$	b) $ad + bd + cd - ae - be - ce$	c) $4b + bc - bd - 4a - ac + ad$
$ac + ad - ae - bc - bd + be$	$ux - uy - uz + vx - vy - vz$	$-rx + sx + tx - ry + sy + ty$
$su - sv + sw - ru + rv - rw$	$8r - 8s + 8t - kr + ks - kt$	$-av - bv + cv + au + bu - cu$

Lösung 10:

a) $a^2 + 10a + 25$	b) $36 + 12b + b^2$	c) $x^2 + 22x + 121$	d) $9x^2 + 6xy + y^2$
$a^2 - 14a + 49$	$4 - 4b + b^2$	$400 - 40x + x^2$	$64x^2 - 16xy + y^2$
$a^2 - 9$	$1 - b^2$	$81 - x^2$	$16x^2 - y^2$

Lösung 11:

$$49x^2, \quad 225m^2, \quad 0.04y^2, \quad \frac{1}{25}r^2, \quad \frac{k^2}{100}, \quad x^2y^2$$

Lösung 12:

a) $9p^2 + 24p + 16$	b) $64 + 96r + 36r^2$	c) $25x^2 + 60xy + 36y^2$	d) $16a^2 + 24ab + 9b^2$
$25p^2 - 30p + 9$	$1 - 18r + 81r^2$	$81x^2 - 36xy + 4y^2$	$36a^2 - 60ab + 25b^2$
$4p^2 - 49$	$16 - 25r^2$	$49x^2 - 9y^2$	$81a^2 - b^2$
e) $2.25 + 3x + x^2$	f) $0.04x^2 - 0.4xy + y^2$	g) $\frac{16}{25}x^2 - \frac{8}{5}xy + y^2$	h) $\frac{k^2}{25} - \frac{12}{5}kr + 36r^2$
$x^2 - 1.6x + 0.64$	$x^2 + 5xy + 6.25y^2$	$\frac{1}{4}x^2 + \frac{2}{3}xy + \frac{4}{9}y^2$	$\frac{49}{25}t^2 + \frac{14}{25}rt + \frac{1}{25}s^2$
$a^2 - 10.24$	$x^2 - 0.01y^2$	$\frac{1}{4}x^2 - y^2$	$0.25u^2 - 0.0625v^2$

Lösung 13:

a) $16 - 8x + x^2$	b) $r^2 - 2rs + s^2$	c) $36x^2 - 12xy + y^2$	d) $9a^2 - 12ab + 4b^2$
$x^2 - 6x + 9$	$r^2 + 2rs + s^2$	$16x^2 - 24xy + 9y^2$	$a^2 - ab - 12b^2$
$4 + 4x + x^2$	$r^2 - 2rs + s^2$	$25x^2 + 70xy + 49y^2$	$64u^2 - 32uv - 21v^2$

Lösung 14:

a) $5a^2 + 11ab + 10b^2$	g) $13x^2 + 4xy$
b) $28a^2 - 18ab - 2b^2$	h) $-4x^2 - 8xy + 37y^2$
c) $50a^2 + 8ab + 15b^2$	i) $3x^2 - 6xy - 10y^2$
d) $100a^2 + 4ab + 2b^2$	j) $-32xy$
e) $10a^2 + 12ab + 10b^2$	k) $21x^2 + 46xy - 7y^2$
f) $5a^2 - 8ab + 5b^2$	l) $24x^2 - 24y^2$

Lösung 15:

a) $a(5 + x + y)$	b) $x(12 - y + x)$	c) $ab(6 - a + b)$
$b(8 + c + d)$	$a(3b + 9 - x)$	$x^2(9 - 2y - z)$
$x(y + 7 + x)$	$r(4s - t + 1)$	$uv(1 - w - u)$

Aufgabe 16:

$$\begin{array}{lll} \text{a)} & (3+a)x + (5+b)y & \text{b)} \quad x(1-y) + r(s-1) \quad \text{c)} \quad x(4+y) - a(3+b) \\ & (8-b)a + (3+v)u & b(a-b) + s(r+s) \quad a(7-a) - x(y-5) \end{array}$$

