



Bruchterme

Aufgabe 1: Die Bruchterme sind weitgehend zu kürzen.

a) $\frac{8ab}{64a^2b^2}$	b) $\frac{24a^2}{24ab}$	c) $\frac{-27a^5}{9a^4}$
d) $\frac{12a^3xy}{10x^2}$	e) $\frac{-45abm^3n}{-10mn^2}$	f) $\frac{15x^2y}{35xy^2}$
g) $\frac{80a^4b^2}{48ab^5}$	h) $\frac{-9z^2}{-12yz}$	i) $\frac{27x^3y^2z}{81xy^2z^3}$
j) $\frac{(a+b)^3}{(a+b)^2}$	k) $\frac{165r^2s^3t^7}{187r^5s^6t^4}$	

Aufgabe 2

a) $\frac{28a-35b}{21}$	b) $\frac{5x+5y}{25x+25y}$	c) $\frac{8a+16b}{24a-8b}$
d) $\frac{36}{9a-18b}$	e) $\frac{ac}{ab+ac}$	f) $\frac{7x-7y}{xy-x^2}$
g) $\frac{x^2+xy}{xy}$	h) $\frac{360c^2-90c}{45c}$	i) $\frac{-b}{b^2+b}$
j) $\frac{x^2y^3-x^4y^2}{x^6y-x^4y^2}$	k) $\frac{92a+46b}{23}$	l) $\frac{25}{5x+10}$
m) $\frac{2mn-2m^2}{5m-5n}$	n) $\frac{18a^2bc}{18a^2b^2c+54a^2bc^2}$	o) $\frac{rs+rt}{sx+tx}$
p) $\frac{12ax-18ay}{24ap+30aq}$	q) $\frac{25y^2-15xy}{9x^2-30xy+25y^2}$	r) $\frac{4a^2+25b^2}{2a+5b}$

Aufgabe 3

a) $\frac{x^2-25}{x^2+10x+25}$	b) $\frac{x^2-2x+1}{x^2-x}$	c) $\frac{a^4-1}{a^2+1}$
d) $\frac{x^2-2xy+y^2}{2x-2y}$	e) $\frac{4a^2-20ab+25b^2}{2ac-5bc}$	f) $\frac{x^2-y^2}{x^4-y^4}$
g) $\frac{9x^2-16y^2}{8y-6x}$	h) $\frac{5x-5z}{x^2-z^2}$	i) $\frac{x^3-2x^2+x}{2x-2}$
j) $\frac{x^4-2x^2+1}{x^3-x}$	k) $\frac{4x-4ax}{4a^2-4}$	l) $\frac{x^4-16}{x+2}$
m) $\frac{15a^2-35ab+9ac-21bc}{9ab-15ac-21b^2+35bc}$		

