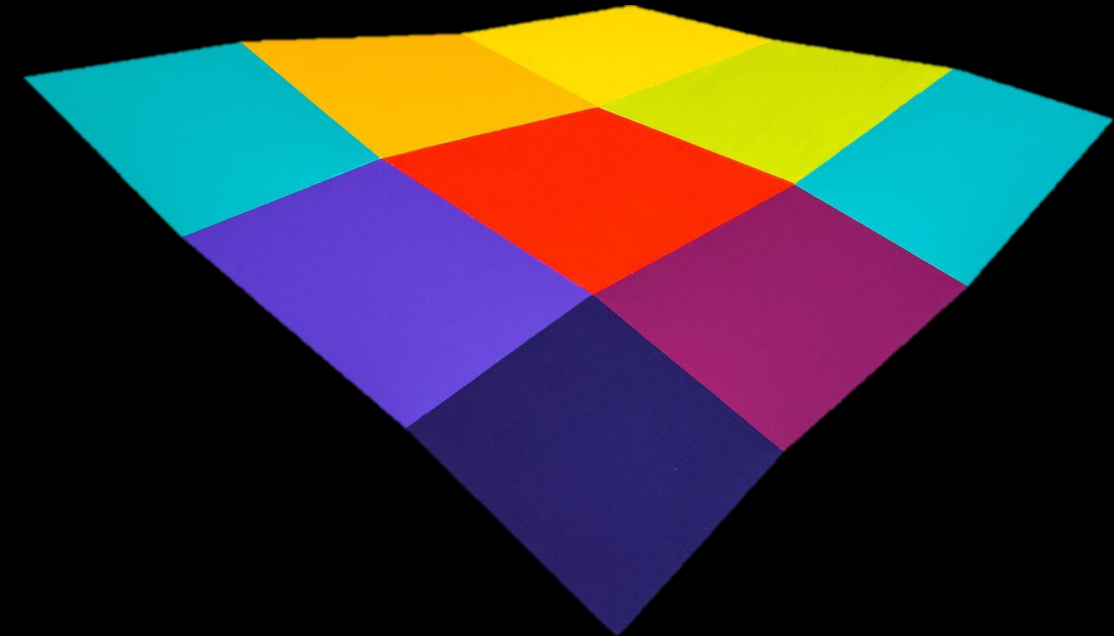
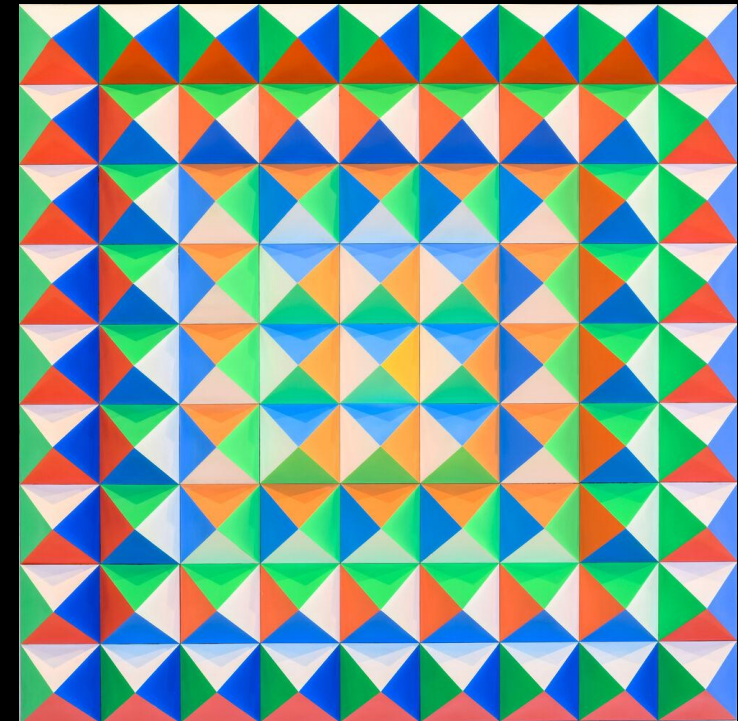
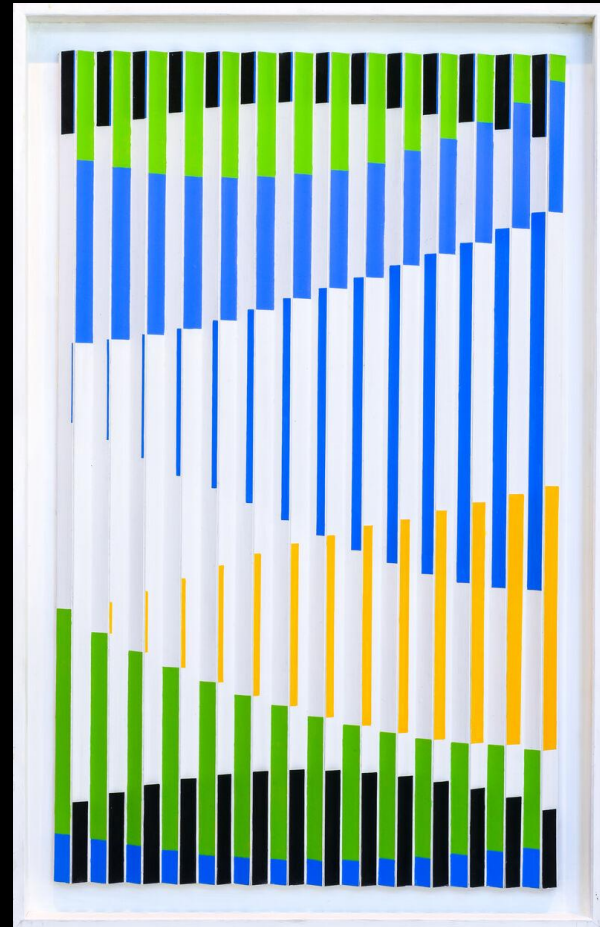
