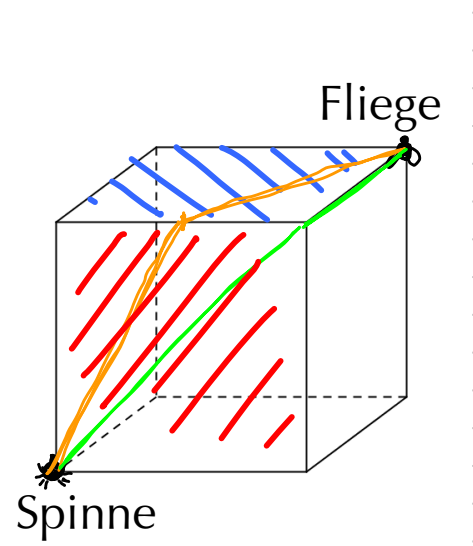
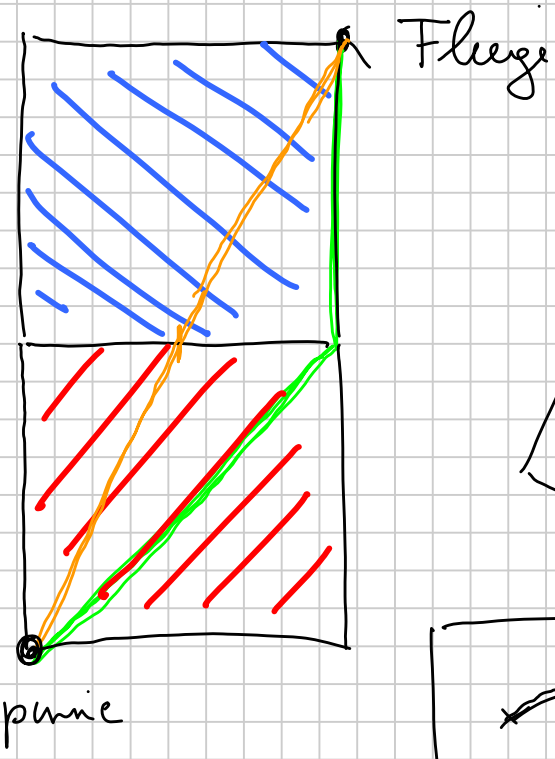
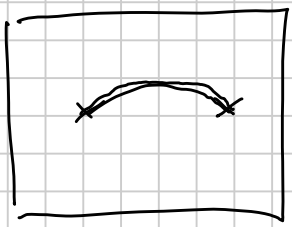
Terme

Denksport







Wiederholung

S 1/32

- $\left(\frac{a^{-3}}{b^2}\right)^{-4} = \frac{a^{+12}}{b^{-8}} = a^{12} \cdot b^8$
- $\sqrt[3]{x^2} \cdot \sqrt[6]{x^5} = x^{\frac{2}{3}} \cdot x^{\frac{5}{6}} = x^{\frac{4}{6}+\frac{5}{6}} = x^{\frac{9}{6}} = x^{\frac{3}{2}} = \sqrt{x^3}$
- ${}^3\log 81 = x = 4 \qquad 3^x = 81 \qquad 3^4 = 81$
- ${}^{10}\log 1.000.000 = \lg 10^6 = x \qquad 10^x = 10^6 \qquad x = 6$

Terme

S 1/42

$T(x) = 2x - 2$ $\quad G = \mathbb{R}$ $\quad D = \mathbb{R}$

$x = 2 \quad T(2) = 2 \cdot 2 - 2 = 2$

$x = 5 \quad T(5) = 2 \cdot 5 - 2 = 8$

$x = 7 \quad = 12$

→ Wertemenge $W = \mathbb{R}$

$T(x) = \frac{4x}{x-2}$ $\quad G = \{1, 2, 3\}$ $\quad D = \{1, 3\}$

$x - 2 \neq 0$

$x \neq 2$

$T(1) = \frac{4 \cdot 1}{1-2} = \frac{4}{-1} = -4$

$T(3) = \frac{4 \cdot 3}{3-2} = \frac{12}{1} = 12$

$W = \{-4, 12\}$

$T(x) = \frac{3x-9}{2x-5}$ $\quad G = \mathbb{R}$ $\quad D = \mathbb{R} \setminus \{\frac{5}{2}\}$