Aufgabe 4

a) $\frac{x^2 - 7x + 12}{x^2 - 16}$

d) $\frac{x^2 - 9x + 20}{x^2 + x - 20}$

g) $\frac{x^2 - 3x - 40}{x^2 - 6x - 16}$

j) $\frac{x^2 - 10x + 16}{x^2 - 6x - 16}$

m) $\frac{30mn + 36n^2}{25m^2 - 36n^2}$

b) $\frac{3a + 3b}{a^2 + 5ab + 4b^2}$

e) $\frac{m^2 + m - 2}{m^2 - m}$

h) $\frac{p^2 - 5pq + 4q^2}{p^2 - 4pq + 4q^2}$

k) $\frac{255 + 32a + a^2}{2a + 30}$

n) $\frac{8ax - 6bx}{6bx^2 - 8ax^2}$

c) $\frac{a^2 - a - 30}{a^2 + 10a + 25}$

f) $\frac{x^2 - 10x + 9}{x^2 - 8x - 9}$

i) $\frac{b^2 + 13b}{b^2 + 2b - 143}$

l) $\frac{x^2 - 13x - 90}{x^2 - 20x + 36}$

o) $\frac{3x^2 - 2xy - 8y^2}{2x^2 - 8y^2}$

Aufgabe 5

a) $\frac{ax + ay + bx + by}{2x + 2y}$

d) $\frac{4x^2 - 4x + cx - c}{5x - 5}$

g) $\frac{m^2 - mn - 4m + 4n}{m^2 - 16}$

j) $\frac{ax + ay + bx + by - cx - cy}{x + y}$

b) $\frac{9a^2 - 9ab}{a^2 - ab + ac - bc}$

e) $\frac{ab - 6b + a - 6}{ab + a}$

h) $\frac{12ab - 3a + 8b - 2}{12ab + 8b}$

c) $\frac{3ab - 15a - 2b^2 + 10b}{5b^2 - b^3}$

f) $\frac{40ax - 60bx + 32ay - 48by}{24ax - 36bx + 16ay - 24by}$

i) $\frac{uw - 3vw}{u^2 + uw - 3uv - 3vw}$

Aufgabe 6

a) $\frac{8a}{27b} \cdot \frac{9bc}{16a}$

d) $44x^2y^2 \cdot \frac{-2x^3}{11y^3}$

g) $pq \frac{p}{q}$

j) $\frac{-x^2y}{28z^3} \cdot \frac{7z^2}{x^2y^2}$

b) $3a \frac{4}{5a}$

e) $\frac{-21u^2v}{26v^4} \cdot \frac{-39v}{28uw^3}$

h) $(-a) \frac{-b}{c}$

k) $6ab \frac{9a}{4b}$

c) $\frac{-a}{b} \cdot \frac{-b}{c} \cdot \frac{-c}{a}$

f) $\left(\frac{-a}{b}\right)^3$

i) $a \frac{-b}{c}$

l) $\left(\frac{-2}{ab^2}\right)^3$

Aufgabe 7

a) $4z \frac{z+1}{8z^2+12z}$

d) $(q-1) \frac{5}{q^2-1}$

g) $(d-5) \frac{d}{d^2-8d+15}$

b) $\frac{5x+5y}{8x-8y} \cdot \frac{20x-20y}{3x+3y}$

e) $\frac{x^2+y^2}{x^2-y^2} \cdot \frac{x-y}{xy}$

h) $(3x+3y) \frac{9}{x+y}$

c) $\frac{5a^2}{5b-3} \cdot \frac{9-15b}{10ac}$

f) $\frac{7r^2s}{12(r-s)} \cdot \frac{(2s-2r)^2}{21rs^2}$

i) $\frac{d-1}{18d} \cdot \frac{12d^2}{1-d}$

$$j) \frac{t}{4u-4v} \cdot \frac{3u^2-3v^2}{t^2+t} \quad k) \frac{v^2+4v+4}{3t-3} \cdot \frac{9t-9}{v^2+5v+6}$$

Aufgabe 8

$$a) xy \left(\frac{x}{y} - \frac{y}{x} \right) \quad b) \left(c - \frac{d}{c} \right) \left(c + \frac{d}{c} \right) \quad c) \left(\frac{n}{2} - \frac{1}{n} \right)^2$$

$$d) -\frac{r^2}{s^2} \left(\frac{s}{r} - \frac{s^2}{r^2} + \frac{s^3}{r^3} \right) \quad e) (u-z) \left(\frac{u}{u-z} - \frac{z}{u^2-z^2} \right) \quad f) \left(\frac{p}{q} - 1 \right)^2 - \left(\frac{p}{q} + 1 \right)^2$$

$$g) \frac{u^2-v^2}{u^2+v^2} \left(\frac{u}{u+v} + \frac{v}{u-v} \right) \quad h) \left(\frac{x}{3} - \frac{y}{2} \right) \left(\frac{x}{2} + y \right) - \left(\frac{x}{3} + y \right) \left(\frac{x}{2} - y \right)$$

$$i) \frac{25xy}{24(x+y)} \cdot 32(xy+y^2) \quad j) \frac{36(a^2+ab)}{11(a+b)^2} : \frac{48(ab+b^2)}{33(a^2-b^2)}$$

$$k) \left(\frac{a^2}{x^2} + \frac{ab}{xy} + \frac{b^2}{y^2} \right) \left(\frac{x}{a} - \frac{y}{b} \right) \quad l) \frac{a^2+3a+2}{4p^2-9} : \frac{a+2}{2p-3}$$

