Frank Klinker

Aufgaben: Terme

Teil 7: Bruchterme

1 Bruchterme mit gleichen Nennern zusammenfassen und kürzen

Aufgabe 1.

a) $\frac{4}{x} - \frac{2}{x}$

b) $\frac{5b}{y} + \frac{3b}{y}$

c) $\frac{5a}{11b} + \frac{2a}{11b} - \frac{4a}{11b}$

d) $\frac{16ab}{3a} + \frac{14ac}{3a} - \frac{15ac}{3a}$

e) $\frac{4x}{3b} - \frac{18bx}{3b} + \frac{20x}{3b}$

f) $\frac{n+x}{3c} + \frac{n-x}{3b}$

g) $\frac{n+x}{4n} - \frac{n-x}{4n}$

h) $\frac{6ab+x}{5c} - \frac{ab-x}{5c}$

i) $\frac{2+a}{x} + \frac{2-2a+5b}{x}$

j) $\frac{3a+5b}{a} - \frac{5b+8a}{a}$

k) $\frac{xy+y}{5m} - \frac{xy-y}{5m}$

l) $\frac{x+7}{-2b} + \frac{3}{-2b} - \frac{x-6}{-2b}$

m) $\frac{5a+b}{-5x} - \frac{a+b}{-5x} - \frac{a+7b}{-5x}$

n) $\frac{11x+xy}{5y} - \frac{2x-4xy}{5y} - \frac{4x-5xy}{5y}$

o) $\frac{mx+my}{m+n} + \frac{nx+ny}{m+n}$

p) $\frac{mx-my}{m+n} + \frac{nx-ny}{m+n}$

q) $\frac{ax+y}{a+n} + \frac{nx-y}{a+n}$

r) $\frac{ax+ay}{a+n} + \frac{nx+ny}{a+n}$

s) $\frac{3x-2y}{u+w} - \frac{3x+2y}{u+w}$

t) $\frac{17ax-5ab}{5x+2b} - \frac{2ax-11ab}{5x+2b}$

u) $\frac{11by+18ax}{x-y} + \frac{7ax-2by}{x-y} - \frac{7ax-4by}{x-y}$

v) $\frac{7x}{x+1} + \frac{7}{7+x}$

w) $\frac{17ax-5ab}{5x+2b} + \frac{11ab-2ax}{2b+5x}$

x) $\frac{11ay+18ax}{x+y} + \frac{7ax-2ay}{x+y} - \frac{7ax-9ay}{x+y}$

y) $\frac{7x-5y}{x-y} + \frac{8x+3y}{x-y} - \frac{8x-9y}{x-y}$

z) $\frac{5c+4d}{c+d} - \frac{8c-13d}{c-d} + \frac{9c-11d}{c-d}$

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2 Bruchterme erweitern, zusammenfassen und kürzen

Aufgabe 2.

a) $\dfrac{3a-4b}{4}+\dfrac{a+6b}{3}-\dfrac{7a+b}{6}$ *b)* $\dfrac{2a+3b-c}{5}-\dfrac{5a+b+4c}{3}-3a$

c) $\dfrac{4x-8y+5z}{2}-\dfrac{3x+7y-2z}{6}$ *d)* $\dfrac{4ab+6ac}{6}-\dfrac{5ab-7ac}{7}$

e) $\dfrac{8y+5x}{5}+\dfrac{3x-5y}{7}$ *f)* $\dfrac{16ac+12ab}{4}-\dfrac{20ac+26ab}{5}$

g) $\dfrac{a+3b}{2}+\dfrac{3a-b}{4}+\dfrac{2a-5y}{8}$ *h)* $\dfrac{3ax-4bx-5cx}{3}-\dfrac{7ax-4bx}{15}+2cx$

i) $\dfrac{3a-4b}{2}-\dfrac{5a-10b}{10}-\dfrac{10ab-30b-8}{15}$

Aufgabe 3.