$2x - 5 \neq 0$

$2x \neq 5$

$x \neq \frac{5}{2}$

S 1/43

$a^2 + b^2 = c^2$ $\quad E = m \cdot c^2$

$$-x-\{-2x-[-6x+(2x-4y)]\}=$$
$$-x-\{-2x-[-6x+2x-4y]\}=$$
$$-x-\{-2x-[-4x-4y]\}=$$
$$-x-\{-2x+4x+4y\}=$$
$$-x-\{+2x+4y\}=$$
$$-x-2x-4y=-3x-4y$$

- $5x^2y \cdot 6y = 30x^2y^2$
- $5z(z-3) = 5z^2-15z$
- $(a+3b)\cdot(a+2c) =$

$$a^2+2ac+3ab+6bc$$

- $(2x-3y)\cdot(x-5y) = 2x^2-10xy-3xy+15y^2$ ($-3xy = 3yx$)

$$2x^2-13xy+15y^2$$

Binomische Formeln

$$(A+B)^2 = A^2+2\cdot A\cdot B+B^2$$

$$(A+B)\cdot(A+B) = A^2+A\cdot B+B\cdot A+B^2$$
$$A^2+2AB+B^2$$

- $(3x+2y)^2 = 9x^2+12xy+4y^2$ ($12xy = 2\cdot 3x\cdot 2y$)

- $(4a + 7c)^2 = 16a^2 + 56ac + 49c^2$

- $(A - B)^2 = A^2 - 2AB + B^2$

  $(6x - 2y)^2 = 36x^2 - 24xy + 4y^2$

- $(A + B) \cdot (A - B) = A^2 - B^2$

  $(4z - 9) \cdot (4z + 9) = 16z^2 - 81$

- $(A + B)^3 = ?$

Pascal'sches Dreieck

0			1			
1		1		1		
2		1	2	1		
3	1		3		3	1
4	1	4		6	4	1
5	1	5	10		10	5	1

$\Rightarrow$ Binomialkoeffizient $\binom{4}{2} = 6$

$(A + B)^3 = 1A^3B^0 + 3A^2B^1 + 3A^1B^2 + 1A^0B^3$

$(A + B)^4 = 1A^4 + 4A^3B + 6A^2B^2 + 4AB^3 + 1B^4$

Faktorisieren S. 1/48

- $5x + 5y = 5(x+y)$
- $27a^2b^3c + 9ab^4c^2 - 18a^2bc =$
  $= 9abc \cdot (3ab^2 + b^3c - 2a)$
- $a^2 - 4ax + 4x^2 = (a - 2x)^2$
- $9z^2 - 12z + 4 = (3z - 2)^2$
- $25x^2 - 40x + 16 = (5x - 4)^2$
- $49z^2 + 56z + 16 = (7z + 4)^2$

  $56z = 2 \cdot A \cdot B$
  $2 \cdot 7z \cdot B$
- $36x^2 + 72x + 5' = (6x + 6)^2 - 31$
  $36x^2 + 72x + 36 - 31$
- $x^2 + 2x - 15 = (x-3) \cdot (x+5)$ Satz von VIETA