Aufgabe 9

$$a) \frac{u^2}{v^2} : u \quad b) \frac{5km}{6} : \frac{3k}{2m} \quad c) 19r^2s^2 : \frac{19r^2s^2}{23t}$$

$$d) \frac{112u^2}{19xyz} : \frac{-7u}{19xyz} \quad e) \frac{xy}{wz} : (yz) \quad f) 21u^2v : \frac{7u^3}{9v^2}$$

$$g) \frac{-78f}{85h^3} : \frac{-48f^2}{85h^3} \quad h) \frac{x^3}{z} : \frac{-x^2}{z} \quad i) \frac{-14xy}{9z^3} : \frac{21x^2}{99z^2}$$

$$j) \frac{-72a^9}{c} : (-24a^3) \quad k) -\frac{abc}{3} : (ab^2) \quad l) \frac{9c^2d}{ab} : (9c^2d)$$

Aufgabe 10

$$a) \frac{25a^2-1}{3} : (5a+1) \quad b) \frac{m^2-m-12}{a^2} : \frac{m-4}{a^2-a} \quad c) (1-p) : \frac{4(p-1)}{3}$$

$$d) \frac{a+b}{c} : (2a+2b) \quad e) \frac{15}{a+b} : \frac{3}{a+b} \quad f) \frac{12x-12y}{a+b} : (12a)$$

$$g) \frac{xy-y^2}{x+y} : \frac{3x-3y}{x-y} \quad h) (m^2-n^2) : \frac{m+n}{m-n} \quad i) \frac{162a^9}{a^2+ab-2b^2} : \left(\frac{-36a^3}{a-b} \right)$$

$$j) \frac{a^4-1}{ac-c^2} : \frac{4a+4}{a^2-ac-ab+bc} \quad k) (a-b)(a-c) : \frac{a^2-b^2}{a-c} \quad l) \frac{m^2-m}{m+2} : \frac{m^2-1}{4m+8}$$

Aufgabe 11

$$a) \left(a^2 + \frac{a}{b} \right) : \frac{a}{b} \quad b) \left(\frac{x^4}{y^4} - x^3 \right) : \left(-\frac{x^2}{x} \right) \quad c) \left(x^2 - \frac{1}{y^2} \right) : \left(x + \frac{1}{y} \right)$$

$$\begin{array}{lll} \text{d)} & \left(4xy - \frac{2x}{y}\right) : \frac{2x}{y} & \text{e)} & \left(\frac{x^2y}{4} - \frac{5xy^2}{6} - 10\right) : \frac{5xy}{8} & \text{f)} & \left(u^2 + \frac{u}{v}\right) : \frac{u}{v} \\ \text{g)} & \left(4x - \frac{5xy}{7z} + \frac{9xy^2}{14z^2}\right) : \left(-\frac{3xy}{7z^2}\right) & \text{h)} & \left(1 - \frac{1}{n^2}\right) : \left(1 + \frac{1}{n}\right) & & \end{array}$$

Aufgabe 12

$$\begin{array}{lll} \text{a)} & 4a - \frac{4a^2 + 5}{a-1} & \text{b)} & \frac{17a-15}{39} - \frac{8a+9}{26} & \text{c)} & \frac{5c}{6a^3} + \frac{c}{3a^2} \\ \text{d)} & 5a-1 + \frac{3}{a} & \text{e)} & \frac{5a+3b}{c} - 3a-b & \text{f)} & \frac{1}{a} + \frac{1}{a^2} + \frac{1}{a^3} \\ \text{g)} & 1 - \frac{c-d}{c+d} & \text{h)} & \frac{8}{m} - \frac{11}{n} + \frac{6}{p} & \text{i)} & \frac{5}{2ac} + \frac{3}{5cd} \\ \text{j)} & \frac{5b^2}{8} + \frac{3b^2}{6} & \text{k)} & \frac{2a-3b}{24} - \frac{5a+b}{32} - \frac{9a-4b}{40} - \frac{b}{80} & & \\ \text{l)} & \frac{3a-c}{12ac} - \frac{5a-b}{10ab} - \frac{7b-c}{15bc} + \frac{4ac-3ab}{30abc} & & & & \end{array}$$