Lösung 17:

$$\begin{array}{lll} \text{a)} & (x+y)(a+3) & \text{b)} \quad (a-b)(5-b) \quad \text{c)} \quad (x+z)(7+y) \\ & (x+y)(a+b) & (3-x)(x-y) \quad (a-b)(c-d) \\ & (r+s)(1-s) & (a-1)(b+c) \quad (r+1)(u-v) \end{array}$$

Lösung 18:

$$\begin{array}{lll} \text{a)} & (2+b)(a+c) & \text{b)} \quad (a+b)(x+a) \quad \text{c)} \quad (a-b)(4+x) \\ & (5-y)(x+z) & (x+y)(y-z) \quad (v-x)(u-w) \\ & (a+b)(x+y) & (r+5)(r-s) \quad (a+b)(1+b) \end{array}$$

Lösung 19:

$$\begin{array}{llll} \text{a)} & (u+v)(u-v) & \text{b)} \quad (5+x)(5-x) & \text{c)} \quad (0.5+b)(0.5-b) \quad \text{d)} \quad (3x+y)(3x+y) \\ & (r+s)(r-s) & (7+t)(7-t) & (0.1+x)(0.1-x) \quad (a+2b)(a-2b) \\ & (x+y)(x-y) & (a+4)(a-4) & (a+1.2)(a-1.2) \quad (r+10s)(r-10s) \\ & (k+m)(k-m) & (r+1)(r-1) & (k+3.2)(k-3.2) \quad (9u+v)(9u-v) \\ \\ \text{e)} & (4a+3b)(4a-3b) & & \\ & (8x+5y)(8x-5y) & & \\ & (0.7r+0.1s)(0.7r-0.1s) & & \\ & (1.3p+1.1q)(1.3p-1.1q) & & \end{array}$$

Lösung 20:

$$\begin{array}{lll} \text{a)} & (x+y)^2 & \text{b)} \quad (a+10)^2 \quad \text{c)} \quad (5-x)^2 \\ & (r-s)^2 & (x-10)^2 \quad (6+b)^2 \\ & (x+7)^2 & (a-1)^2 \quad (10-x)^2 \end{array}$$

Lösung 21:

$$\begin{array}{lll} \text{a)} & (4x+10y)^2 & \text{b)} \quad (2a-6)^2 \quad \text{c)} \quad (3x+5y)^2 \\ & (3a-8b)^2 & (12+7y)^2 \quad (2a-7b)^2 \\ & (7r+9s)^2 & (30-4t)^2 \quad (4u-v)^2 \\ & (u-11v)^2 & (x+100)^2 \quad (10r+s)^2 \end{array}$$

Lösung 22:

$$\begin{array}{lll} \text{a)} & (5x+8y)(5x-8y) & \text{b)} \quad (4a-b)^2 \quad \text{c)} \quad (0.25a+2b)^2 \\ & (2a+3b)^2 & (20x+9y)(20x-9y) \quad (3x+0.1y)^2 \\ & (7r-3s)^2 & (6u+v)^2 \quad (0.2r+0.8s)(0.2r-0.8s) \end{array}$$

Lösung 23:

$$\begin{array}{lll} \text{a)} & 2(2a+7b)(2a-7b) & \text{b)} \quad 3(6x+7y)^2 \quad \text{c)} \quad 100(4x-3y)^2 \\ & 3(3x-y)(3x+y) & 6(2a-5b)^2 \quad 11(a+2b)^2 \\ & 10(9u-2v)^2 & 20(7u+4v)(7u-4v) \quad 500(r+5)(r-5) \end{array}$$

Lösung 24:

$$\begin{array}{llll}
\text{a)} & \frac{2a}{a^2-b^2} & \text{d)} & 0 \\
\text{b)} & \frac{2y}{x^2-y^2} & \text{e)} & 2\frac{a^2+b^2}{a^2-b^2} \\
\text{c)} & \frac{2x^2-3y^2}{x^2-y^2} & \text{f)} & \frac{-4ab}{a^2-b^2}
\end{array}
\quad
\begin{array}{llll}
\text{g)} & \frac{-4a^2-6ab+8b^2}{a^2-b^2} & \text{j)} & \frac{b^2+2ab}{a^2+ab} \\
\text{h)} & \frac{y-1}{x^2-y^2} & \text{k)} & \frac{a^2b+ac+bc}{ab(a+b)} \\
\text{i)} & \frac{7x+3y}{x^2+xy} & \text{l)} & \frac{9axy-5bx+5by}{xy(x-y)}
\end{array}$$