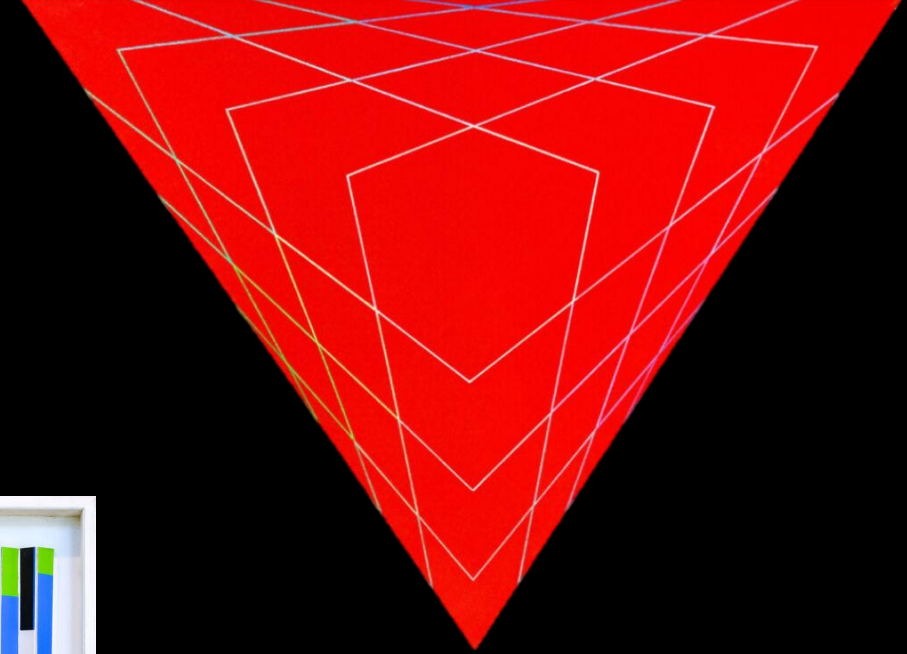
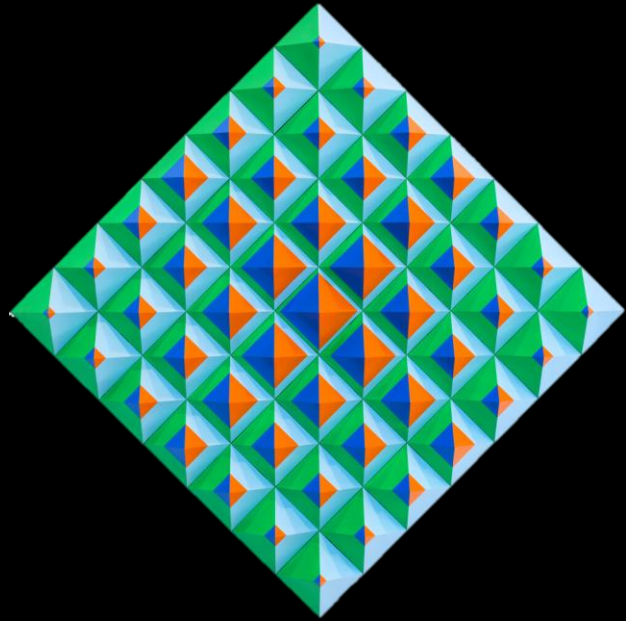


