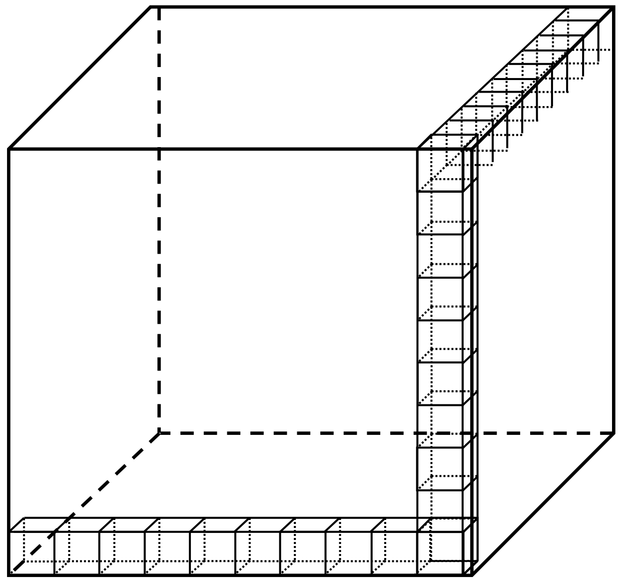
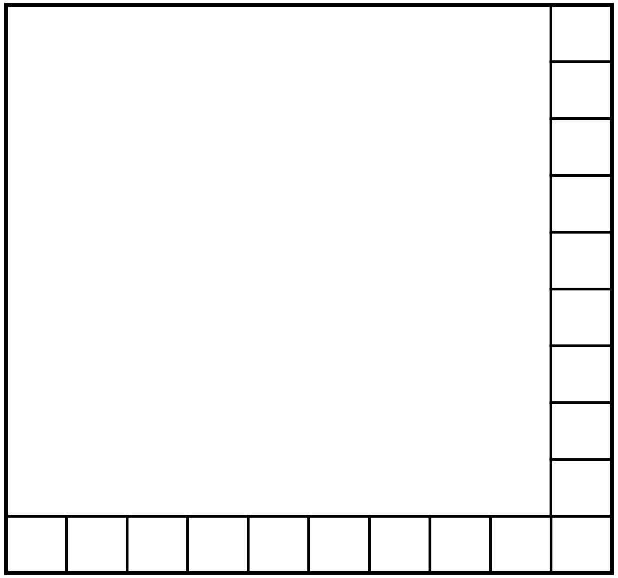
Raummasse
1000 – teilig



$$1\ m^3 = 1000\ dm^3 = 10^3\ dm^3$$
$$1\ dm^3 = 1000\ cm^3 = 10^3\ cm^3$$
$$1\ cm^3 = 1000\ mm^3 = 10^3\ mm^3$$

$$\boxed{1\ \ell = 1\ dm^3}$$

Flächenmasse
100 - teilig



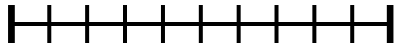
$1\ km^2 = 100\ ha = 10^2\ ha$

$1\ ha = 100\ a = 10^2\ a$

$1\ a = 100\ m^2 = 10^2\ m^2$

$1\ m^2 = 100\ dm^2 = 10^2\ dm^2$

Längenmasse
10 - teilig



1 km = 1000 m = 10^{3} m

1 m = 10 dm = 10^{1} m

1 dm = 10 cm = 10^{-1} m

1 cm = 10 mm = 10^{-2} m

Summand + Summand = Summe

Minuend - Subtrahend = Differenz

Faktor · Faktor = Produkt

Dividend : Divisor = Quotient

Klammerregeln

$$a + (b + c) = a + b + c$$

$$a + (b - c) = a + b - c$$

$$a - (b + c) = a - b - c$$

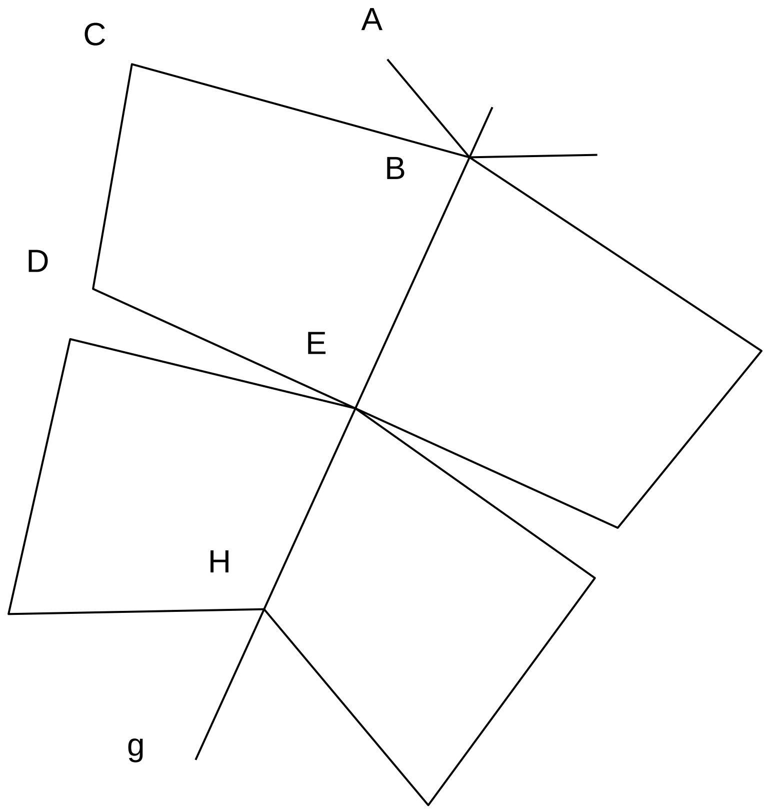
$$a - (b - c) = a - b + c$$

Klammerregeln:

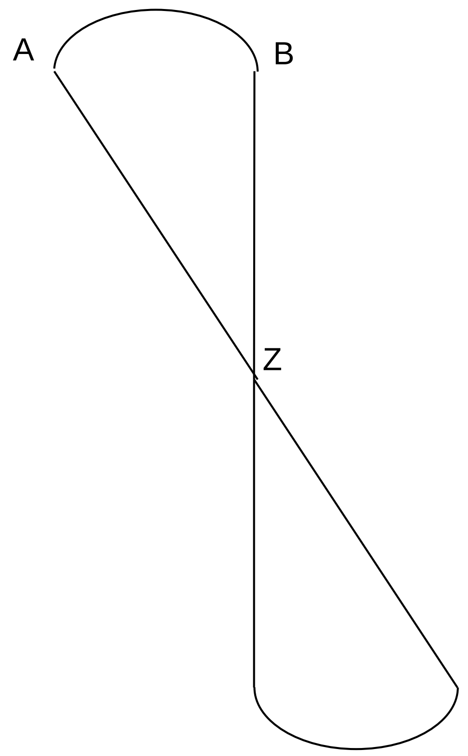
1. $a + (b + c) = a + b + c$
2. $a - (b + c) = a - b - c$
3. $a (b + c) = ab + ac$
4. $- a (b + c) = - ab - ac$