Polynomdivision S. 1/50

$6107 : 29 = 210$
-58
30
-29
$1 \; R$

$\frac{6107}{29} = 210\frac{17}{29}$

- $(x^3 - 3x^2 - 9x + 27) : (x-3) = x^2 - 9$

$-x^3 \pm 3x^2$

$0x^3 \quad 0x^2 \quad -9x$

$\pm 9x \mp 27$

$0 \qquad 0R$

$$\frac{x^3 - 3x^2 - 9x + 27}{x-3} = x^2 - 9$$

- $x^3 - x^2 - 16x + 20 : x + 4 = x^2 - 5x + 4$

$-x^3 \mp 4x^2$

$-5x^2 - 16x$

$\pm 5x^2 \pm 20x$

$+4x + 20$

$\mp 4x \mp 16$

$4R$

$$\frac{x^3 - x^2 - 16x + 20}{x+4} = x^2 - 5x + 4 + \frac{4}{x+4}$$

Bruchterm

$$T(x) = \frac{x-3}{x^2-4} \qquad G = \mathbb{R} \qquad D = \mathbb{R} \setminus \{-2; 2\}$$

$x^2 - 4 \neq 0$

$(x-2)\cdot(x+2) \neq 0$

$x_1 = 2 \qquad x_2 = -2$

Produkt-Null-Satz (PNS)

$$\frac{16x^2}{8xy} = \frac{2x}{y}$$

- $$\frac{5a^2b - 10ab^2}{10ab} = \frac{5ab(a-2b)}{10ab} = \frac{a-2b}{2}$$

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

- $\frac{3x-2y}{4a} + \frac{4x-y}{4a} = \frac{3x-2y+4x-y}{4a} = \frac{7x-3y}{4a}$

- $\frac{2x+3y}{3a} - \frac{x-y}{3a} = \frac{2x+3y-(x-y)}{3a} = \frac{x+4y}{3a}$

S 1/54

$$\frac{2x}{4a} + \frac{4y}{3b} = \frac{2x\cdot 3b}{12ab} + \frac{4y\cdot 4a}{12ab} = \frac{6bx+16ay}{12ab}$$

S. 1/55

$$\frac{5}{x-y} \quad \frac{2x+3y}{x^2-y^2} + \frac{8}{x+y} =$$

EF (Erweiterungsf.)

N_1	$x-y$	$x-y$	$(x+y)$
N_2	x^2-y^2	$(x+y)(x-y)$	
N_3	$x+y$	$x+y$	$(x-y)$
HN	$(x-y)$	$(x+y)$	

$$= \frac{5(x+y)-(2x+3y)+8(x-y)}{HN} =$$

$$= \frac{5x+5y-2x-3y+8x-8y}{HN} = \frac{11x-6y}{HN} =$$

$$= \frac{11x-6y}{(x-y)(x+y)}$$

- $\frac{1}{x^2-3x+2} - \frac{1}{x^2-4} + \frac{1}{x^2-x} =$ | $x^2-x-2x+2$

N_1	x^2-3x+2	$(x-2)\cdot(x-1)$	$(x+2)\cdot x$
N_2	x^2-4	$(x+2)(x-2)$	$x\cdot(x-1)$
N_3	x^2-x	$(x-1)$	$(x+2)(x-2)$
HN	$(x-2)(x-1)(x+2)\cdot x$		

3. BINOMI !

- $\frac{(x+2)\cdot x - x(x-1) + (x+2)\cdot(x-2)}{HN} =$

- $\frac{x^2+2x-x^2+x+x^2-4}{HN} = \frac{x^2+3x-4}{(x-2)(x+2)(x-1)\cdot x} =$

später

$$= \frac{x^2+3x-4}{(x^2-4)(x-1)x} = \frac{(x-1)(x+4)}{(x^2-4)(x-1)\cdot x} = \frac{x+4}{x(x^2-4)}$$