Lösung 25:

$$\begin{array}{llll}
\text{a)} & \frac{9x^2z-10xy^2}{3y^2z} & \text{d)} & \frac{u^2+3uv}{6v^2} \\
\text{b)} & \frac{15a^2c-8a^2b}{10b^2c} & \text{e)} & \frac{b^2-a^2}{2ab} \\
\text{c)} & \frac{8x^2+3y^2}{8y^2} & \text{f)} & 16ab^2-20a^2b
\end{array}
\quad
\begin{array}{llll}
\text{g)} & \frac{172}{35}a^3o^2 & \text{j)} & \frac{a^2+2ab+b^2}{a^2b^2} \\
\text{h)} & \frac{b^2-a^2}{a^2b^2} & \text{k)} & \frac{a^2-2ab+b^2}{a^2b^2} \\
\text{i)} & \frac{b^2-a^2}{b^2} & \text{l)} & \frac{a^2c^2+2ab^2c+b^4}{b^2c^2}
\end{array}$$

Lösung 26:

$$\begin{array}{llll}
\text{a)} & \frac{ac}{bd} & \text{c)} & \frac{2ac}{5b^2} \\
\text{b)} & \frac{2x^2}{3y^2} & \text{d)} & \frac{ax}{4by}
\end{array}
\quad
\begin{array}{llll}
\text{e)} & \frac{28a^2y}{27b^3} & \text{g)} & \frac{3ac}{32b} \\
\text{f)} & \frac{5}{2y^2} & \text{h)} & \frac{2y}{5x}
\end{array}$$

Lösung 27:

$$\frac{x^2}{4}, \quad \frac{4x^2}{y^2}, \quad \frac{u^2}{v^2}, \quad \frac{16a^2b^2}{49x^2}, \quad \frac{64p^2r^2}{9x^2y^2}$$

Lösung 28:

$$\begin{array}{llll}
\text{a)} & \frac{a^2-b^2}{c^2-d^2} & \text{c)} & \frac{2ax+2ay+x+y}{3x-3y} \\
\text{b)} & \frac{5a}{2b} & \text{d)} & \frac{8x^2-2x-15}{x^2-16}
\end{array}
\quad
\begin{array}{ll}
\text{e)} & \frac{a^2+2ab+b^2}{x^2-2xy+y^2} \\
\text{f)} & 2x
\end{array}$$

Lösung 29:

$$\begin{array}{llll}
\text{a)} & 3a & \text{d)} & \frac{4x^2+4xy}{7y} \\
\text{b)} & \frac{8y}{5} & \text{e)} & \frac{a^2-b^2}{a^2+b^2} \\
\text{c)} & \frac{64a^2b}{3} & \text{f)} & \frac{x^2+2xy+y^2}{x-y}
\end{array}
\quad
\begin{array}{ll}
\text{g)} & \frac{a-b}{x+y} \\
\text{h)} & \frac{-24a-12b}{7a} \\
\text{i)} & \frac{-3x^2z+3xyz}{x+y}
\end{array}$$

Lösung 30:

$$\begin{array}{llll}
\text{a)} & \frac{an}{bm} & \text{d)} & \frac{3b}{2} \\
\text{b)} & \frac{vx}{uy} & \text{e)} & \frac{2a^2}{5b^2} \\
\text{c)} & \frac{3}{5b} & \text{f)} & \frac{748c^2u}{875my^2}
\end{array}
\quad
\begin{array}{ll}
\text{g)} & \frac{15a^2b^2}{4c^2} \\
\text{h)} & \frac{3ax}{2by} \\
\text{i)} & \frac{8acx^2}{3yz}
\end{array}$$

Lösung 31:

$$\begin{array}{llll}
\text{a)} & \frac{a^2-b^2}{c^2-d^2} & \text{c)} & \frac{3}{2} \\
\text{b)} & \frac{x^2+xy}{u^2-v^2} & \text{d)} & \frac{a+b}{a-b}
\end{array}
\quad
\begin{array}{llll}
\text{e)} & a+b & \text{g)} & 1 \\
\text{f)} & \frac{5a-5b}{8} & \text{h)} & 1
\end{array}$$

Lösung zu Frau Knecht's Übungen:

1.