Achsensymmetrie / Punktsymmetrie

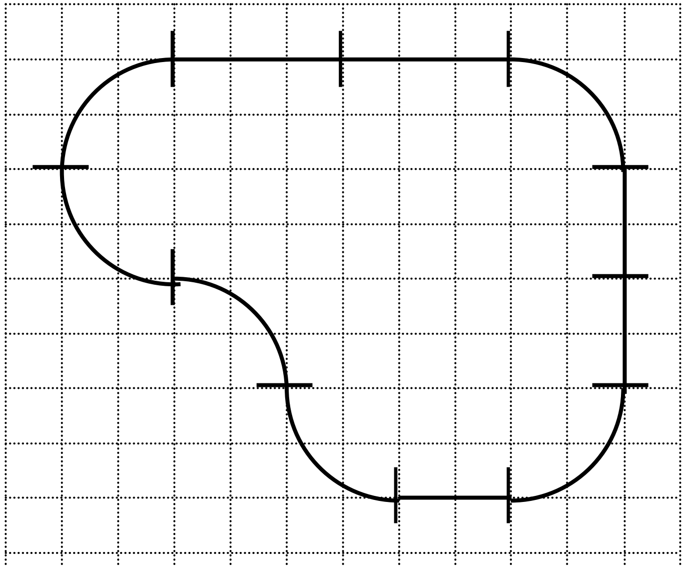
Schmetterling

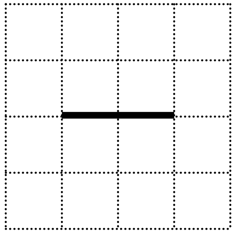


Propeller

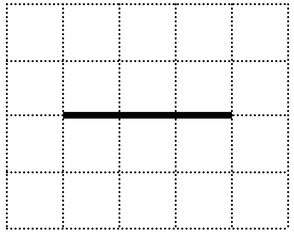


Terme addieren und subtrahieren

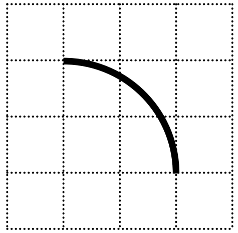




a



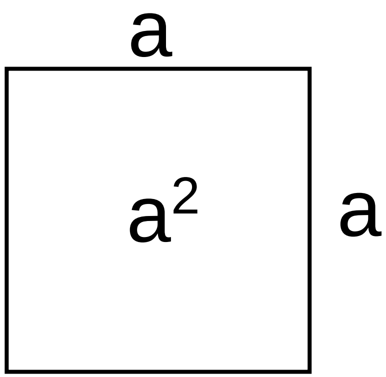
b



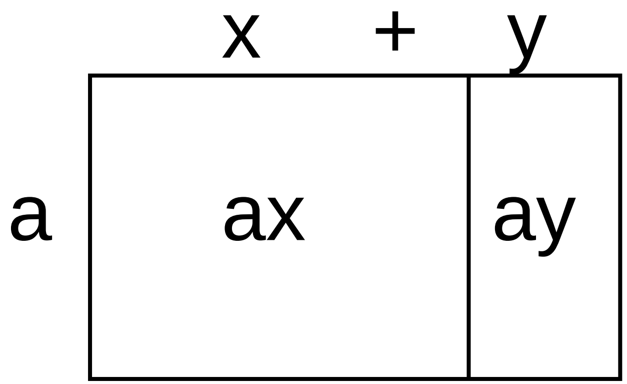
c

	Terme
der Reihe nach	a + a + c + a + c + c + c + c + b + b+ c
mehrere Teilstücke	2a + c + a + 4c + 2b + c
Stücke pro Sorte	3a + 2b + 6c