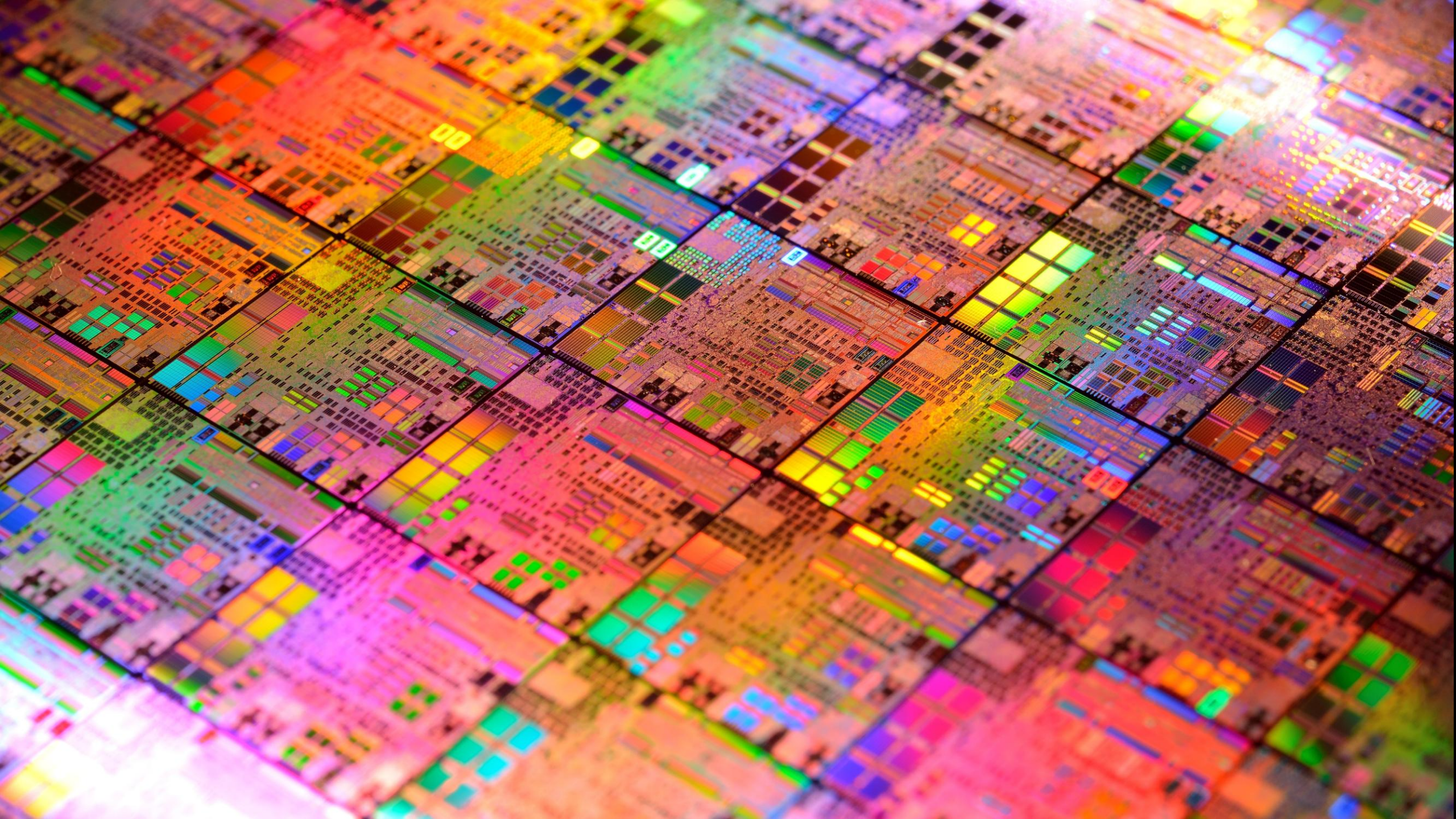


ARITHMEUM
rechnen einst und heute









Calculating in olden times

Counting devices



1	10	100	1000
2	20	200	2000
3	30	300	3000
4	40	400	4000
5	50	500	5000
6	60	600	6000
7	70	700	7000
8	80	800	8000
9	90	900	9000

Luca Pacioli's 1494 Summa de arithmetica, based on the earlier Arabic system

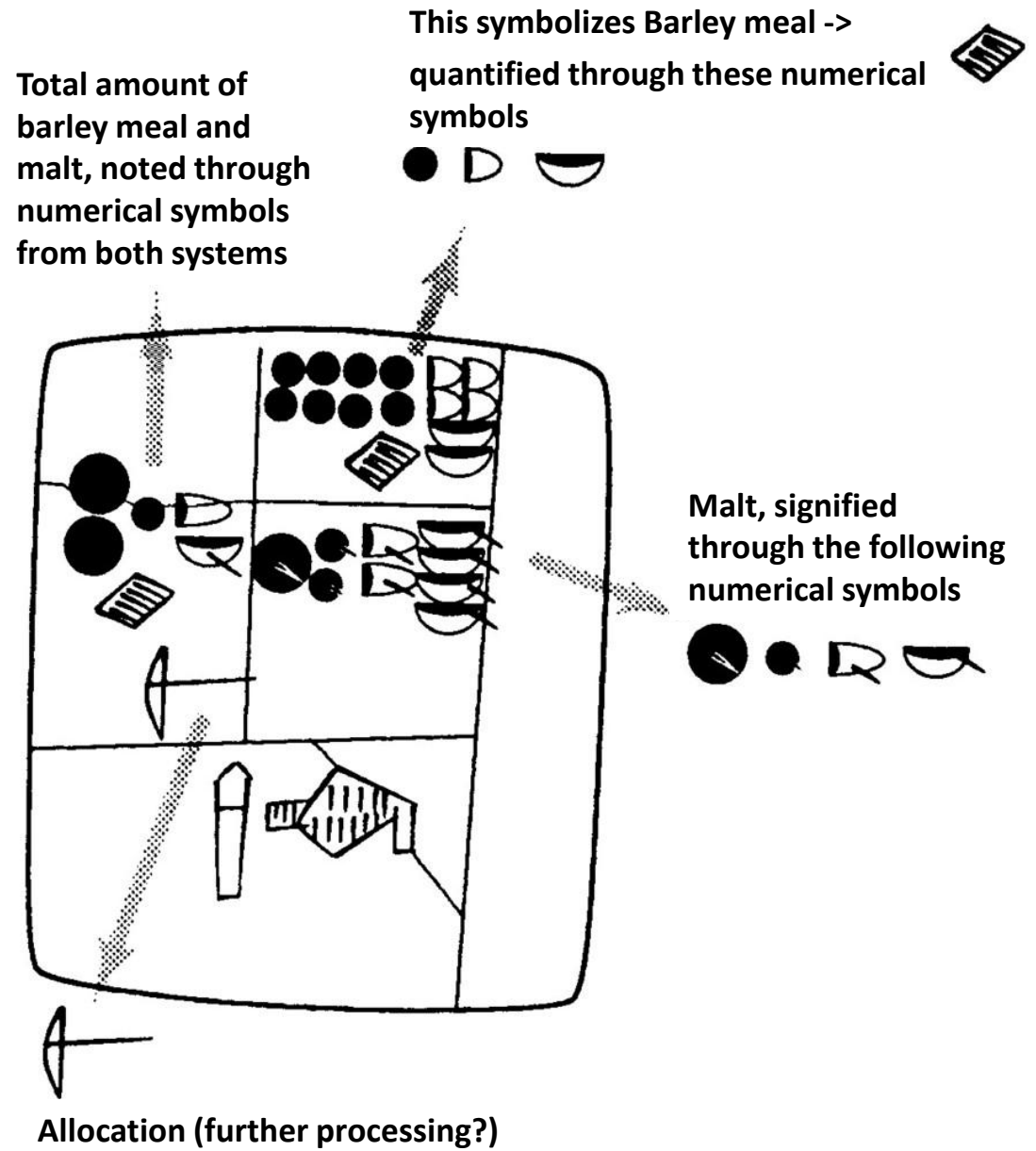


Calculi (clay tokens), approx. 4000 BCE

Tokens	Sumerian Pictographs	Tokens	Sumerian Pictographs	Tokens	Sumerian Pictographs
	 Numeral 1		 Bread		 Seat
	 Numeral 10		 Wool		 Place
	 Numeral 600		 Sheep		 Legal Decision
	 Numeral 36000		 Metal		 Cloth