a) $\dfrac{5x+3y}{3a}-\dfrac{2x+5y}{6b}-\dfrac{8x+6y}{6ab}$ *b)* $\dfrac{8x+7y}{10x}-\dfrac{9x-5y}{15x}-\dfrac{2}{3}$

c) $\dfrac{4a-3n}{2}+\dfrac{3a-8}{7n}-\dfrac{1}{2}$ *d)* $\dfrac{3x}{4b}+\dfrac{3ax}{8ab}-\dfrac{6x}{12a}$

e) $\dfrac{7ad}{5c}-\dfrac{3d}{8c}$ *f)* $\dfrac{8axy}{20dn}-\dfrac{12ady}{36nx}$

g) $\dfrac{ap}{nx}+\dfrac{ar}{ns}-\dfrac{ax}{ny}$ *h)* $\dfrac{4x}{5y}+\dfrac{12nx}{15my}-\dfrac{16ax}{20cy}$

i) $\dfrac{14ax}{27bn}-\dfrac{63adx}{18nb}+\dfrac{84ax}{54bn}$ *j)* $\dfrac{3\pi Ddh}{36}+\dfrac{2\pi D^2h}{24}+\dfrac{\pi d^2h}{12}$

k) $\dfrac{n-x}{4a}-\dfrac{n+x}{5a}+\dfrac{n+x}{3a}$ *l)* $\dfrac{2x+4n}{2x}+\dfrac{2x-4n}{6x}-\dfrac{x}{12x}$

m) $\dfrac{4}{a}+\dfrac{3}{b+c}$ *n)* $\dfrac{3}{4}-\dfrac{b}{a-b}$

o) $\dfrac{a}{y-c}+\dfrac{a}{x+b}$ *p)* $\dfrac{4x}{4c-3d}-\dfrac{3x}{3a-4b}$

q) $\dfrac{5x}{a+b}-\dfrac{3y}{cd}+\dfrac{4x}{a+b}+\dfrac{8y}{cd}+\dfrac{x}{cd}$ *r)* $\dfrac{12b}{n+x}+\dfrac{3a}{cy}-\dfrac{3b}{n+x}+\dfrac{4a}{cy}+\dfrac{b}{2cy}$

s) $\dfrac{7ab(n-x)}{16nx}+\dfrac{21ab(x-y)}{20xy}-\dfrac{14ab(y-n)}{12ny}$

t) $\dfrac{5a-7b}{9a+6b}-\dfrac{3x+5y}{6x+6y}+\dfrac{8by+ax-3ay-10bx}{2(3ax+3ay+2bx+2by)}$

u) $\dfrac{5x-4y}{8x-20y}-\dfrac{3a+c}{2a+2c}+\dfrac{14ax-52ay-22cy+2cx}{8(2ax+2cx-5ay-5cy)}$

v) $\dfrac{7x+3y}{10x+5y}-\dfrac{9a+2b}{14a+21b}-\dfrac{381bx+159by+20ay}{105(4ax+6bx+2ay+3by)}$

3 Bruchterme multiplizieren, faktorisieren und kürzen

Aufgabe 4.

a) $\dfrac{6x}{bc} \cdot \dfrac{bc}{18x}$

b) $\dfrac{125bx}{10ay} \cdot \dfrac{30ay}{25xz}$

c) $\dfrac{12a}{5b} \cdot \dfrac{28}{3} \cdot \dfrac{15x}{14a}$

d) $\dfrac{21abc}{34xyz} \cdot \dfrac{35z}{4n} \cdot \left(- \dfrac{68y}{49bc} \right)$

e) $\left(- \dfrac{15ab}{76xy} \right) \cdot \left(- \dfrac{4x}{5b} \right) \cdot \left(- \dfrac{38y}{5} \right)$

f) $\dfrac{a-b}{5} \cdot 10 \cdot \dfrac{2}{a-b}$

g) $\dfrac{6ab}{5(x+y)} \cdot \dfrac{25(x+y)}{3b}$

h) $\dfrac{m+n}{a-b} \cdot \dfrac{x-a}{m-n} \cdot \dfrac{a-b}{a-x}$

i) $\dfrac{x-5}{6y} \cdot \dfrac{4x}{5-x} \cdot \left(- \dfrac{33y}{8} \right)$

j) $\dfrac{a+b}{4x+4y} \cdot \dfrac{5x+5y}{a-b}$

k) $\dfrac{4x+8}{12y-6} \cdot \dfrac{3x-6}{4y+2} \cdot \dfrac{5+10y}{x+2}$

l) $\dfrac{4x-3y}{a-3b} \cdot \dfrac{3b-a}{36x-27y}$

m) $\dfrac{a+c}{ac} \cdot \dfrac{a-c}{x} \cdot \dfrac{by}{a+c} \cdot \dfrac{cx}{a-b}$