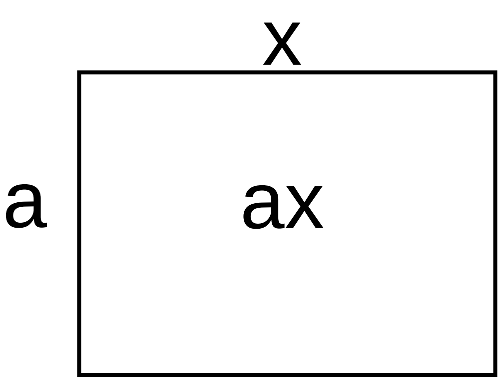
Terme multiplizieren und dividieren



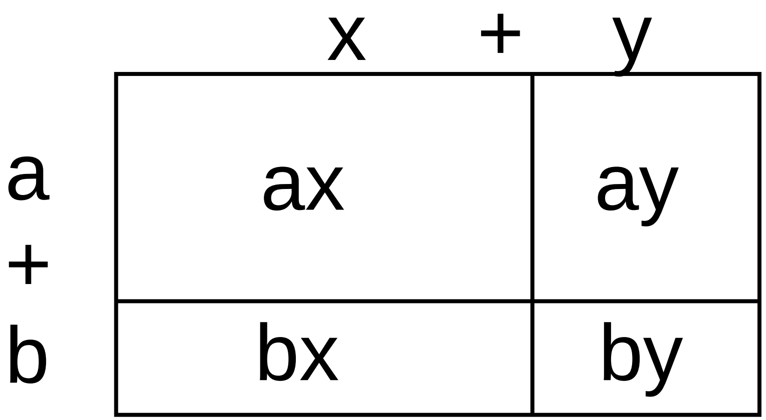
$a \cdot a = a^2$



$a\,(x + y) = ax + ay$



$a \cdot x = ax$



$(a + b)\,(x + y) = ax+ay+bx+by$

Proportionalität

$\cdot 4$

1	2	3	4	5	8
6	12	18	24	30	48

$\cdot 4$

Graph: Halbgerade

$$y : x = k$$

Umgekehrte Proportionalität

$\cdot 4$

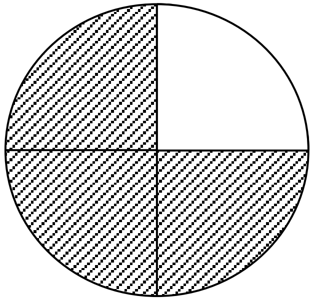
1	2	3	4	6	8
12	6	4	3	2	1.5

$:4$

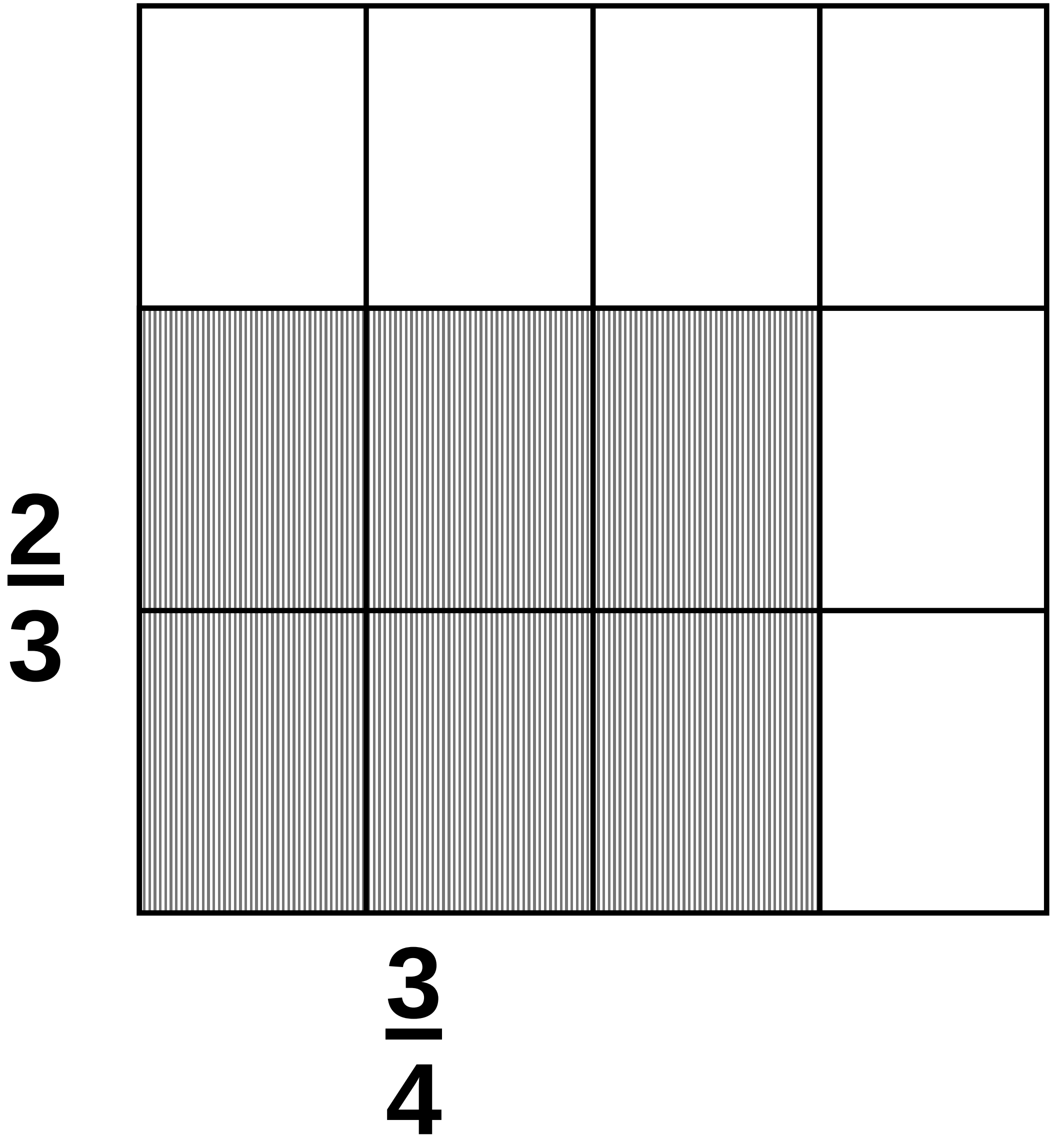
Graph: Hyperbel

$$x \cdot y = k$$

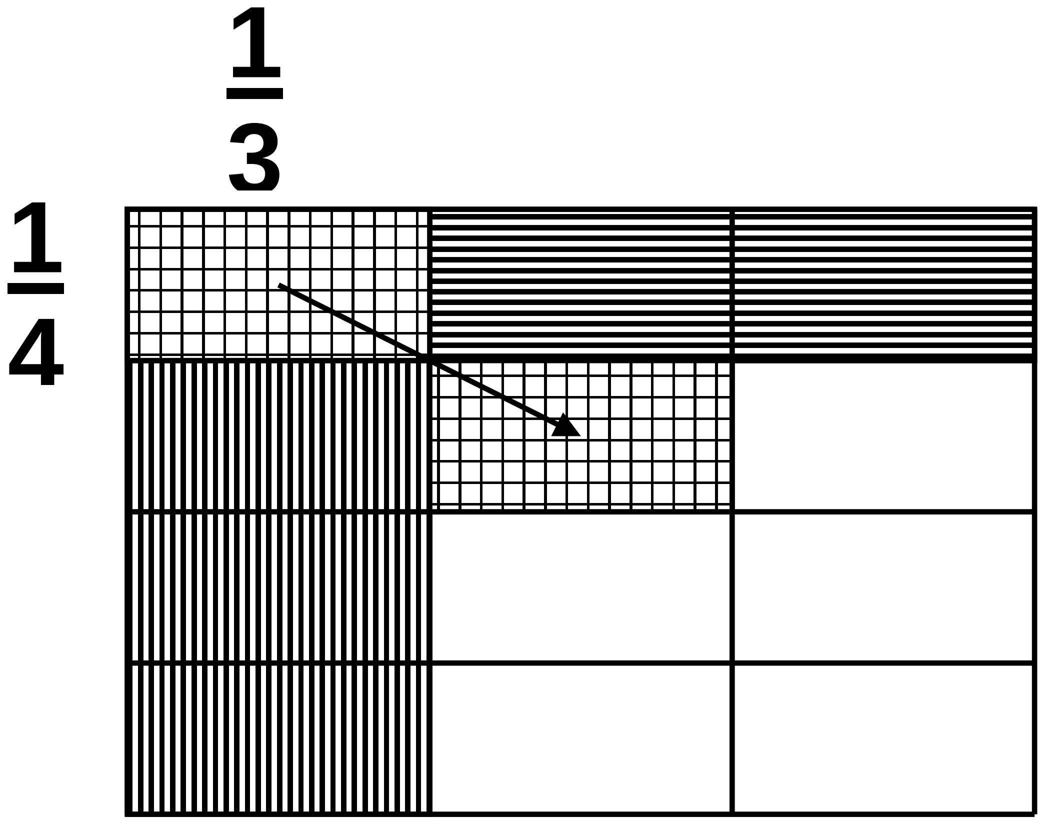
Gebrochene Zahlen

Bild	Bruch	$\frac{\dots}{100}$	Dezimal bruch	Prozent
	$\frac{3}{4}$	$\frac{75}{100}$	0.75	75 %

Brüche multiplizieren



Brüche addieren



Binomische Formeln

$$(a + b)^2 = a^2 + 2ab + b^2$$

$$(a - b)^2 = a^2 - 2ab + b^2$$

$$(a + b)(a - b) = a^2 - b^2$$

Faktorisieren

$$6xy^2 - 3x = 3x\,(2y^2 - 1)$$

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

$$x^2 - x - 2 = (x - 2)\,(x + 1)$$

Prozentrechnung

$$w = \frac{G \cdot p}{100} \quad 1\% = \frac{1}{100} \quad 1‰ = \frac{1}{1000}$$