Aufgabe 13

$$\begin{array}{lll} \text{a)} & \frac{2}{x+y} + \frac{2}{x-y} & \text{b)} & \frac{a}{ab-b^2} - \frac{c}{ac-bc} & \text{c)} & \frac{2}{a} + \frac{4a-b}{a^2+ab} \\ \text{d)} & \frac{2v+3w}{2v+w} - \frac{2v-w}{2v} - \frac{2v+3w}{w} & \text{e)} & \frac{1}{a-2} - \frac{1}{a-3} & \text{f)} & \frac{x-y}{x+3y} - \frac{x+y}{3y} \\ \text{g)} & \frac{1}{a+b} + \frac{1}{a} & \text{h)} & \frac{3}{m+3} - \frac{2}{m+1} - \frac{1}{m+1} & & \\ \text{i)} & \frac{9x-13}{6x-15y} + \frac{2x+3}{8x-20y} - \frac{7(x-1)}{4x-10y} & \text{j)} & \frac{7}{3a+6b} - \frac{1}{2a+4b} - \frac{5}{4a+8b} & & \\ \text{k)} & \frac{x-y}{x} - \frac{x^2+y^2}{x^2-xy} & \text{l)} & \frac{4}{x-1} + \frac{3}{1-x} & & \\ \text{m)} & \frac{a-7}{2a-1} - \frac{3a+2}{3a+1} & \text{n)} & \frac{15}{3x-9} - \frac{4}{4-12x} & & \\ \text{o)} & \frac{9x+10z}{15xz} - \frac{2y-6z}{3xy} - \frac{5x+3y}{5yz} & \text{p)} & \frac{3u^2+6uv}{15u-20v} - \frac{5uv-4v^2}{6u-8v} - \frac{uv}{3u-4v} - \frac{5u-14v}{30} & & \\ \text{q)} & \frac{4x^2}{10xy-25y^2} - \frac{25y^2}{10xy-4x^2} + \frac{5y}{2x} - \frac{2x}{5y} & \text{r)} & \frac{u-1}{u^2+u} - \frac{u+1}{u^2-u} - \frac{1}{u} + \frac{4}{u^2-1} & & \end{array}$$

Aufgabe 14

$$\begin{array}{ll} \text{a)} & \frac{4m}{m^2+m-6} - \frac{m-4}{m^2-3m+2} \\ \text{c)} & \frac{4}{x-3} + \frac{7}{x^2+3x-18} \\ \text{b)} & \frac{m^2-8m}{2m^2+m-15} - \frac{m}{5-2m} \\ \text{d)} & \frac{5}{n^2+n-6} - \frac{3}{n^2-n-2} \end{array}$$