Clay tablet Uruk, approx. 3000 BCE



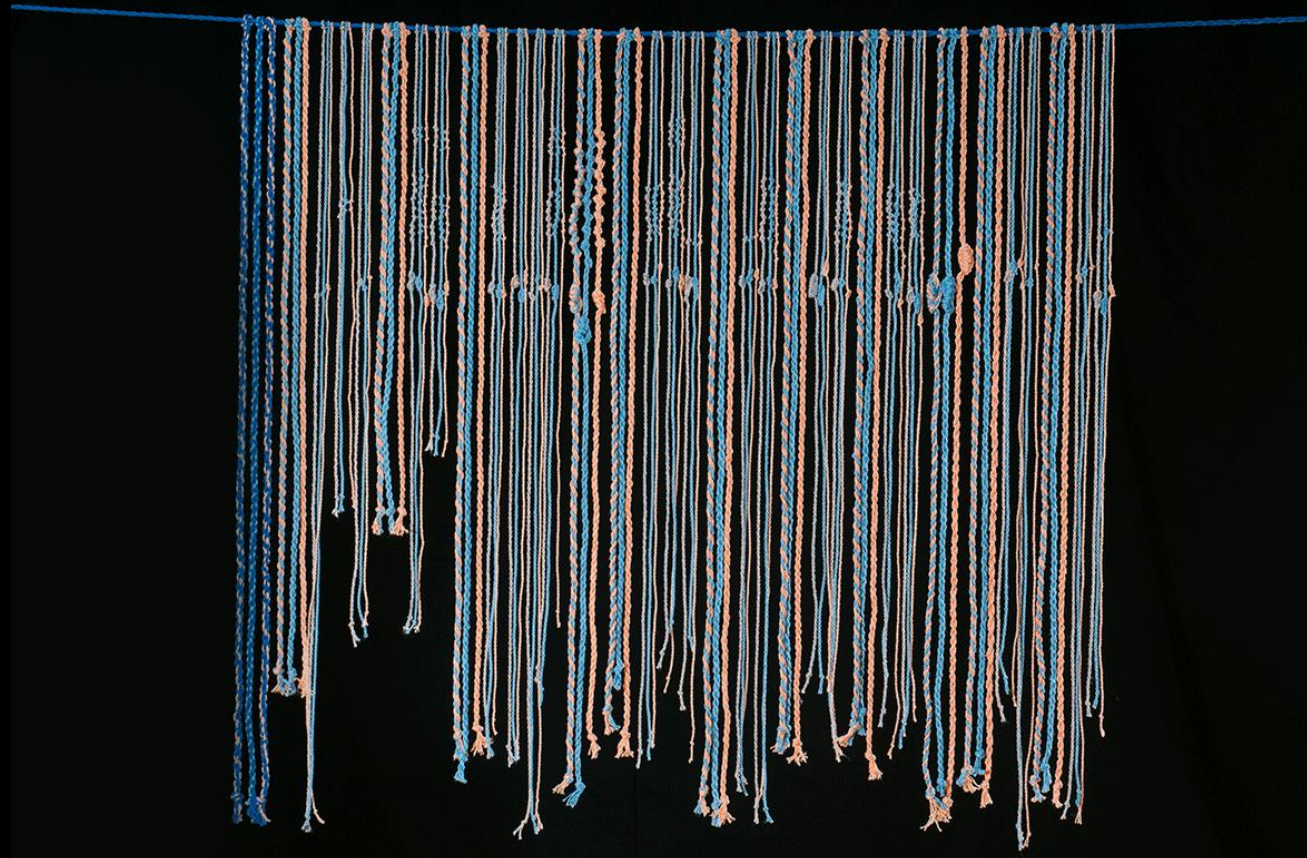
COTADOR MAIOR TEZORERO
TAVANTISVIOOVIPOC
CYRACA CON DOR CHAVA



con tavor ytequero

con tador

Quipu, approx. 13th – 15th century



Workshop – Fingers, Stones and Knots





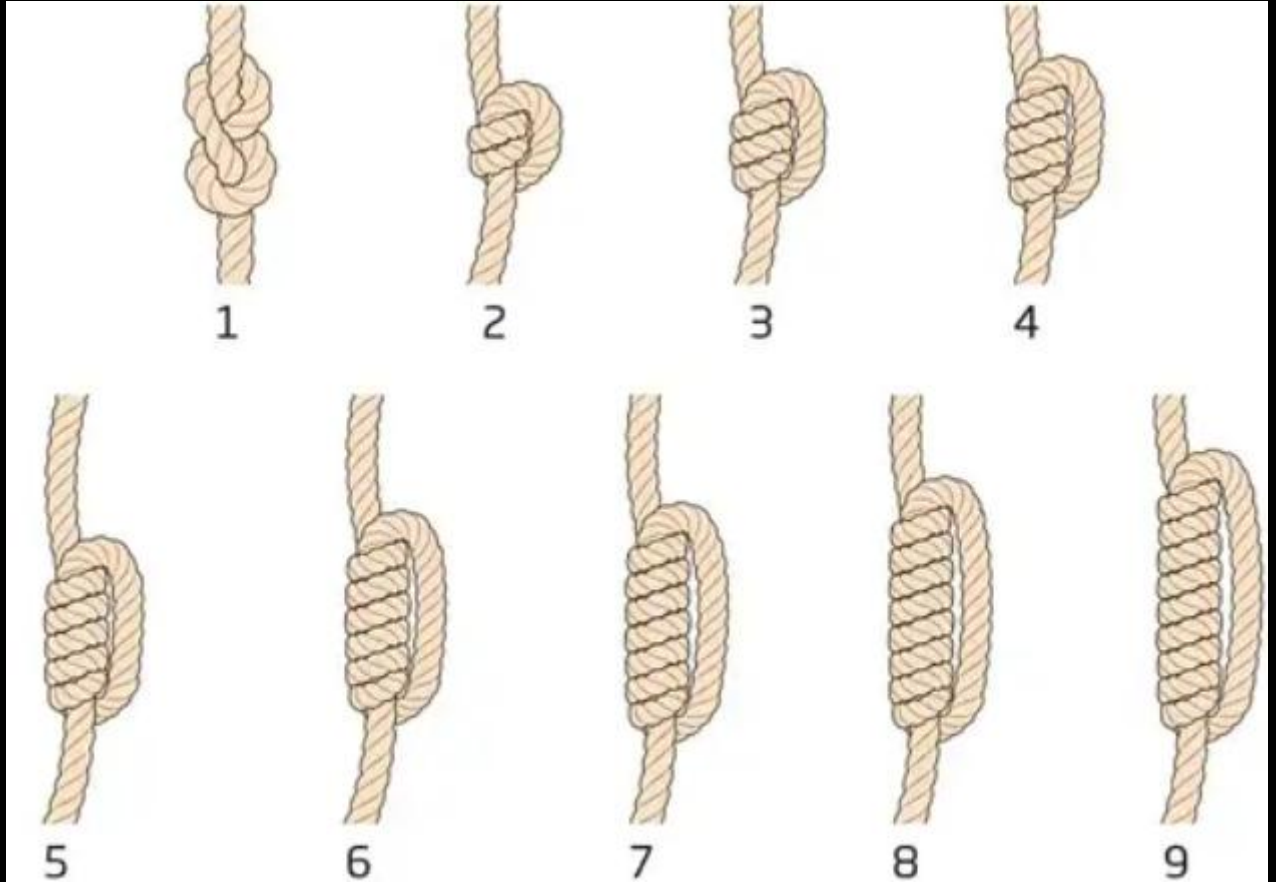
Ones