w: Prozentwert
G: Grundwert
p: Prozentsatz

Zinsrechnung

$$z = \frac{K \cdot p \cdot t}{100 \cdot 360}$$

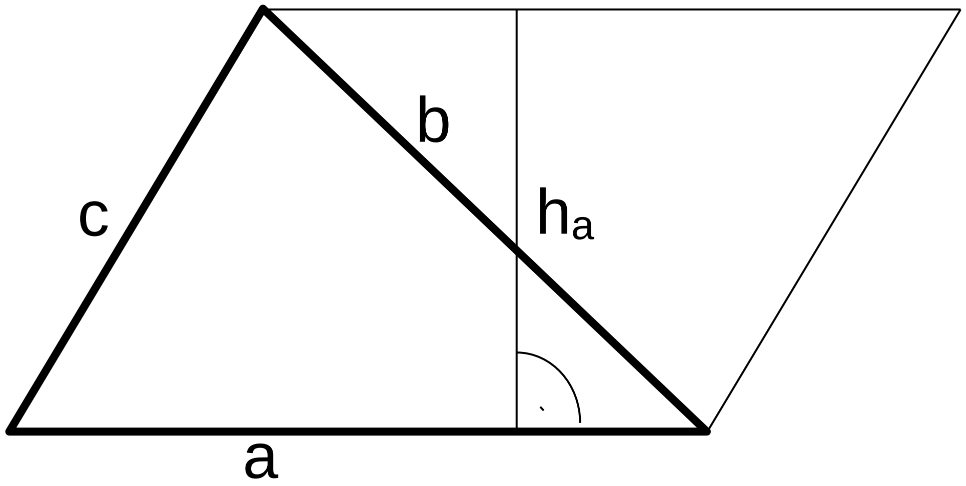
z: Zins

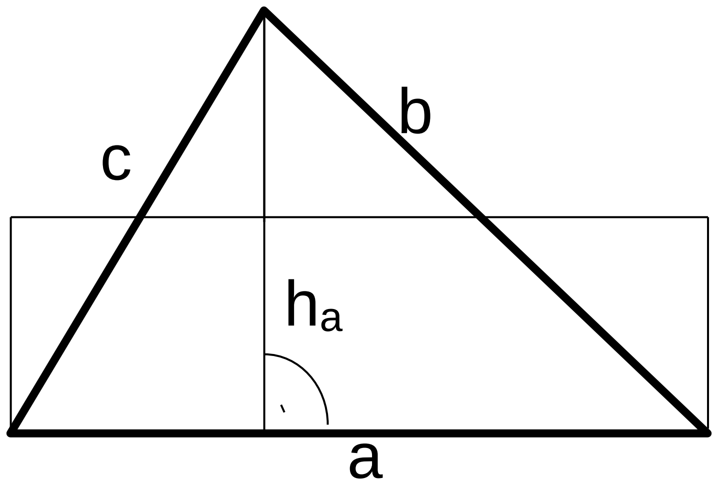
K: Kapital

p: Zinssatz

t: Zeit

Flächenberechnung beim Dreieck





$A_{\text{(Dreieck)}}$ =

(Grundseite · Höhe) : 2 =

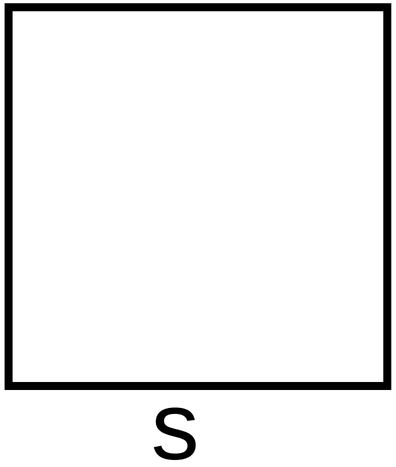
$(a \cdot h_a) : 2$

$A_{\text{(Dreieck)}}$ =

Grundseite · $\frac{1}{2}$ Höhe =

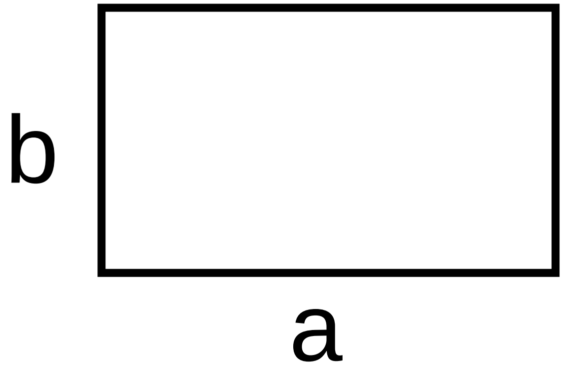
$a \cdot \frac{1}{2} h_a$

Flächenberechnungen



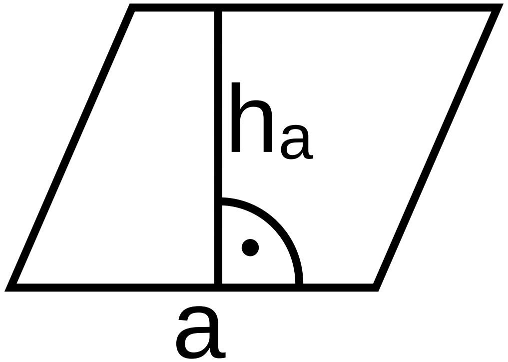
$u = 4s$

$A = s^2$



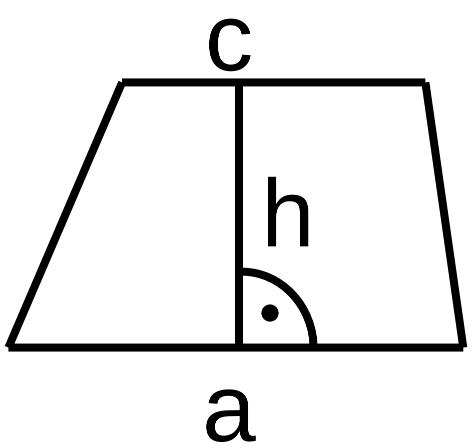
$u = 2(a+b)$

$A = a \cdot b$



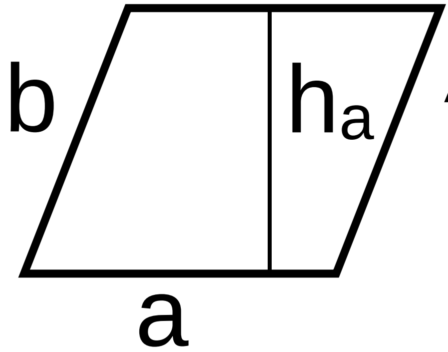
$u = 2(a+b)$

$A = h_a \cdot a$



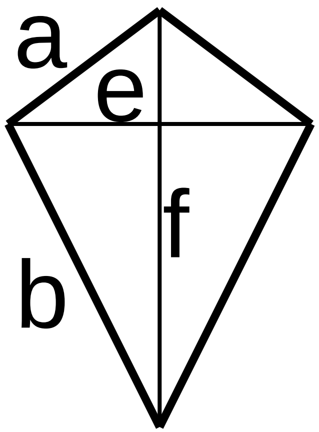
$$\mathbf{A} = \frac{\mathbf{a} + \mathbf{c}}{\mathbf{2}} \cdot \mathbf{h}$$