$$e) \frac{2x-1}{x-3} - \frac{2x^2+4}{x^2-9} - \frac{2}{3x}$$

$$g) \frac{a-2}{(a-4)^2} - \frac{a-2}{a^2-7a+12}$$

$$i) \frac{(a+b)^2}{ap+aq-bp-bq} - \frac{a-b}{p+q}$$

$$k) \frac{1}{a-2} + \frac{1}{a+5} - \frac{2a+3}{a^2+3a-10}$$

$$m) \frac{1}{u+5} + \frac{3}{u+15} - \frac{2}{u}$$

$$f) \frac{a}{a-b} - \frac{b}{a+b} - \frac{2ab}{a^2-b^2}$$

$$h) \frac{a-3}{4a^2-28a+49} - \frac{a+2}{4a^2-49}$$

$$j) \frac{4}{c-5} - \frac{3}{c+3} - \frac{c+26}{c^2-2c-15}$$

$$l) \frac{4a}{(2a-c)^2} - \frac{2c}{4a^2-c^2} - \frac{2}{2a+c}$$

Aufgabe 15

$$a) \left(\frac{1}{r-s} - \frac{1}{r+s} \right)^2$$

$$c) \frac{a^2-13a-230}{10} : \left(\frac{a}{100} + \frac{1}{10} \right)$$

$$e) \frac{3a}{3a-2b} \cdot \frac{3a}{2b} - \left(\frac{3a}{3a-2b} + \frac{3a}{2b} \right)$$

$$g) \left(\frac{n^3-2n-1}{n^2-1} - n \right) \left(n - \frac{2n^2}{n+1} \right)$$

$$i) \frac{72(a-b)^2}{25a^3} \left(\frac{54c^3}{(a-b)^3} : \frac{81c^2}{5a^2} \right)$$

$$k) \frac{a^2b}{b} \left\{ \left(\frac{1}{a} - \frac{1}{b} \right) \left(\frac{1}{a} - \frac{1}{b} + \frac{1}{c} \right) + \left(\frac{1}{b} - \frac{1}{a} + \frac{1}{c} \right) \left(\frac{1}{b} - \frac{1}{a} \right) \right\}$$

$$m) \frac{2a-c}{6a^2-4ab} - \frac{4b-3c}{12ab-8b^2}$$

$$b) \frac{x^4}{46y^3} : \left(\frac{x^2}{23y} : \frac{5y}{x^2} \right)$$

$$d) \left(\frac{ab}{a-b} + a \right) \left(\frac{ab}{a+b} - b \right) \frac{b-a}{ab^2}$$

$$f) \left(\frac{8x^2+4x+1}{4x^2-2x} - \frac{2x}{2x-1} \right) \frac{6x-3}{4x^2+2x}$$

$$h) \left(x - \frac{1}{x} \right) : \left(x + \frac{1}{x} \right)$$

$$j) \left(\frac{2a+1}{2a-1} - \frac{2a-1}{2a+1} \right) \left(\frac{a}{2} - \frac{1}{2} + \frac{1}{8a} \right)$$

$$l) \left(\frac{a^3-1}{a^3} - \frac{a^2-a-1}{a^2} - \frac{1}{a} \right) : \frac{1}{a^3}$$

Aufgabe 16

$$a) \frac{a}{\frac{b}{c}} \quad b) \frac{-\frac{a}{b}}{c} \quad c) \frac{\frac{a^2}{n}}{ab} \quad d) \frac{1}{-\frac{1}{n}}$$

$$e) \frac{\frac{a-b}{a}}{a^2-b^2} \quad f) \frac{\frac{m+n}{a}}{m+n} \quad g) \frac{\frac{a}{b}}{c} \quad h) \frac{\frac{54a}{81}}{75c}$$

Aufgabe 17

a)	$\frac{a + \frac{1}{3}}{a - \frac{1}{3}}$	b)	$\frac{b+1}{b - \frac{1}{2}}$	c)	$\frac{1 - \frac{1}{x}}{1 + \frac{1}{x^2}}$	d)	$\frac{\frac{c}{2} - d}{1 + \frac{d}{2}}$
e)	$\frac{\frac{a}{b} - \frac{c}{d}}{1 - \frac{ac}{bd}}$	f)	$\frac{\frac{a}{b} - c}{\frac{a}{b} + c}$	g)	$\frac{1 - \frac{a}{z}}{\frac{1}{x} + \frac{1}{y}}$	h)	$\frac{\frac{5m}{2n}}{\frac{1}{2n} - \frac{1}{4}}$
i)	$\frac{\frac{a}{c} + b}{\frac{a}{bd} + \frac{c}{d}}$	j)	$\frac{\frac{x}{4} + 5y}{\frac{x}{5} + 4y}$	k)	$\frac{3a - \frac{16b^2}{3a}}{1 + \frac{4b}{3a}}$	l)	$\frac{\frac{2}{9b^2} + \frac{1}{3ab}}{1 + \frac{2a}{3b}}$
m)	$\frac{1}{\frac{1}{a} + \frac{1}{b}}$	n)	$\frac{1}{\frac{1}{R} - \frac{1}{R_1} - \frac{1}{R_2}}$	o)	$\frac{6 - 10x}{4x + \frac{15}{5 + \frac{30x}{2 - 6x}}}$		