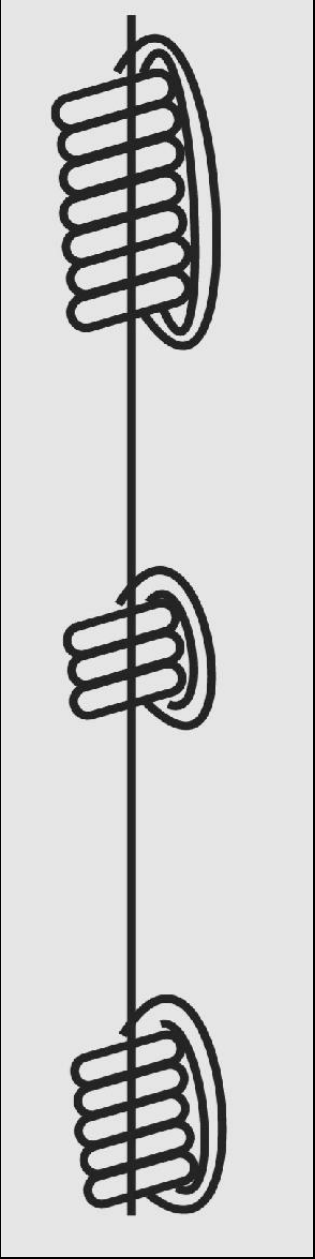
Tens

Hundreds

Thousands

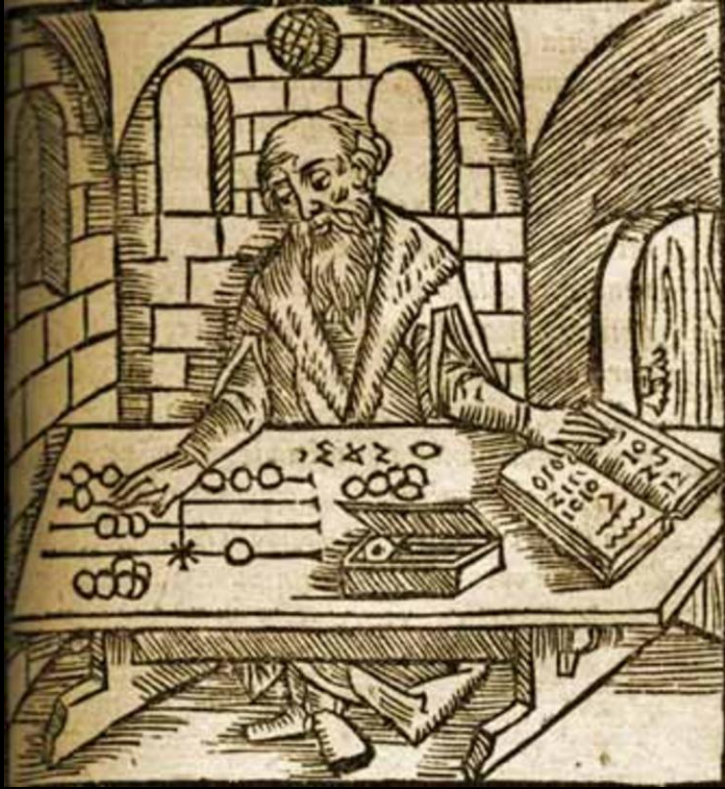
Ten Thousands



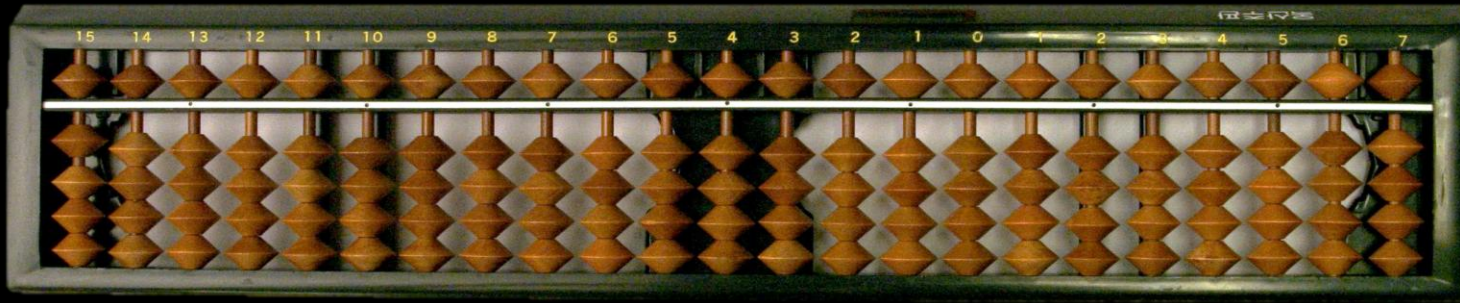


Calculating in olden times

Calculation Aides



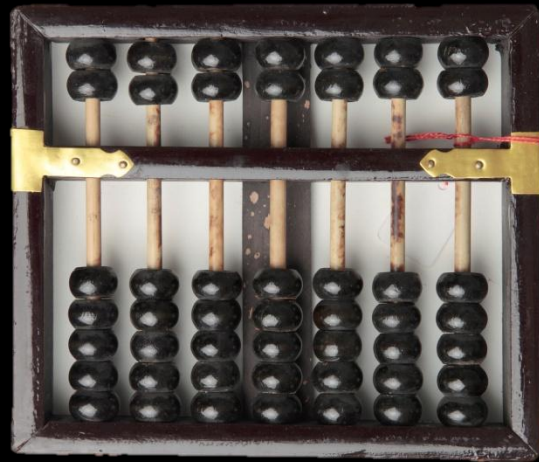
Reckoning table, original in Dinkelsbühl, approx. 15th century