Flächenlehre



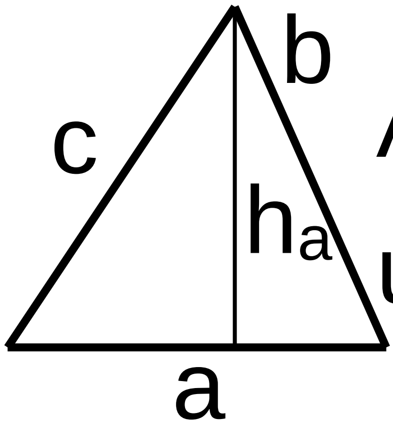
$$A = a \cdot h_a$$

$$u = 2a + 2b$$



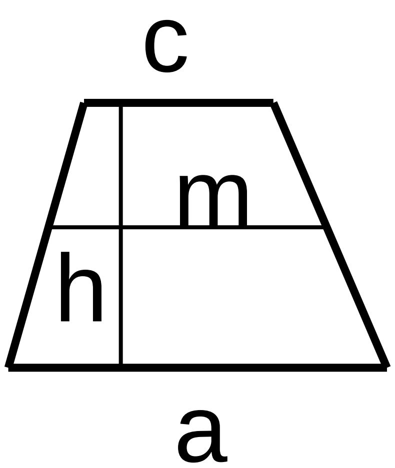
$$A = \frac{e \cdot f}{2}$$

$$u = 2a + 2b$$



$$A = \frac{a \cdot h_a}{2}$$

$$u = a + b + c$$



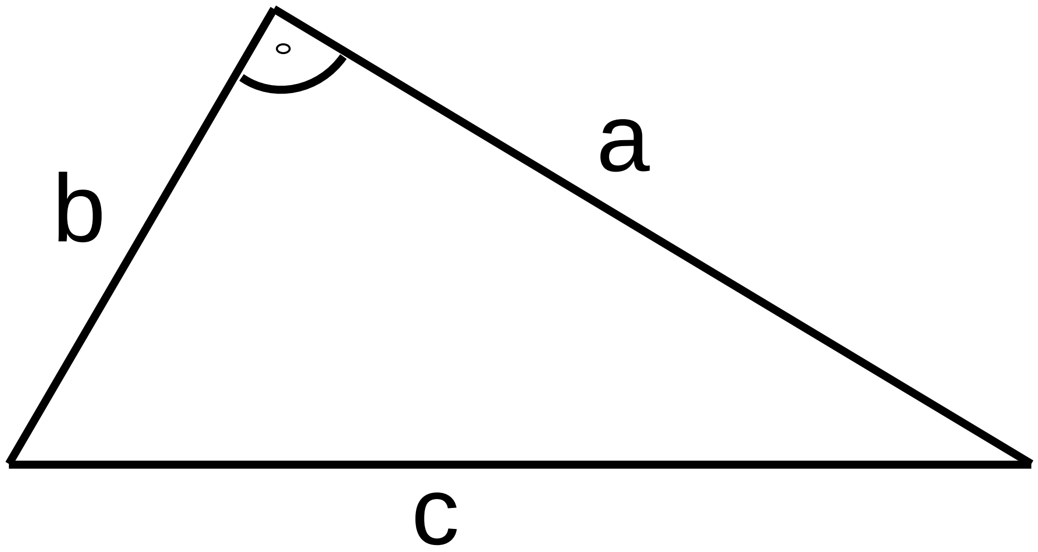
$$A = m \cdot h$$

$$A = \frac{(a+c)h}{2}$$

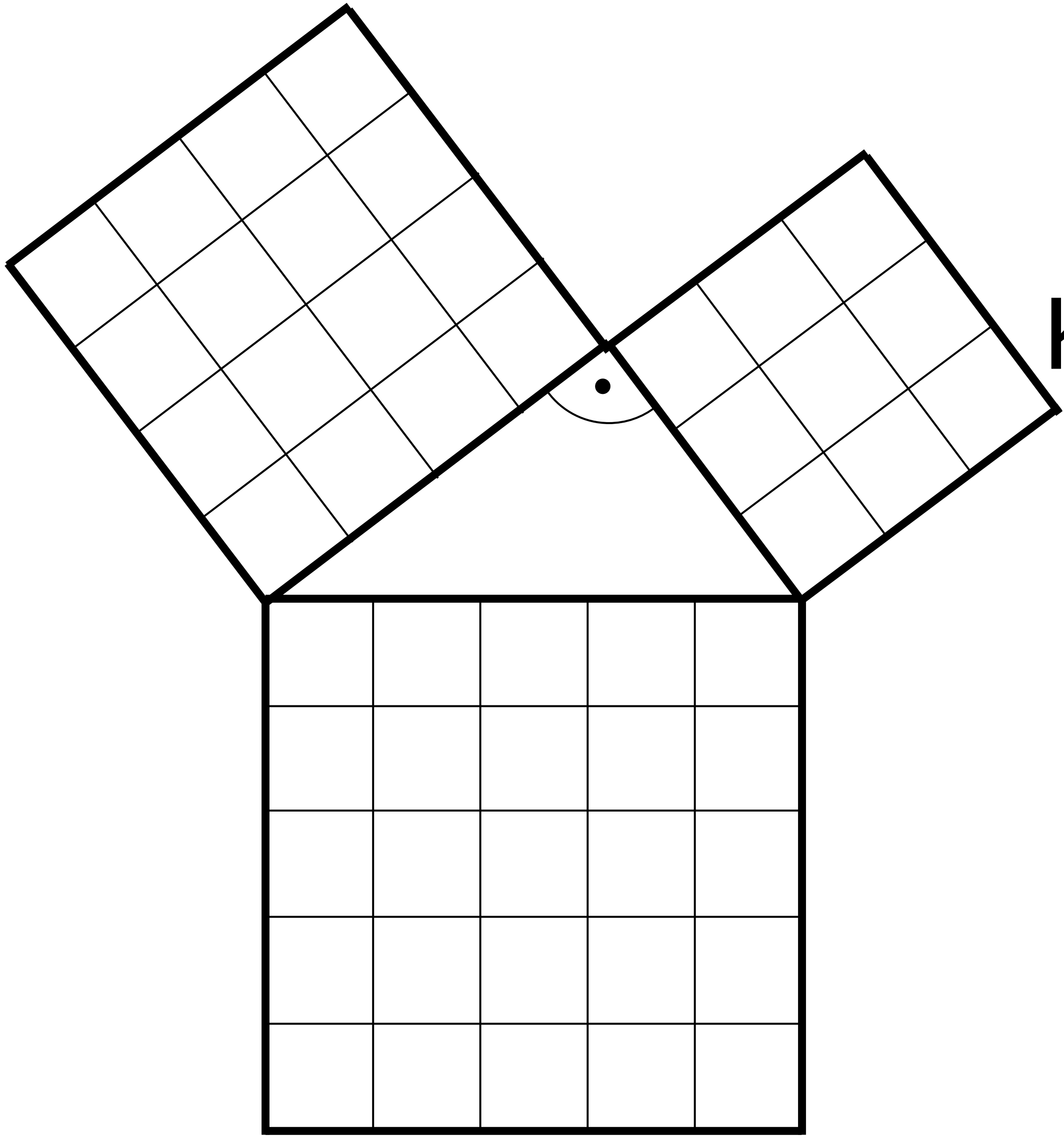
Satz des Pythagoras

$$a^2 + b^2 = c^2$$

$$\text{Kathete}^2 + \text{Kathete}^2 = \text{Hypotenuse}^2$$



Satz des Pythagoras



Kathete^2 + Kathete^2

Hypotenuse^2

$$\boxed{a^2 + b^2 = c^2}$$

Kathetensätze

$$a^2 = p \cdot c$$

$$b^2 = q \cdot c$$

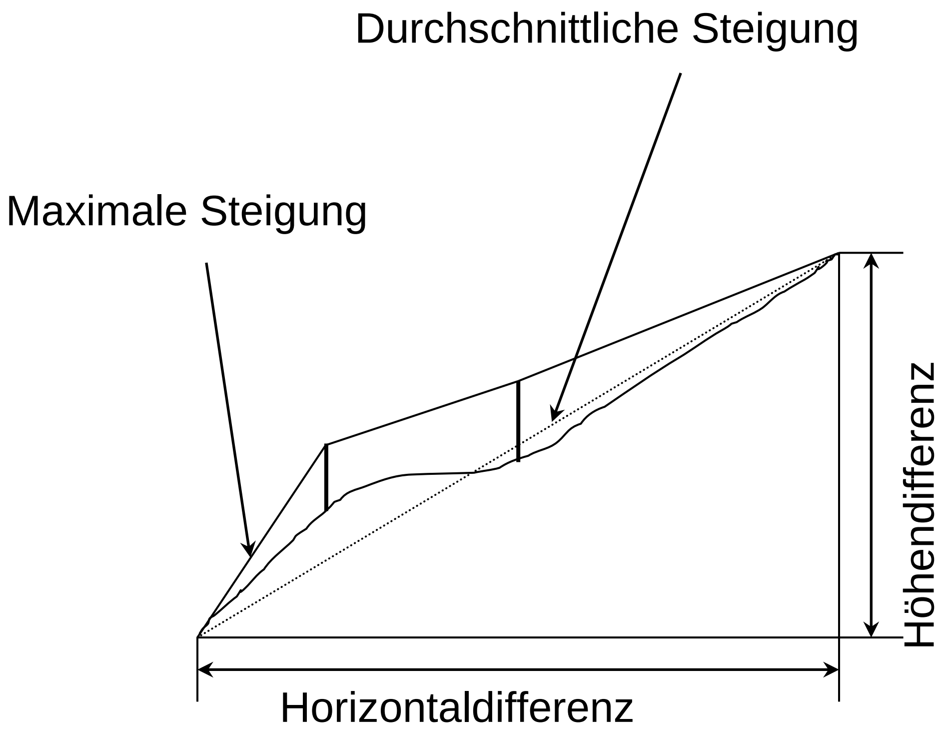
$$\text{Kathete}^2 = \text{Hypotenusenabschnitt} \cdot \text{Hypotenuse}$$

Höhensatz

$$h^2 = p \cdot q$$

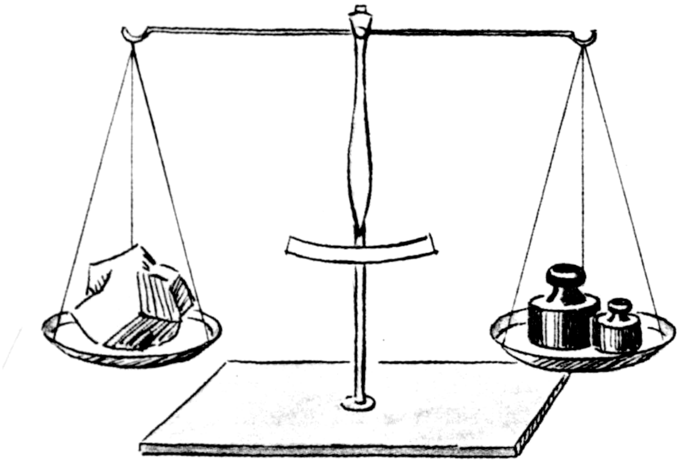
$$\text{Höhe}^2 = \text{Hypotenusenabschnitt} \cdot \text{Hypotenusenabschnitt}$$