1. $2a - 3b$
2. $3m - 5n$
3. $3p - 2q + 1$
4. $7p + 10q - 7$
5. $2a - 5b$
6. $-m - 3n + 6$
7. $2p - 3q$
8. $3x^2 - x + 5$
9. $a^2 + 3a$
10. $-a^3 - 3a^2b + 5ab^2 - ab$
11. $-3xy^2 + 3x - 8x^2y - 4y^2$

2.

- | | |
|--------------------------|------------------|
| 1. $-a^5$ | |
| 2. a^5 | |
| 3. $6a^5$ | 19. $-y^2z^2$ |
| 4. $72x^5$ | 20. $-c$ |
| 5. $6x^5$ | 21. $-x$ |
| 6. $-72x^5$ | 22. nicht def. |
| 7. a^4 | 23. -1 |
| 8. a^4 | 24. $-(x - y)^2$ |
| 9. $-\frac{1}{4}a^7$ | |
| 10. $-4a^7$ | |
| 11. xy | |
| 12. 0 | |
| 13. $35a^4 - 42ab^3$ | |
| 14. $-15a^3b^2 + 12a^4b$ | |
| 15. $8p^3q^3 + 6pq^4$ | |
| 16. $8x^6y^3 - 3x^4y^5$ | |
| 17. $-5a + 3$ | |
| 18. $-4y^2$ | |

Aufgabe 1: Lösungen

- a) $4x(x^2 + 3 - 8x)$
- b) $(4x + 5)(y + z)$
- c) $2(a - 2b + 3)$
- d) $3(4a - 5b + 3)$
- e) $3(4a - 3b + 5)$
- f) $5(3a - 4b + 2)$
- g) $3(3a + 4b - 6)$
- h) $4a(2b - 3c + 4)$
- i) $4y(6x - 4a + 3)$
- j) $2(3x - 2y + 4z)$
- k) $4(2x - 3y + 4)$
- l) $2(4x + 3y + 2)$
- m) $2(5x - 4y - 2)$
- n) $4a(3x - y + 2)$
- o) $6x(a - 2b + 1)$
- p) $3a(6z - 3 + 2y)$
- q) $3(3z + 2)$
- r) $5(2x - 3)$
- s) $7(y^2 - 2)$
- t) $7y(y - 2)$
- u) $7(3x + 5y - 2z)$
- v) $7(8x - 2z)$
- w) $7x(3x - 7)$
- x) $0.25a(a - 3)$

Aufgabe 2: Lösungen

- a) $-5(a - 2b + 3ab)$
- b) $-6(4a^2 + 2a - b)$
- c) $-a(3 - 7b + 8a)$
- d) $-b(-b + 3 - 2a)$
- e) $-4a(-3 + a)$
- f) $-7a(2a - 9)$
- g) $-6x(-x + 3y)$
- h) $-8x(-3x - 8y)$