S 1/59

B. 5.74) $\frac{2x+3y-z}{5} - \frac{5x+y+4z}{3} - 3x =$

$$= \frac{(2x+3y-z)\cdot 3 - (5x+y+4z)\cdot 5 - 3x\cdot 15}{15} =$$

$$= \frac{6x+9y-3z-25x-5y-20z-45x}{15} =$$

$$= \frac{-64x+4y-23z}{15}$$

B. 5.75 $\frac{a^3}{2} \cdot \frac{1}{2a^2} \cdot \left(\frac{a}{3}\right)^3 = \frac{a^3 \cdot 1 \cdot a^3}{2 \cdot 2a^2 \cdot 27} = \frac{a^4}{108}$

B. 5.76 $\frac{(a-b)^2}{1} : \frac{1}{a^2-b^2} = \frac{(a-b)^2}{(a+b)(a-b)} = \frac{a-b}{a+b}$

B. 5.78 $\frac{12(x+y)}{9(u+v)} : \frac{8(x+y)}{3(u+v)} = \frac{12(x+y)}{9(u+v)} \cdot \frac{3(u+v)}{8(x+y)} = \frac{1}{2}$

B. 5.80 $\frac{ab+3b^2}{7b^2} : \frac{2a+6b}{21b} = \frac{b(a+3b)}{7b^2} \cdot \frac{21b}{2(a+3b)} = \frac{3}{2} = 1\frac{1}{2}$

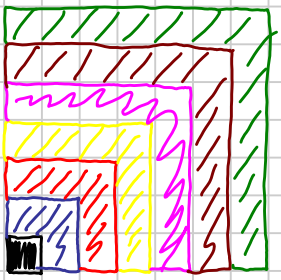
B. 583 $\left(\frac{x^2+4y^2}{x^2-4y^2}\right) : \left(\frac{x}{x-2y} - \frac{2y}{x+2y}\right) =$

$= \frac{x^2+4y^2}{(x+2y)(x-2y)} : \frac{x(x+2y)-2y(x-2y)}{(x-2y)(x+2y)} =$

$= \frac{x^2+4y^2}{(x+2y)(x-2y)} \cdot \frac{(x-2y)(x+2y)}{x^2+2xy-2xy+4y^2} = \frac{1}{1} = 1$

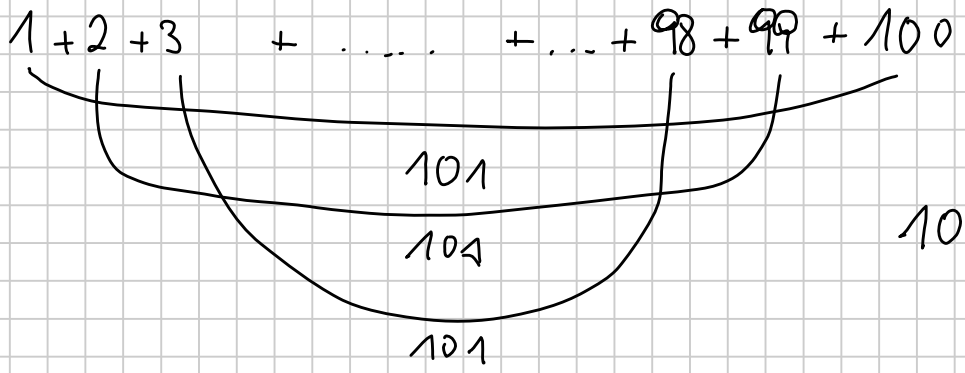
Quadratzahlen

1, 4, 9, 16, 25



$1+3+5+7+9+11+13+\ldots = n^2$

$1+2+3+4+5+6+7+\ldots+100 = 5050$



$101 \cdot 50 = 5050$

Gleichungen

$$3x + 5 = 7x$$

Bsp. Handy

1.) 5 € GG + 0,01 €/min

2.) 0,05 €/min

$K_1(x) = 5 + 0{,}01 \cdot x$

$K_2(x) = 0{,}05 \cdot x$

gleich viel? $5 + 0{,}01x = 0{,}05x$ Lineare Gl.

⇒ www.geogebra.at GRATIS