Steigung

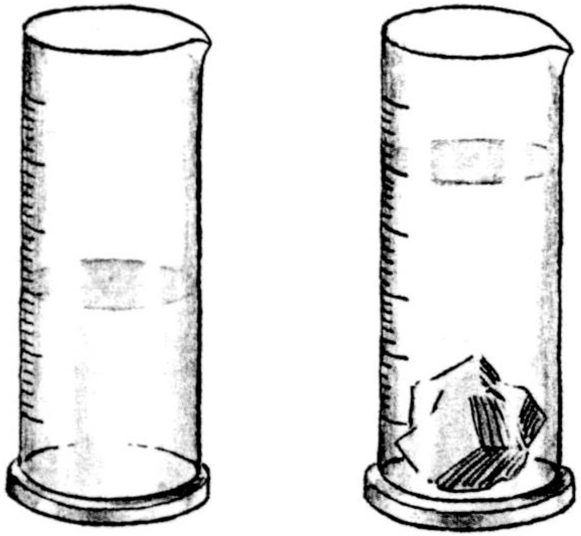


$$\frac{\textbf{Höhendifferenz}}{\textbf{Horizontaldifferenz}}$$

Dichte



Meßzylinder



$$\frac{\text{Masse}}{\text{Volumen}}$$

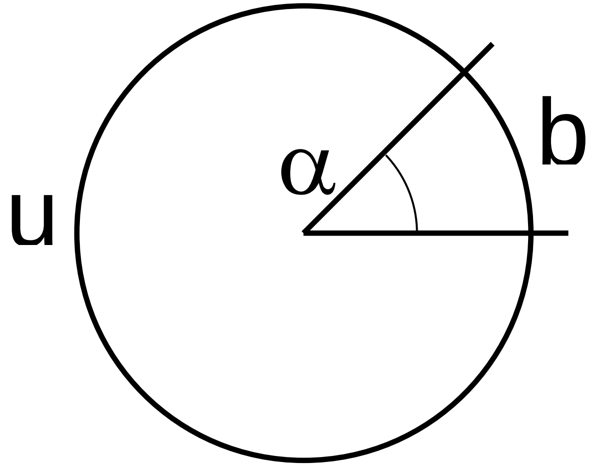
$$\frac{g}{cm^3} \qquad \frac{kg}{dm^3} \qquad \frac{t}{m^3}$$

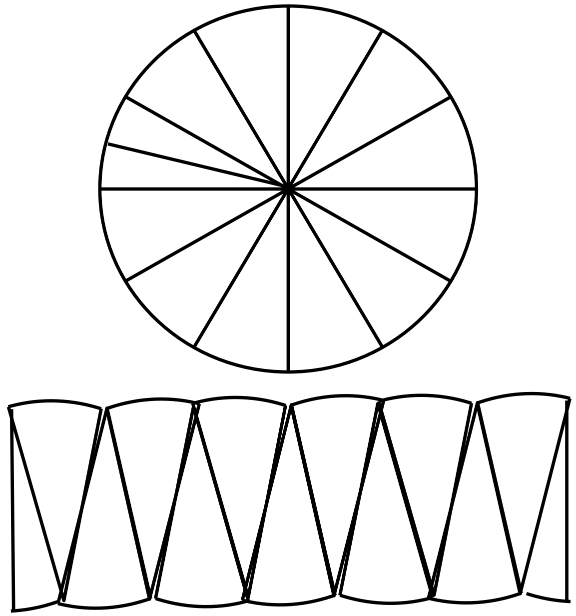
Geschwindigkeit

$$\frac{\textbf{Weg}}{\textbf{Zeit}}$$

$$\begin{tikzcd}
\dfrac{\text{km}}{\text{h}} \arrow[rr, bend left, ": 3.6"] & & \dfrac{\text{m}}{\text{sec}} \arrow[ll, bend left, "\cdot\ 3.6"]
\end{tikzcd}$$

Kreisberechnungen





Umfang: $u = 2\,r\,\pi$

$u = d\,\pi$

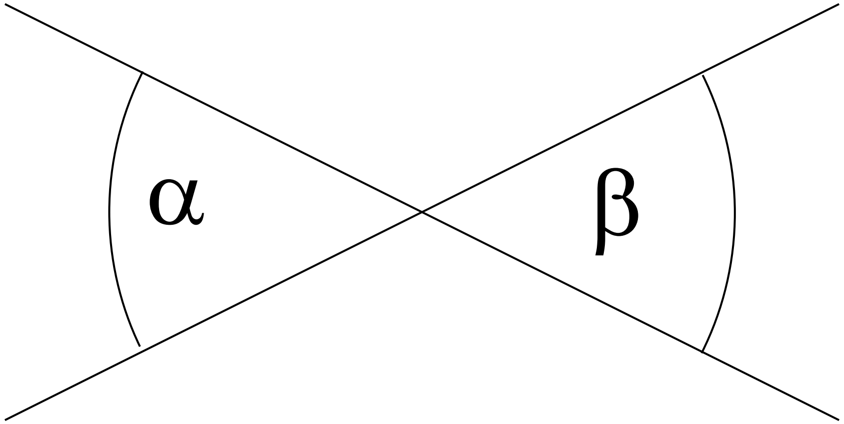
Bogen : $b = \dfrac{2r\pi \cdot \alpha}{360}$

Fläche: $A = r^2\,\pi$

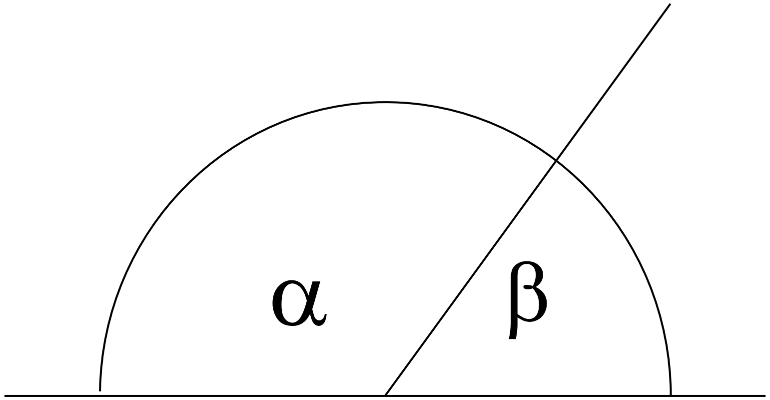
Sektor: $A = \dfrac{r^2\pi \cdot \alpha}{360}$