Aufgabe 3: Lösungen

- a) $6e^2 f^2 (7e^2 - 5ef^4 + 12f^3)$
- b) $15x^3 y^2 (4x - 6xy^3 + 1)$
- c) $20a^2 b^4 (-4a^3 c^3 - 5abc^3 + 8b^2)$
- d) $12g^4 h (7f^3 gh + 1 - 3f^4 gh^5)$
- e) $(a - b)(2a - 3b + 7)$
- f) $(x + y)(7x + y - 1)$
- g) $(a + b)(3c - 5d)$
- h) $(x - y)(2a^2 - 5ab + 7b^2)$
- i) $(3f + g - 2h)(2k - 5l + 1)$
- j) $(1.6a^4 + 1.7b^3 c^2)(1.6a^4 - 1.7b^3 c^2)$
- k) $(12x^4 y^2 + 5z^3)^2$
- l) $(5e^2 f^3 - 17gh^2)^2$
- m) $6a^2 b^3 (5a - 9b^2)^2$
- n) $18x^4 y (2x^2 + 1)^2$
- o) $(18k + 2l^2 m - 3n)(18k - 2l^2 m + 3n)$
- p) $(4a^2 b^3 - 3c^2 + 5fg^3)(4a^2 b^3 - 3c^2 - 5fg^3)$
- q) $(7a - 5b^2 + 4c + 7d^2)(7a - 5b^2 - 4c - 7d^2)$
- r) $(u - 2v)(2w^2 - 7x)^2$
- s) $(3rs^2 + 2t^3)^2 (3rs^2 - 2t^3)^2$

Lösungen: Bruchterme addieren

$$\begin{array}{cccc}
\frac{4d+2b}{bd} & \frac{3m+6y}{my} & \frac{2x-5bx}{2b} & \frac{4x+2y-y^2}{xy} \\
\frac{dxy-2byz}{bd} & \frac{x^3z-2yz^3}{3y} & \frac{x^2+y^2}{xy} & \frac{2mz+5nz}{mn} \\
\frac{7dx-10bx}{2bd} & \frac{2ab^2c+4cd^2e}{bd} & \frac{2y^2-4xz}{xy^2} & \frac{-5xy}{3} \\
\frac{-7y}{8} & \frac{8d^2}{15} & \frac{15c^3v^4x-5c^2x}{3v^5} & \frac{3a+6b^2}{5a^2} \\
\frac{2m^2-3m^3}{n} & \frac{x^2+1}{x^2-1} & \frac{x^2+y^2}{x^2-y^2} & 2\frac{z^2+y^2}{z^2-y^2} \\
2x & \frac{1}{1+a} & \frac{b^2-1}{b} & \frac{-u^2+uv^2+v^3}{u^2-v^2} \\
\frac{2e}{e^2-f^2} & \frac{b-b^3-a+a^3}{(1-a^2)(1-b^2)} & \frac{c^2+c+2}{c+1} & \\
\frac{7x^2-3x-1}{x^2(x-1)} & 2\frac{y^2+2^2}{(y-2)^2(y+2)} & &
\end{array}$$

Lösungen: Bruchterme multiplizieren

$$\begin{array}{cccc}
b & \frac{c^2}{4x^2} = \left(\frac{c}{2x}\right)^2 & \frac{8}{27} & \frac{z}{c} \\
\frac{2x}{z} & \frac{3}{2} & \frac{2x^2}{3(x+1)} & \frac{2y}{3} \\
\frac{2v(v+2)}{3(v-1)} & \frac{g(g+h)}{g-h} & \frac{2}{3} & \frac{g}{8fd} \\
\frac{b}{a+b} & \frac{c(c+d)^2}{d(c-d)} & \frac{x}{2(x-1)} & \frac{a(a+b)}{2} \\
\frac{e-f}{2f} & \frac{y+z}{2xy(x-y)} & \frac{v}{x-1} & \frac{6}{5x^2} \\
\frac{2}{x(2x+1)} & \frac{y^2}{y+bx} & \frac{-1}{m+2} &
\end{array}$$

Lösungen: Bruchterme dividieren

$$\begin{array}{cccc}
18c^4 & 4 & \frac{5}{16} & \frac{5a^2cb}{4x^2y^2z} \\
\frac{8n}{z^m m} & \frac{3um}{10n} & \frac{3(y-1)}{2y^2} & \frac{2z}{3u} \\
\frac{(g-1)(h+2)}{4gh} & \frac{k(h+3f)}{9f^2} & \frac{2c}{3x} & \frac{3x^2}{4z} \\
\frac{b+c}{a+c} & \frac{z+2}{4(z-1)} & \frac{4}{y+1} & \\
\frac{z^2+1}{z-1} & \frac{u+3}{u-3} & \frac{2(c-4)}{c^2(c+4)} & \\
\frac{9}{v(2v+1)} & \frac{2a+3xb}{2x(a+b)} & &
\end{array}$$