Aufgabe 18

a)	$\frac{20x^2 - 30xy}{8x^2 - 10xy} - \frac{4(2x + 3y)}{4x + 5y} - \frac{4x^2 - 25xy}{16x^2 - 25y^2}$
b)	$\frac{2m - 3n}{3m + 4n} - \frac{3m - 4n}{2m - 3n} - 3 + \frac{7m^2 - 11mn + 5n^2}{6m^2 - mn - 12n^2}$
c)	$\frac{7a + 2b}{6ab - 2b^2} - \frac{6a^2 + 7b^2}{9a^2b - b^2} - \frac{6a^2 - 4b^2}{27a^3 - 3ab^2} - \frac{3a - 4b}{9a^2 + 3ab}$
d)	$\frac{1}{r^2 + 4rs + 4s^2} + \frac{1}{r^2 - 4s^2} - \frac{1}{r^2} - \frac{4s^2}{r^4 - 4r^2s^2}$

Aufgabe 19

a)	$\frac{x^3 + x^2 - xy^2 - y^2}{x^3 - x^2 - xy^2 + y^2}$	b)	$\frac{3(x + y)}{4x} \cdot \frac{5x^2}{x^2 - y^2}$	c)	$\left(\frac{3x}{3y} + \frac{1}{x}\right) : \frac{3x^2}{4y}$
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Lösungen

Aufgabe 1

a)	$1/(8ab)$	b)	a/b	c)	$-3a$
d)	$6a^3y/(5x)$	e)	$9abm^2/(2n)$	f)	$3x/(7y)$
g)	$5a^3/(3b^3)$	h)	$3z/(4y)$	i)	$x^2/(3z^2)$
j)	$(a+b)$	k)	$15t^3/(17r^3s^3)$		

Aufgabe 2

a)	$(4a-5b)/3$	b)	$1/5$	c)	$(a+2b)/(3a-b)$
d)	$4/(a-2b)$	e)	$c/(b+c)$	f)	$-7/x$
g)	$(x+y)/y$	h)	$8c-2$	i)	$-1/(b+1)$
j)	$-y/x^2$	k)	$2(2a+b)$	l)	$5/(x+2)$
m)	$-2m/5$	n)	$1/(b+3c)$	o)	r/x
p)	$(2x-3y)/(4p+5q)$	q)	$-5y/(3x-5y)$	r)	nicht kürzbar

Aufgabe 3

a)	$(x-5)/(x+5)$	b)	$(x-1)/x$	c)	a^2-1
d)	$(x-y)/2$	e)	$(2a-5b)/c$	f)	$1/(x^2+y^2)$
g)	$-(3x+4y)/2$	h)	$5/(x+z)$	i)	$x(x-1)/2$
j)	$(x^2-1)/x$	k)	$-x/(a+1)$	l)	$(x^2+4)(x-2)$
m)	$(5a+3c)/(3b-5c)$				

Aufgabe 4

a)	$(x-3)/(x+4)$	b)	$3/(a+4b)$	c)	$(a-6)/(a+5)$
d)	$(x-5)/(x+5)$	e)	$(m+2)/m$	f)	$(x-1)/(x+1)$
g)	$(x+5)/(x+2)$	h)	$(p-4q)(p-q)/(p-2q)^2$	i)	$b/(b-11)$
j)	$(x-2)/(x+2)$	k)	$(a+17)/2$	l)	$(x+5)/(x-2)$
m)	$6n/(5m+6n)$	n)	$-1/x$	o)	$(3x+4y)/(2(x+2y))$