Chinese Suanpan, 4:1 version

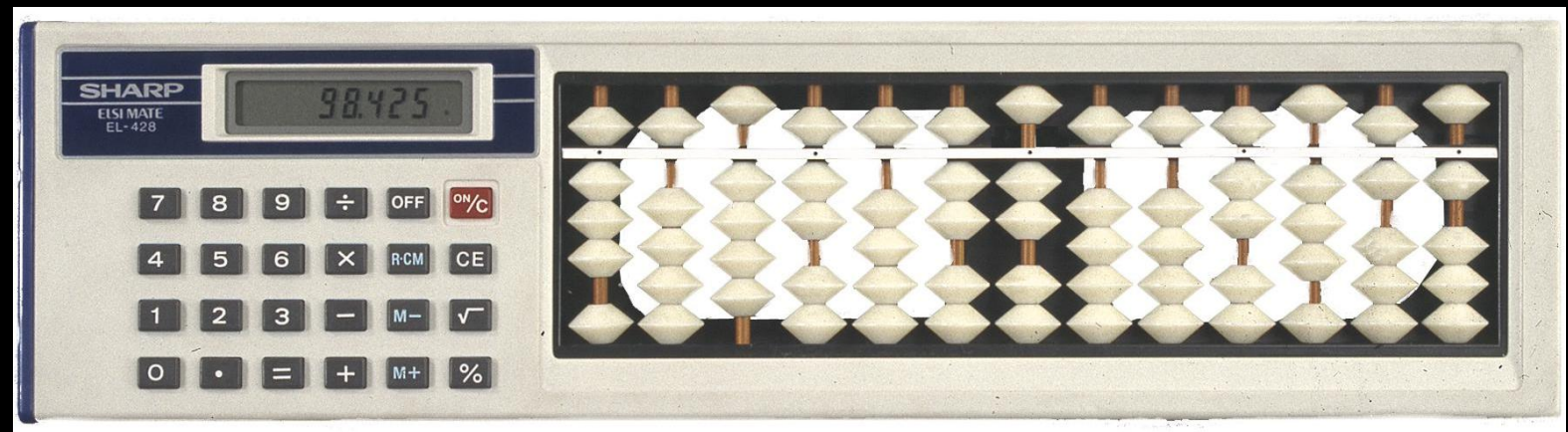


Roman Abacus



Chinese Suanpan, 5:2 version

Japanese Soroban, modern version



Workshop – Reckoning Master & Abacus

Rechenbüch/
Zuff Linien vnd
Zyffren / In allerley Hand-
tierung / Geschäften vnd Rauff-
mannschaft. Durch
Adam Risen.
Wie nütwen künstlichen Reglen vnd
Exemplen gemehret / Innhalt fürs
gestelten Registers.
Dieser vnd Wechselluten künstlich vnd
gerecht zūmachen / vß dem Quadrat / Durch
die Arithmetie vnd Geometri. Von
Erhart Helm / Mathematico
zū Franckfurt beschriben.
Alles von nütwen yezund widerumb
erschen vnd corrigiert.



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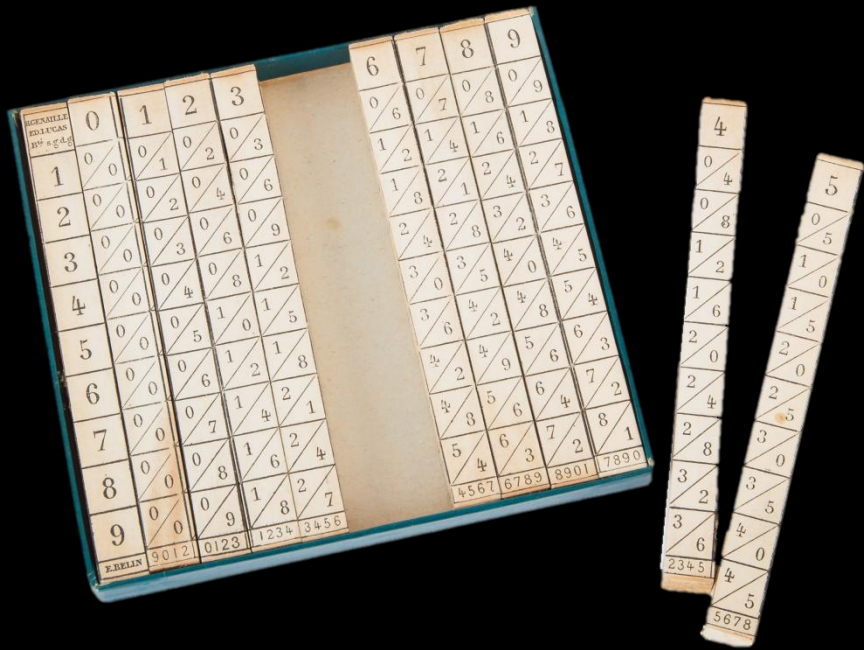


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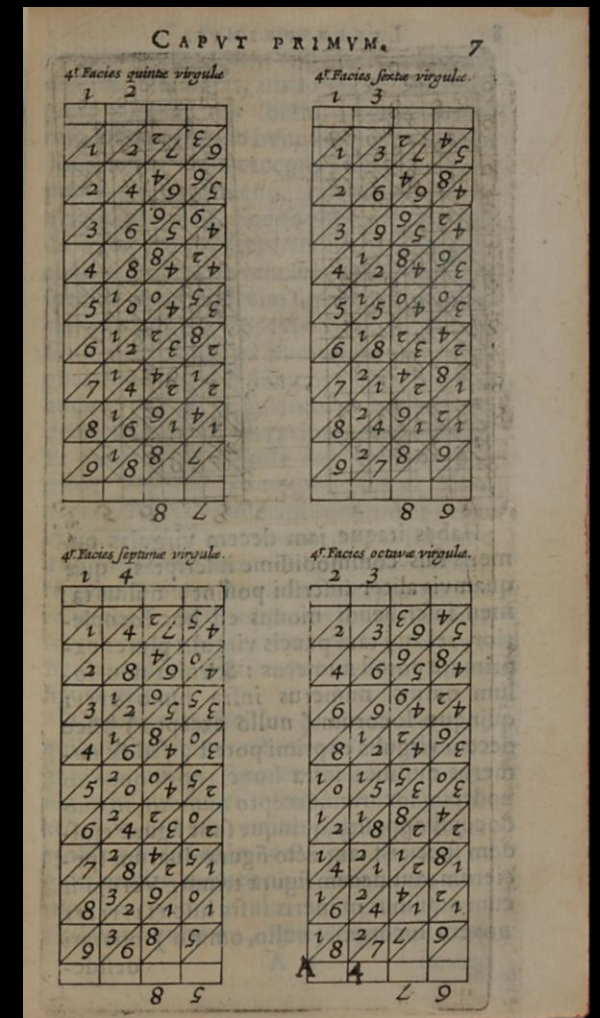
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Napier's rods, since approx. 1700