Lösungen: Vermischte Aufgaben

$$\begin{array}{cccc}
 \frac{10xz + 9y^2}{30y^2z} & \frac{5m + 8n}{40} & \frac{4v^2}{u^2} = \left(\frac{2v}{u}\right)^2 & \frac{2(4x + 2y - y^2)}{x^2y} \\
 \frac{2(x^2y^2)}{x^2y} & 2m + 5n & \frac{7x^2 - 5}{x^3} & \frac{8ab^2 + 4cd^2}{abd} \\
 \frac{y^2 - 2 + 5y}{y^4} & \frac{x + y + z}{xyz} & \frac{y - x - 2}{2x^2y^2} & \frac{wx - 2w}{4x^2} \\
 \frac{x}{x + 1} & \frac{y}{x - y} & \frac{z^2 + 4yz - y^2}{z^2 - y^2} & 1 + 2a \\
 \frac{51a^2b - 20ab^2 - 8ab - 2a^2 - 5b + 4a + 10}{30ab} & & & \frac{-30x^2y + 8xy^2 - 7xy + 12x^3 + 37y^2}{24x^2y^2} \\
 \frac{27abc - 10a^2c + 30b^2c - 12ab^2 - 15a^2b + 40a^2c}{30abc} & & & \\
 \frac{8a^2x - 3xy - 15ax}{60a^2xy} & & & \\
 \frac{4p + 5q}{2p} & \frac{-9v + 33w}{3v - 9w} & \frac{z - y - x^2 + y^2 + z^2 + zy}{z + y} & \frac{60v^2w + 4v^2 + 2w}{30vw} \\
 \frac{9v - 2w}{2vw} & \frac{3p^2 - 9q^2 + 27pq}{p(3q + 9p)} & \frac{z^3 - yz^2 - y^2z + y^3 + y^2 + zy}{x^2 - y^2} & \frac{x^2 + x + y + y^2}{6xy}
 \end{array}$$

Lösungen zu Bruchterme und Bruchgleichungen

Lösung zu 1. Welche Zahlen darf man nicht einsetzen? Bestimme die Definitionsmenge des Bruchterms.

- a) $\mathbb{D} = \mathbb{Q} \setminus \{4\}$ b) $\mathbb{D} = \mathbb{Q} \setminus \{0.5\}$ c) $\mathbb{D} = \mathbb{Q} \setminus \{-3, 0\}$ d) $\mathbb{D} = \mathbb{Q} \setminus \{-1, 1\}$ e) $\mathbb{D} = \mathbb{Q} \setminus \{-7\}$
f) $\mathbb{D} = \mathbb{Q} \setminus \{0, 2\}$ g) $\mathbb{D} = \mathbb{Q} \setminus \{5\}$ h) $\mathbb{D} = \mathbb{Q} \setminus \{-3.5, 3.5\}$ i) $\mathbb{D} = \mathbb{Q} \setminus \{-3\}$

Lösung zu 2. Kürze so weit wie möglich.

- a) $\frac{8}{3x}$ b) $\frac{13}{29}$ c) $\frac{2}{5}$ d) $\frac{2}{3}$ e) $\frac{1}{x}$ f) $\frac{x+y}{2}$ g) $\frac{3}{2(xy+1)}$ h) $\frac{1}{3}$ i) $\frac{5x}{8z}$ j) $\frac{ac}{ef}$ k) $-\frac{7}{8}$ l) $\frac{x-1}{x-3}$ m) $\frac{x}{y}$ n) $\frac{xy}{2}$ o) -1 p) $-a^2 + b^2$

Lösung zu 3. Kürze so weit wie möglich.

- a) $\frac{x+3}{2}$ b) 3 c) -1 d) $\frac{x+14}{7-y}$ e) $\frac{8}{9}$ f) $\frac{2y}{xz}$ g) $\frac{1}{x-1}$ h) $\frac{1}{x+3}$ i) $\frac{x}{x+y}$

Lösung zu 4. Erweitere auf den Nenner N.