n) $\dfrac{a+b}{n} \cdot \dfrac{c+d}{a-b} \cdot \dfrac{nx}{a+b} \cdot \dfrac{a-b}{c+d}$

o) $\dfrac{x^2-y^2}{(x+y)^2} \cdot (2x+2y)$

p) $\dfrac{a^2-b^2}{(a+b)^2} \cdot \dfrac{a+b}{(a-b)}$

q) $\dfrac{5x+5}{x^2-y^2} \cdot (x-y)$

r) $\dfrac{a-4}{3(a^2-16)} \cdot (3a+12)$

s) $\dfrac{3c-2a}{15ab} \cdot \dfrac{5x+2b}{3c} \cdot \dfrac{9bc}{15cx+6bc-10ax-4ab}$

Aufgabe 5.

a) $\left(\dfrac{5ax}{c} + \dfrac{3}{4} - \dfrac{7a}{4c} \right) \cdot \dfrac{2c}{x}$

b) $\dfrac{32efg}{14eh-5ef+12gh} \cdot \left(\dfrac{7eh}{8fg} - \dfrac{5e}{16g} + \dfrac{3h}{4f} \right)$

c) $-\dfrac{8rs}{9xy} \cdot \left(\dfrac{9yz}{4rs} - \dfrac{3yz}{32rs} - \dfrac{5z}{64s} \right)$

d) $\dfrac{3ax}{5b+14c-40d} \cdot \left(\dfrac{5b}{24a} + \dfrac{7c}{12a} - \dfrac{5d}{3a} \right)$

e) $\dfrac{20a}{3b} \cdot \left(\dfrac{9b}{8a} - \dfrac{6b}{25a} + 3b \right)$

f) $-\left(\dfrac{a-b}{x+y} - \dfrac{3(a-b)}{2(x+y)} - \dfrac{1}{6d} \right) \cdot \dfrac{2(x+y)}{3(a-b)}$

g) $\left(\dfrac{x}{3} + \dfrac{y}{4}) \right) \cdot \left(\dfrac{9}{x} - \dfrac{8}{y} \right)$

h) $\left(\dfrac{3y}{10x} - \dfrac{6b}{15a} \right) \cdot \left(\dfrac{5x}{18y} - \dfrac{3a}{4b} + \dfrac{5ax}{9by} \right)$

i) $\left(\dfrac{3a}{x} + 2a - \dfrac{4a}{6x} \right) \cdot \left(- \dfrac{2x}{3a} \right)$

j) $\dfrac{15x}{2} \cdot \left(\dfrac{5}{3x} - \dfrac{a}{15} \right) - \dfrac{2}{13x} \cdot \left(2x - \dfrac{13bx}{4} \right)$

k) $\left(\dfrac{1}{a} + \dfrac{1}{b} \right)^2$

l) $\left(\dfrac{a-b}{6(x+y)} - \dfrac{3(a-b)}{2(x+y)} \right) \cdot \left(\dfrac{x+y}{a-b} - \dfrac{2(x+y)}{3(a-b)} \right)$

m) $\left(\dfrac{3u}{4v} - \dfrac{5x}{6y} \right)^2$

n) $\left(\dfrac{1}{x} + \dfrac{1}{y} \right) \cdot (x-y) - (x+y) \cdot \left(\dfrac{1}{x} - \dfrac{1}{y} \right)$

o) $\left(\dfrac{x}{y} + \dfrac{y}{x} \right)^2$

4 Bruchterme dividieren, faktorisieren und kürzen

Aufgabe 6.