Winkel

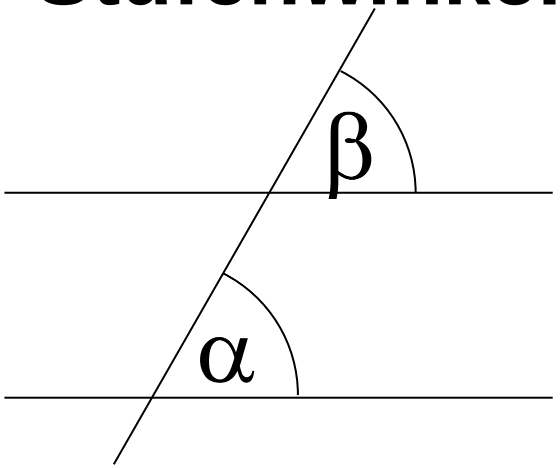
Scheitelwinkel



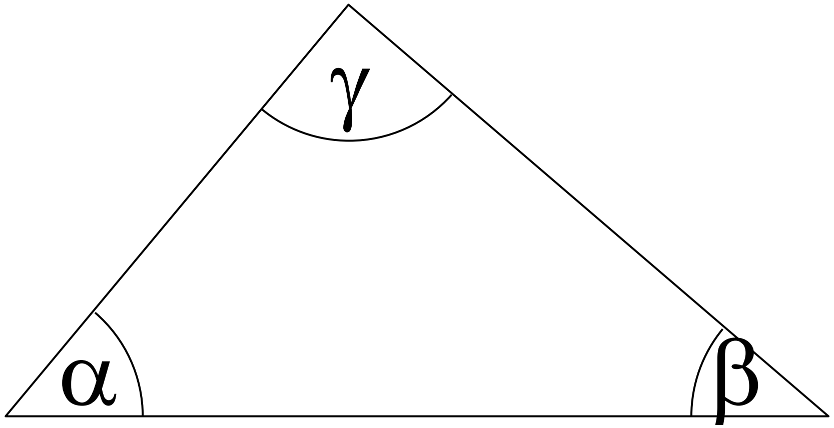
Nebenwinkel



Stufenwinkel

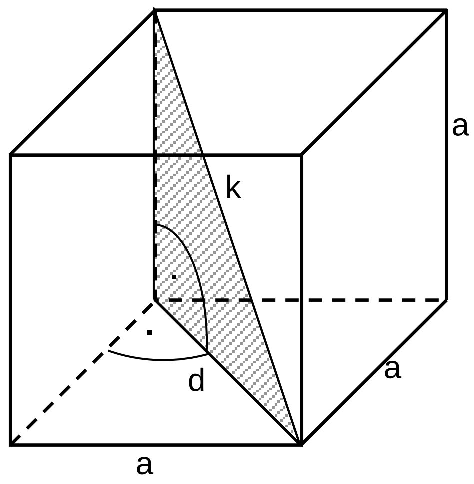


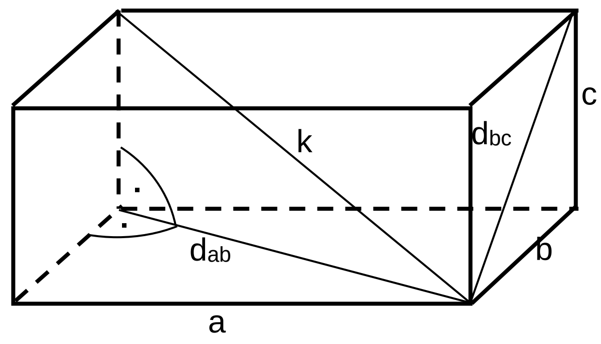
Innenwinkel im Dreieck

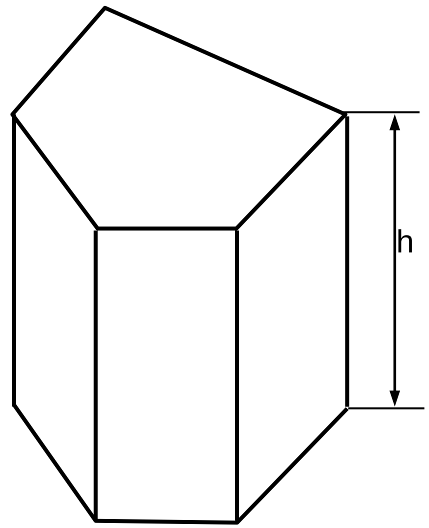


Würfel - Quader - Prisma

B

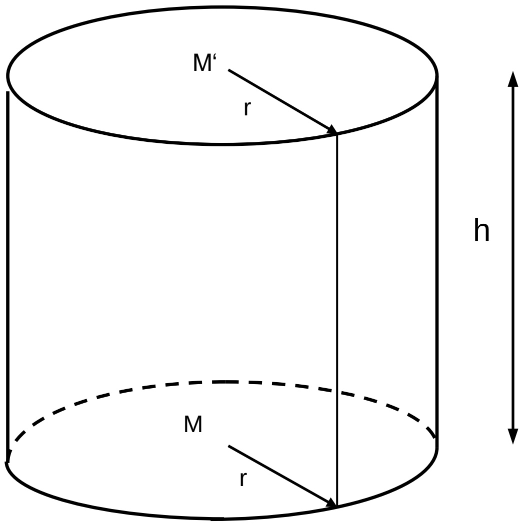
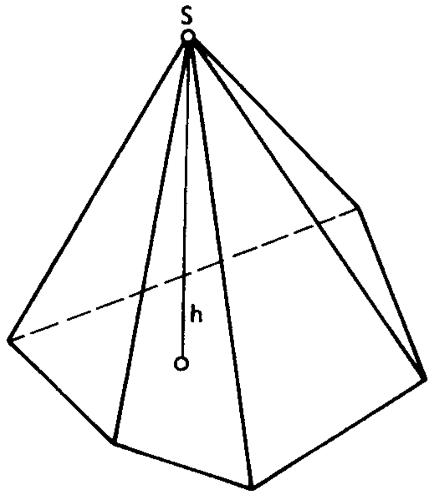
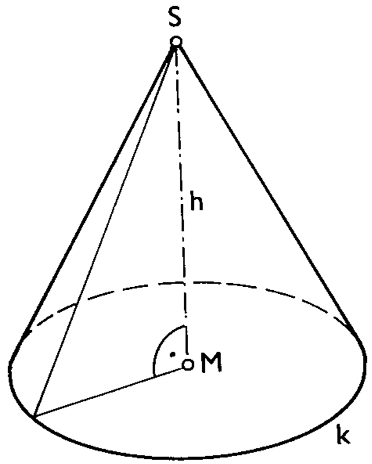






	Würfel	Quader	Prisma
M	$M = 4a^2$	$M = 2(bc + ac)$	$M = u \cdot h$
O	$A = 6a^2$	$A = 2(ab+bc+ac)$	$A = 2A_{GF} + M$
V	$V = a^3$	$V = a \cdot b \cdot c$	$V = A_{GF} \cdot h$

Zylinder - Pyramide - Kegel

B			
M	$M = 2\,r\pi \cdot h$		$M = r\pi s$
O	$A = 2\,r^2\pi + M$	$A = A_{GF} + M$	$A = \pi r(r + s)$
V	$V = r^2\pi h$	$V = \frac{A_{GF} \cdot h}{3}$	$V = \frac{r^2\pi \cdot h}{3}$