- a) $\frac{3x(x-1)}{9x^2}$ b) $\frac{-x^2(x-y)}{x^2(4-y)}$ c) $\frac{2 \cdot 7}{2x-4}$ d) $\frac{x(x-1)}{x^2-1^2}$

Lösung zu 5. Berechne und kürze das Ergebnis.

- a) $\frac{5}{x}$ b) 1 c) $\frac{6}{7}$ d) y e) 3 f) $\frac{1}{x-1}$

Lösung zu 6. Berechne und kürze das Ergebnis, wenn möglich.

- a) $\frac{7}{27x}$ b) $\frac{3y+4x}{xy}$ c) $\frac{2x-15y}{5x^2y^2}$ d) $\frac{5x-2}{x(x-1)}$ e) $-\frac{y+x}{xy}$ f) $\frac{2+3x^2}{6xy}$ g) $\frac{1}{4}$ h) $\frac{2}{3(x-1)}$ i) $\frac{2}{x-1}$
j) $\frac{1}{x+3}$

Lösung zu 7. Berechne und kürze, wenn möglich.

- a) $\frac{x^2}{12}$ b) $\frac{1}{3}$ c) $\frac{ab}{c}$ d) $\frac{ac}{b}$ e) x^2 f) y^2 g) $\frac{a^3}{6b^2}$ h) $\frac{32}{27a}$ i) $\frac{(3x-4)(x-2)}{(x+1)(x+3)}$ j) $\frac{x^2+3}{2(x+3)}$
k) $\frac{8}{3x}$ l) $\frac{4}{y^2}$ m) $\frac{3}{2x(x-1)}$ n) $\frac{x-2}{(x^2-y)(x-y)}$

Lösung zu 8. Löse die Bruchgleichung.

- a) $x = 3$ b) $x = 0$ c) $x = -4$ d) $x = 2$ e) $-3 = 5$ f) $x = 0$ g) $x = 6$ h) $x = ?$ (keine Lösung)
i) $x = 9$ j) $x = -4$ k) $x = 4$

Lösung zu 9. Löse die Bruchgleichung.

- a) $x = 5$ b) $x = 3$ c) $x = 4$ d) $x = 4$ e) $x = -1$ f) $x = 1$

Lösung zu 10. Löse die Bruchgleichung.

- a) $x = 12$ b) $x = 8$ c) $x = 3$ d) $x = -1$ e) $x = ?$ keine Lösung f) $x \in \mathbb{Q}$ g) $x = 1$
h) $x = 5$

Lösung zu 11. Löse die Bruchgleichung.

- a) $x = 8$ b) $x = 2$ c) $x = 3$ d) $x = 1$ e) $x = 13$ f) $x = -5$ g) $x = 0$ h) $x = -3$

Lösung zu 12. Bestimme die Lösungsmenge.

- a) $\mathbb{L} = \{x | x < -2 \vee x > 2\}$ b) $\mathbb{L} = \{x | 2 < x < 4\}$ c) $\mathbb{L} = \{x | x < \frac{1}{2} \vee x > \frac{3}{2}\}$ d) $\mathbb{L} = \{x | 1 < x < 2\}$ e) $\mathbb{L} = \{x | x < -4\}$ f) $\mathbb{L} = \{x | x > -\frac{5}{2} \wedge x \neq 0\}$ g) $\mathbb{L} = \{x | -2 < x < 0\}$
h) $\mathbb{L} = \{x | -1 < x < 1\}$ i) $\mathbb{L} = \{x | 0 < x < 3\}$

Lösung zu 13. Löse die Gleichung nach x auf.

- a) $x = \frac{a+7}{5}$ b) $x = \frac{3a-5}{2}$ c) $x = \frac{1-a}{4}$ d) $x = \frac{a+b}{2}$ e) $x = \frac{4a-3b}{24}$ f) $x = \frac{1}{3(a+b)}$ g) $x = \frac{a}{2}$
h) $x = \frac{2+a}{2}$ i) $x = \frac{1}{x+1}$ j) $x = b - 2a$ k) $x = -b - a$ l) $x = \frac{2ab}{b-a}$ m) $x = \frac{a^2+3a-b+1}{a+1}$