Aufgabe 5

a)	$(a+b)/2$	b)	$9a/(a+c)$	c)	$-(3a-2b)/b^2$
d)	$(4x+c)/5$	e)	$(a-6)/6$	f)	$(5x+4y)/(3x+2y)$
g)	$(m-n)/(m+4)$	h)	$(4b-1)/(4b)$	i)	$w/(u+w)$
j)	$a+b-c$				

Aufgabe 6

a)	$c/6$	b)	$12/5$	c)	-1
d)	$-8x^5/y$	e)	$9u/(8v^2w^3)$	f)	$-a^3/b^3$
g)	p^2	h)	ab/c	i)	$-ab/c$
j)	$-1/(4yz)$	k)	$27a^2/2$	l)	$-8/(a^3b^6)$

Aufgabe 7

a)	$(z+1)/(2z+3)$	b)	$25/6$	c)	$-3a/(2c)$
d)	$5/(q+1)$	e)	$(x^2+y^2)/(xy(x+y))$	f)	$-r(s-r)/(9s)$
g)	$d/(d-3)$	h)	27	i)	$-2d/3$
j)	$3(u+v)/(4(t+1))$	k)	$3(v+2)/(v+3)$		

Aufgabe 8

a)	x^2-y^2	b)	c^2-d^2/c^2	c)	$n^2/4-1+1/n^2$
d)	$-r/s+1-s/r$	e)	$u-z/(u+z)$	f)	$-4p/q$
g)	1	h)	$y^2/2-xy/12$	i)	$100xy^2/3$
j)	$9a(a-b)/(4b(a+b))$	k)	$(b^3x^3-a^2y^2)/(abx^2y^2)$	l)	$(a+1)/(2p+3)$

Aufgabe 9

- | | | |
|-------------|---------------|-----------------|
| a) u/v^2 | b) $5m^2/9$ | c) $23t$ |
| d) $-16u$ | e) $x/(wz^2)$ | f) $27v^3/u$ |
| g) $3/(2f)$ | h) $-x$ | i) $-22y/(3xz)$ |
| j) $3a^6/c$ | k) $-c/(3b)$ | l) $1/(ab)$ |

Aufgabe 10

- | | | |
|-----------------------------|-------------------|----------------------|
| a) $(5a+1)/3$ | b) $(a-1)(m+3)/a$ | c) $-3/4$ |
| d) $1/(2c)$ | e) 5 | f) $(x-y)/(a(a+b))$ |
| g) $y(x-y)^2/(3(x+y)^2)$ | h) $(m-n)^2$ | i) $-9a^6/(2(a+2b))$ |
| j) $(a^2+1)(a-1)(a-b)/(4c)$ | | |
| k) $(a-c)^2/(a+b)$ | l) $4m/(m+1)$ | |

Aufgabe 11

- | | | |
|----------------------------|------------------------|------------|
| a) $ab+1$ | b) $xy-x^2/y$ | c) $x-1/y$ |
| d) $2y^2-1$ | e) $2x/5-4y/3-16/(xy)$ | f) $uv+1$ |
| g) $-28z^2/(3y)+5z/3-3y/2$ | | h) $1-1/n$ |

Aufgabe 12

- | | | |
|-----------------------|------------------------------|--------------------|
| a) $-(4a+5)/(a-1)$ | b) $(10a-57)/78$ | c) $(5c-2ac)/6a^3$ |
| d) $(5a^2-a+3)/a$ | e) $(5a+3b-3ac-bc)/c$ | f) $(a^2+a+1)/a^3$ |
| g) $2d/(c+d)$ | h) $(8np-11mp+6mn)/(mnp)$ | |
| i) $(25d+6a)/(10acd)$ | j) $9b^2/8$ | |
| k) $(-143a-33b)/480$ | l) $(-19ab+bc-18ac)/(60abc)$ | |