$a)$ $\dfrac{48xyz}{3c} : (4xz)$

$b)$ $\dfrac{26a}{7} : \dfrac{29a}{14b}$

$c)$ $\dfrac{3a}{4b} : \dfrac{6ad}{2b}$

$d)$ $\left(-\dfrac{33x}{5}\right) : \dfrac{55x}{10a}$

$e)$ $\dfrac{4a}{35b} : \dfrac{8x}{63b}$

$f)$ $\dfrac{12ab}{5xy} : \dfrac{2b}{5x}$

$g)$ $(-18xy) : \left(-\dfrac{9y}{3a}\right)$

$h)$ $-\dfrac{9ab}{2c} : (2a)$

$i)$ $\dfrac{a}{a+b} : \dfrac{x}{a+b}$

$j)$ $\dfrac{ax+bx}{a-b} : (a+b)$

$k)$ $\dfrac{6x+3y}{4a-4b} : \dfrac{12ax+6ay}{7ax-7bx}$

$l)$ $\dfrac{6(x+y)}{15(x-y)} : \dfrac{3(x+y)}{5(x-y)}$

$m)$ $\left(\dfrac{3ax}{4bc} : \dfrac{6ad}{8c}\right) : \dfrac{18x}{2b}$

$n)$ $\left(\dfrac{12bx-12by}{5bx} : \dfrac{27b-27c}{4cn}\right) : \dfrac{16bx-16by}{5bx-5cx}$

$o)$ $\left(\left(\dfrac{2x}{4} : \dfrac{1}{3}\right) : \dfrac{x}{5}\right) : (4a)$

$p)$ $\left(\dfrac{a(a-1)}{a(x-1)} : \dfrac{5(1-a)}{a(x+1)}\right) : \dfrac{1}{15(1-x)}$

$q)$ $\left(\dfrac{2x-4}{by-3b} : \dfrac{6-3x}{xy+3x}\right) : \dfrac{y+3}{3b-by}$

$r)$ $\left(\dfrac{3cnx-3bcx}{5ab} : \dfrac{9nx-9bx}{10bx+10by}\right) : \dfrac{4cx+4cy}{3ad}$

$s)$ $\dfrac{3ab(a+b)}{5xy(c-d)} : \dfrac{3a+3b}{5c-5d} + \dfrac{5ab(b+c)}{4dx} : \dfrac{5by+5cy}{16d} - \dfrac{ab(3a+b)}{5cx} : \dfrac{y(6a+2b)}{10c}$

Aufgabe 7.

$a)$ $\dfrac{\frac{m}{a}}{\frac{n}{a}}$

$b)$ $\dfrac{1+\frac{a}{b}}{1+\frac{b}{a}}$

$c)$ $\dfrac{\frac{y}{2}}{\frac{x}{3}}$

$d)$ $\dfrac{\frac{18ab}{25xy}}{\frac{9b}{5y}}$

$e)$ $\dfrac{x+\frac{x}{b}}{1+\frac{1}{b}}$

$f)$ $\dfrac{c-\frac{d}{a}}{c+\frac{d}{a}}$

$g)$ $\dfrac{\frac{a}{b}-\frac{x}{y}}{\frac{a}{b}+\frac{x}{y}}$

$h)$ $\dfrac{\frac{1}{x}+y}{\frac{1}{x}-y}$

$i)$ $\dfrac{\frac{2m-3n}{3r}-\frac{m+4n}{2t}}{\frac{4t-3r}{6n}-\frac{t+2r}{m}}$

$j)$ $\dfrac{\frac{4a-5b}{5x}-\frac{2a-3b}{3y}}{\frac{12y-10x}{15b}-\frac{y-x}{a}}$

$k)$ $\dfrac{a^2-b^2}{a^2+b^2} : (a+b)^2$

$l)$ $\dfrac{12}{a^2-9} : \dfrac{3}{a+9}$

$m)$ $\dfrac{a^2b}{a+5} : \dfrac{ab^2}{(a+5)^2}$

$n)$ $\dfrac{ux-x^2}{uv+v^2} : \dfrac{x-u)^2}{(u+v)^2}$

Aufgabe 8.