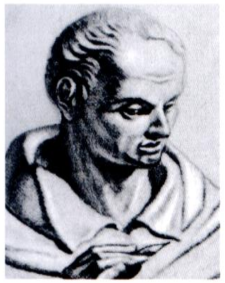
Kugel

Volumen

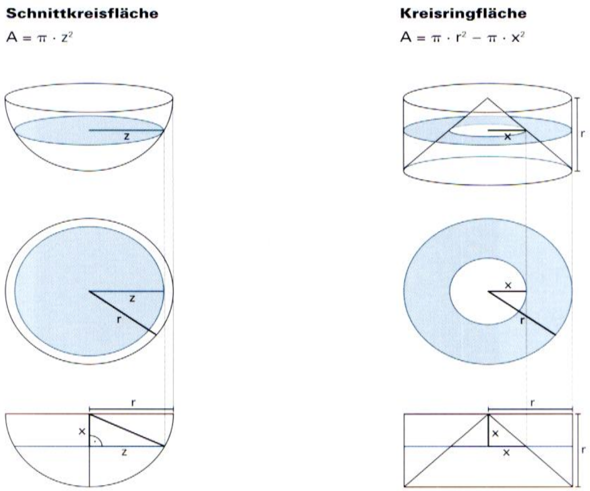
$$V = \frac{4}{3} r^3 \pi$$

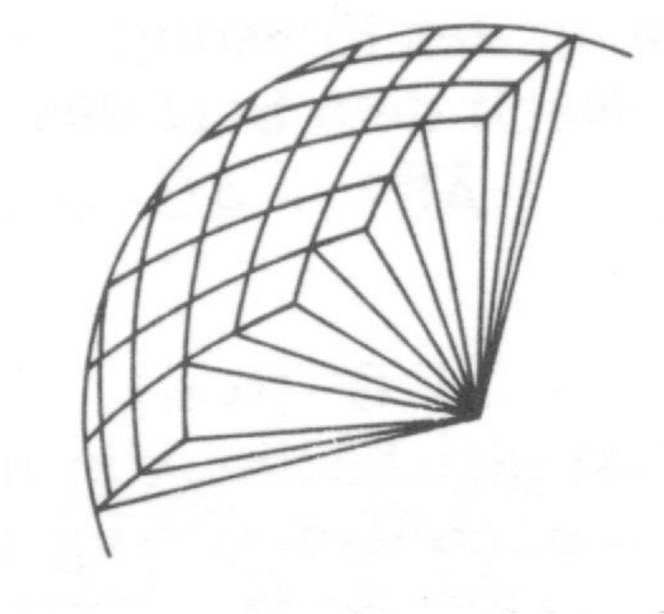
Oberfläche

$$A = 4 r^2 \pi$$



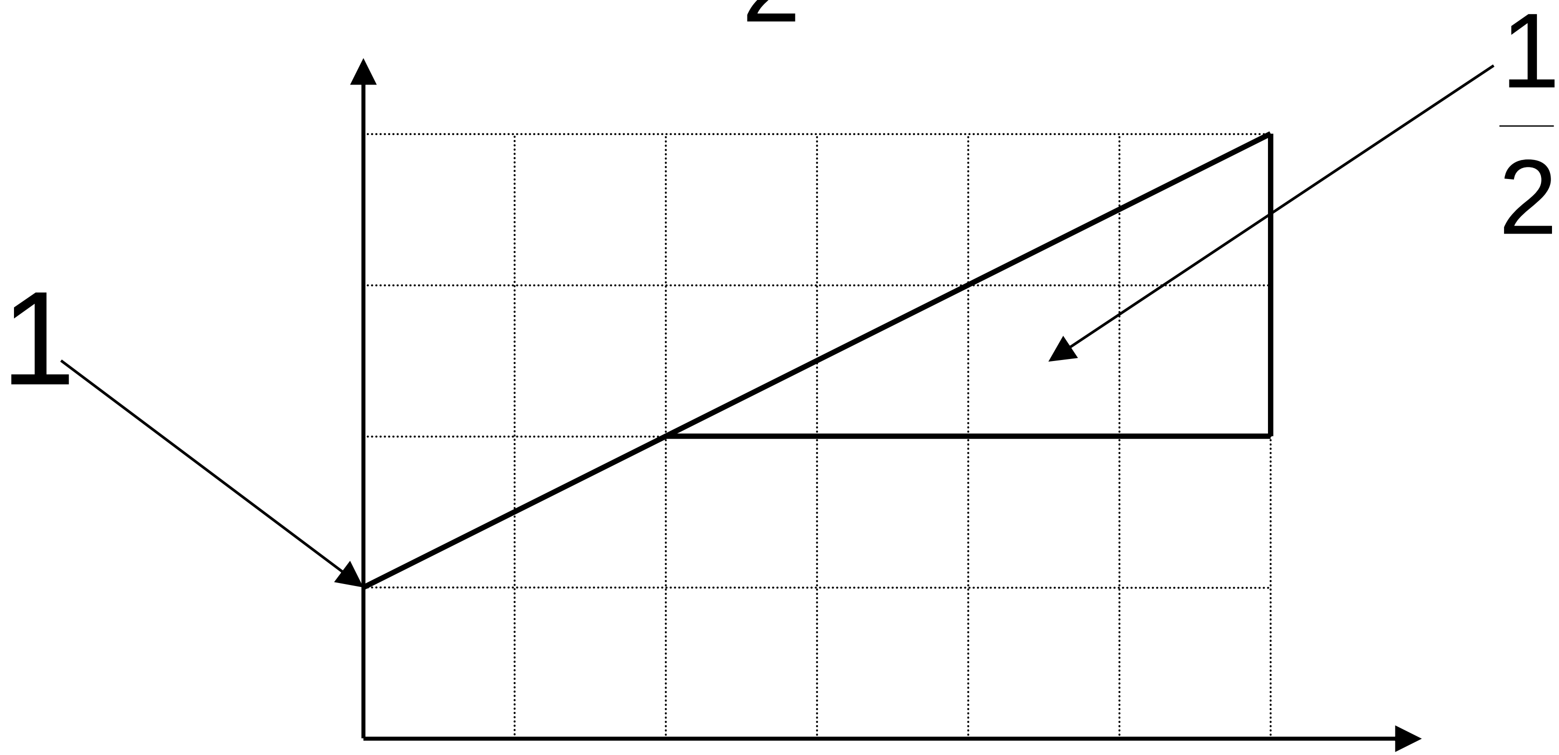
Bonaventura Cavalieri
(1598 – 1647)



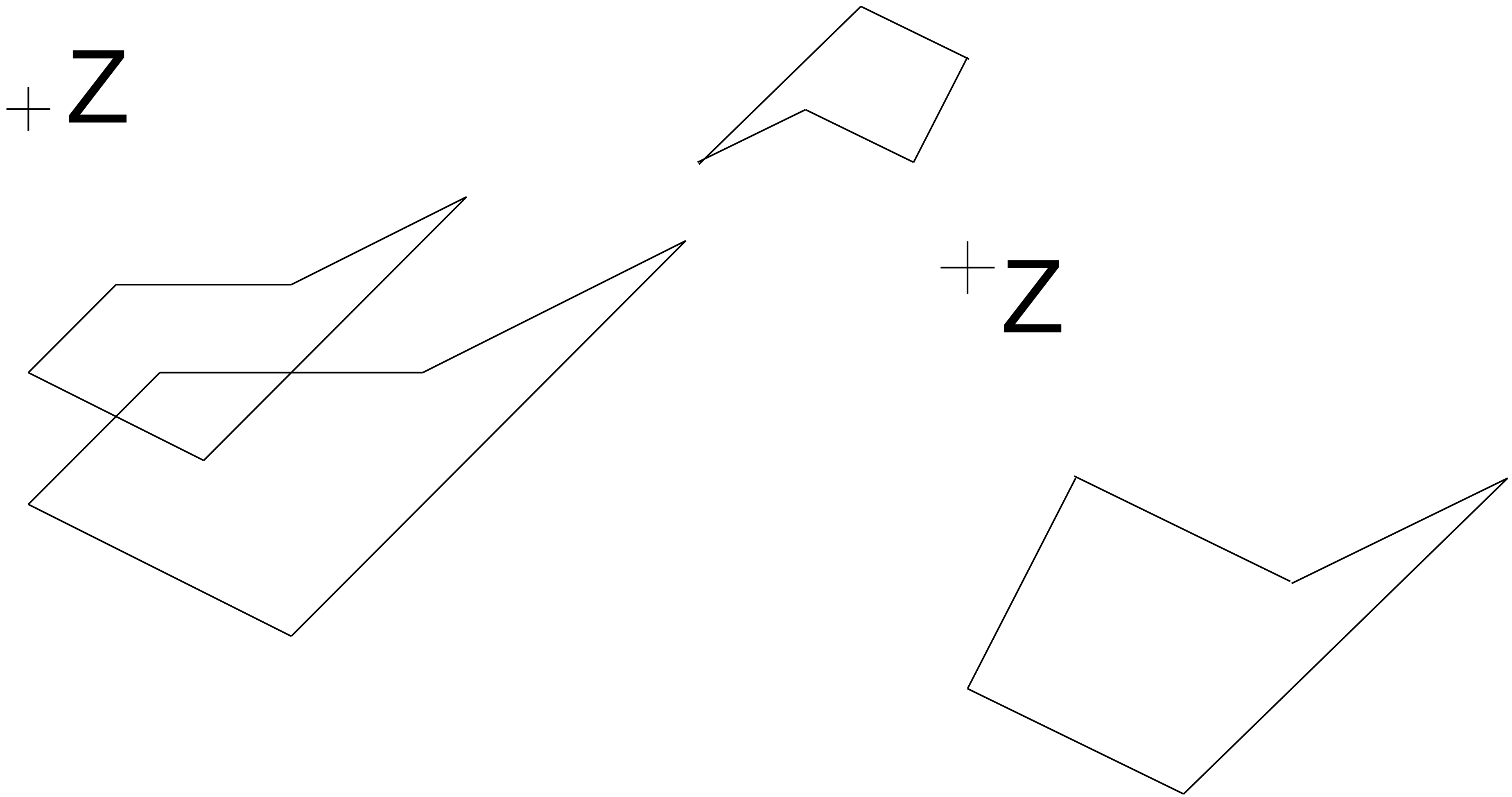


Geradengleichung

$$\mathbf{y = \frac{1}{2}x + 1}$$



Zentrische Streckung



Zinseszins

$$K_n = K_0 (1 + p)^n$$

Näherungsformel für die Verdoppelung des Kapitals (für $p < 7$)

$$n = \frac{70}{\text{Zinssatz in Prozenten}}$$

Permutationen

Auf wie viele Arten können 4 (n) Schüler auf 4 (n) Plätze sitzen?

$$4 \cdot 3 \cdot 2 \cdot 1 = 4\,! = 24 \qquad n\,!$$

Kombinationen

Auf wie viele Arten können 3 Kugeln aus 8 gezogen werden?

1. Ziehung
2. Ziehung
3. Ziehung

$$\frac{8 \cdot 7 \cdot 6}{3 \cdot 2 \cdot 1} = 56$$

Wiederholungen ausschliessen