Aufgabe 13

- | | |
|-----------------------------------|------------------------------------|
| a) $4x/((x+y)(x-y))$ | b) $1/b$ |
| c) $(6a+b)/(a(a+b))$ | d) $(w^3-8v^3-16v^2w)/(2vw(2v+w))$ |
| e) $-1/((a-2)(a-3))$ | f) $-(x^2+xy+6y^2)/(3y(x+3y))$ |
| g) $(2a+b)/(a(a+b))$ | h) $(4m+6)/((m+3)(m+1))$ |
| i) $-1/(12(2x-5y))$ | j) $7/(12(a+2b))$ |
| k) $-2xy/(x(x-y))$ | l) $1/(x-1)$ |
| m) $-(3a^2+21a+5)/((2a-1)(3a+1))$ | n) $(8-16x)/((x-3)(1-3x))$ |
| o) $(2z^2-x^2)/(xyz)$ | p) $(u-v)/30$ |
| q) $(2x+5y)/(2x-5y)$ | r) $-1/u$ |

Aufgabe 14

- | | |
|------------------------------------|------------------------------|
| a) $3(m^2-m+4)/((m+3)(m-2)(m-1))$ | b) $m/(m+3)$ |
| c) $(4x+31)/((x-3)(x+6))$ | d) $2/((n+3)(n+1))$ |
| e) $(x-6)/(3x(x+3))$ | f) $(a-b)/(a+b)$ |
| g) $(a-2)/((a-4)^2(a-3))$ | h) $(4a-7)/((2a-7)^2(2a+7))$ |
| i) $4ab/((a-b)(p+q))$ | j) $1/((c-5)(c+3))$ |
| k) 0 | l) $8ac/((2a-c)^2(2a+c))$ |
| m) $(2u^2-10u-150)/(u(u+5)(u+15))$ | |

Aufgabe 15

- | | |
|-----------------------|----------------------|
| a) $4s^2/(r^2-s^2)^2$ | b) $5/(2y)$ |
| c) $10(a-23)$ | d) $a/(a+b)$ |
| e) 0 | f) $3(2x+1)/(4x^2)$ |
| g) $n/(n+1)$ | h) $(x^2-1)/(x^2+1)$ |
| i) $48c/(5a(a-b))$ | j) $(2a-1)/(2a+1)$ |
| k) $(a-b)^2/(4b)$ | l) $a-1$ |
| m) $c/(4ab)$ | |

Aufgabe 16

- | | | | |
|----|--------------|----|-------------|
| a) | ac/b | b) | $a/(bc)$ |
| c) | a/b | d) | $-n$ |
| e) | $1/(a(a+b))$ | f) | $(m+n)^2/a$ |
| g) | $ad/(bc)$ | h) | $10a/13$ |

Aufgabe 17

- | | | | |
|----|---------------------|----|------------------------------|
| a) | $(3a+1)/(3a-1)$ | b) | $(2b+2)/(2b-1)$ |
| c) | $(x^2-x)/(x^2+1)$ | d) | $(c-2d)/(2+d)$ |
| e) | $(ad-bc)/(bd-ac)$ | f) | $(a-bc)/(a+bc)$ |
| g) | $(xyz-axy)/(yz+xz)$ | h) | $10m/(2-n)$ |
| i) | bd/c | j) | $5/4$ |
| k) | $3a-4b$ | l) | $1/(3ab)$ |
| m) | $ab/(a+b)$ | n) | $RR_1R_2/(R_1R_2-RR_2-RR_1)$ |
| o) | 2 | | |

Aufgabe 18

- | | | | |
|----|----------------------|----|---------------------|
| a) | $(x+3y)/(4x+5y)$ | b) | $-(8m+22n)/(3m+4n)$ |
| c) | $(3a+2b)/(2a(3a+b))$ | d) | $1/(r+2s)^2$ |

Aufgabe 19

- | | | | |
|----|--------------------|----|---------------|
| a) | $(x+1)/(x-1)$ | b) | $15x/(4x-4y)$ |
| c) | $(4x^2+4y)/(3x^3)$ | | |