$a)$ $(8ac - 4adx - a) : (2a)$

$b)$ $(30ac - 15bcd + 35cx) : (5c)$

$c)$ $(24nx - 12bx + 16cx) : (-4x)$

$d)$ $(36ab + 60ac - 24ax) : (-6a)$

$e)$ $(-24ab + 28ax - 56bx) : (-14abx)$

$f)$ $\dfrac{-12x^2 + 33x^2y - 24x^4}{-3x^2}$

$g)$ $\left(\dfrac{18bc}{5x} + \dfrac{21abc}{2y} - \dfrac{12ab}{5c}\right) : (3ab)$

$h)$ $\left(\dfrac{25cx}{16by} + \dfrac{5bx}{8cy}\right) : \dfrac{5x}{4y}$

$i)$ $\left(\dfrac{15x}{28ab} - \dfrac{20x}{21b} + \dfrac{10x}{7a}\right) : \dfrac{5x}{7a}$

$j)$ $\left(\dfrac{22pq}{3n} - \dfrac{99ps}{5v} + \dfrac{55ps}{7w}\right) : (11pq)$

$k)$ $(24ab + 36ac - 60bc) : \dfrac{12abc}{3x}$

$l)$ $\left(-\dfrac{15ab}{8xy} - \dfrac{25ac}{12x} + \dfrac{5a}{16y}\right) : \left(-\dfrac{25ab}{6xy}\right)$

$m)$ $\left(\dfrac{35ab}{6cx} - \dfrac{15b}{2x} + \dfrac{45a}{8c}\right) : \left(-\dfrac{5ab}{2c}\right)$

Aufgabe 9.

$a)$ $(36x - 54z) : (4x - 6z)$

$b)$ $(35ac - 45bc) : (7a - 9b)$

$c)$ $(6n + 4x - 14z) : (3n + 2z - 7z$

$d)$ $(cx + cy + dx + dy) : (x + y)$

$e)$ $(12ax + 16bx + 12by + 24bz) : (3a + 4b)$

$f)$ $(30ab - 18ab - 40a + 24) : (3b - 4)$

$g)$ $(15ax - 6ay - 20bx + 8by) : (5x - 2y)$

$h)$ $(6ax - 3x - 12a + 6) : (2a - 1)$

$i)$ $(15cx - 12bx + 8by - 10cy) : (-4b + 5c)$

$j)$ $(2ax + ay + 2bx + by) : (2x + y)$

$k)$ $\dfrac{16px - 8py - 32qx + 16qy}{8x - 4y}$

$l)$ $\dfrac{8ax + 16bx - 24cx - 10ay - 20by + 30cy}{2a + 4b - 6c}$

$m)$ $\dfrac{14ax + 10bx - 6cx - 21ap - 15bp + 9cp}{7a + 4b - 6c}$

$n)$ $\left(\dfrac{10b}{6} - \dfrac{175mnxy}{36acd} + \dfrac{24abcd}{10xy} - 7mn\right) : \left(\dfrac{50xy}{18a} + 4cd\right)$

$o)$ $\left(\dfrac{126ax}{8b} - \dfrac{27nx}{4b} + \dfrac{14ab}{12x} - \dfrac{bn}{2x}\right) : \left(\dfrac{18x}{2b} + \dfrac{4b}{6x}\right)$

$p)$ $(15ax - 10ac + 5ad - 6bx + 4bc - 2bd) : (5a - 2b)$

$q)$ $\dfrac{16bx + 8ax - 24cx - 20by - 10ay + 30cy}{2a + 4b - 6c}$

Aufgabe 10.

$a)$	$(x^2 - 4x - 21) : (x + 3)$	$b)$	$(x^2 - 14x + 45) : (x - 9)$
$c)$	$(x^2 - y^2) : (x - y)$	$d)$	$(a^3 + 1) : (a + 1)$
$e)$	$(6x^2 + 29x + 35) : (3x + 7)$	$f)$	$(35x^2 + 8x - 3) : (5x - 1)$
$g)$	$(u^3 + 8) : (u + 2)$	$h)$	$(x^4 - 1) : (x - 1)$
$i)$	$(x^2 + 3x - 8) : (x + 5)$	$j)$	$(2x^3 + 5x - 7) : (2x - 7)$
$k)$	$(x^2 - 2) : (x + 1)$	$l)$	$(x^3 + 2x^2 - x - 1) : (x + 2)$