1	2	3	4	5	6	7	8	9
2	4	6	8	10	12	14	16	18
3	6	9	12	15	18	21	24	27
4	8	12	16	20	24	28	32	36
5	10	15	20	25	30	35	40	45
6	12	18	24	30	36	42	48	54
7	14	21	28	35	42	49	56	63
8	16	24	32	40	48	56	64	72
9	18	27	36	45	54	63	72	81
10	20	30	40	50	60	70	80	90



Excerpt from Napier, *Rabdologiae seu numeratio per virgulas libri duo*, published since 1617

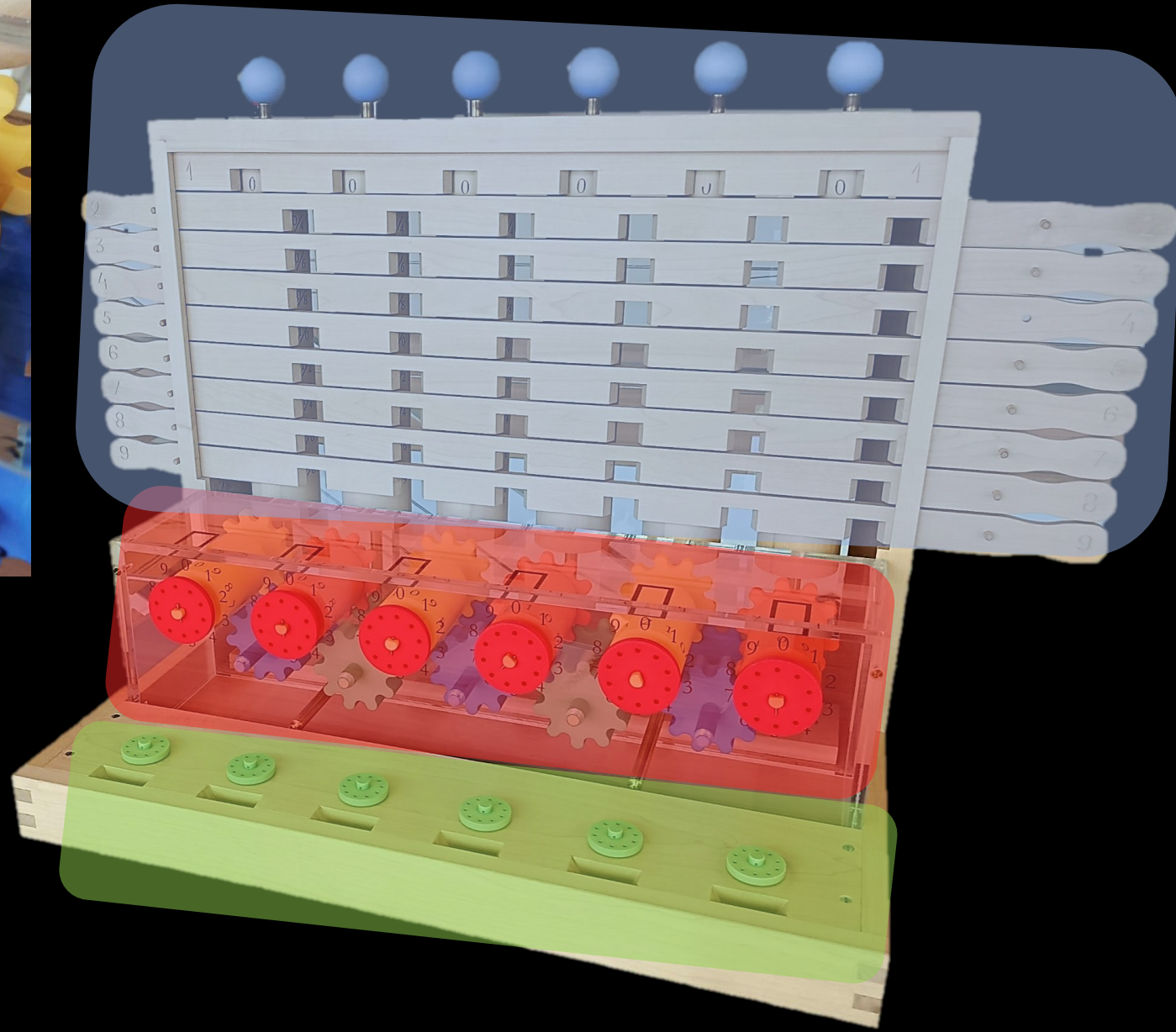


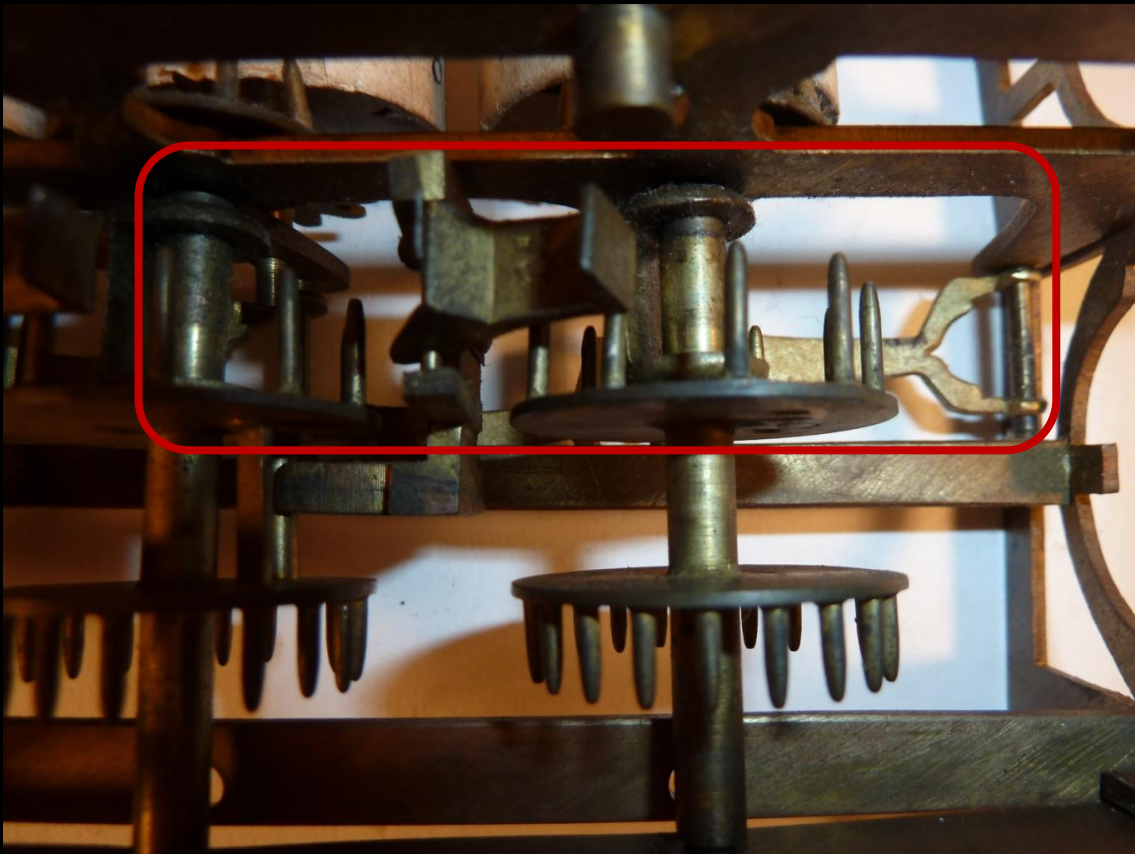
Calculating in olden times

Calculating Machines – Addition & Subtraction



Reconstruction of Schickard's calculating machine, 1623



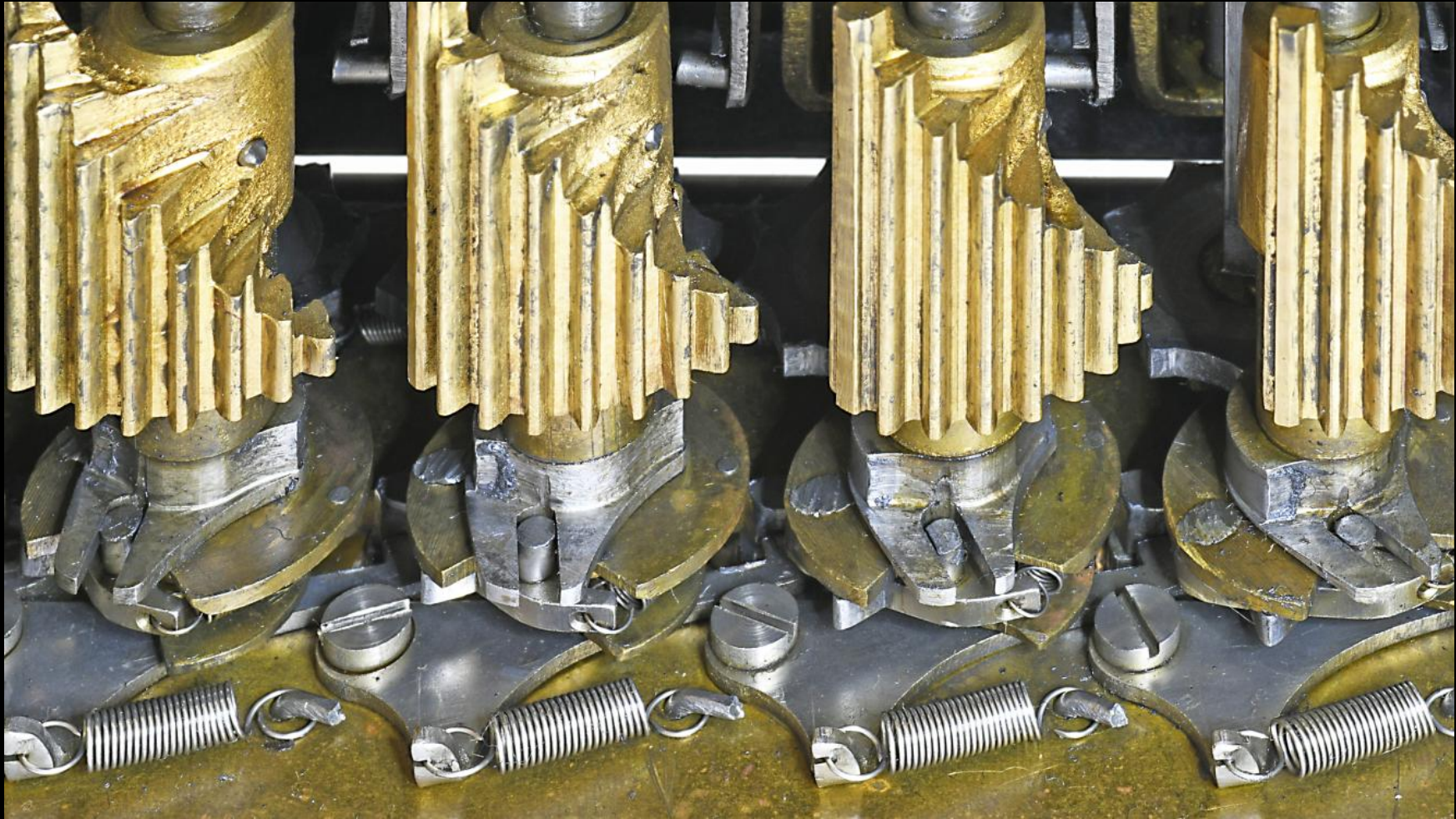


Pascaline, since 1642



Calculating in olden times

Calculating Machines – 4 Species

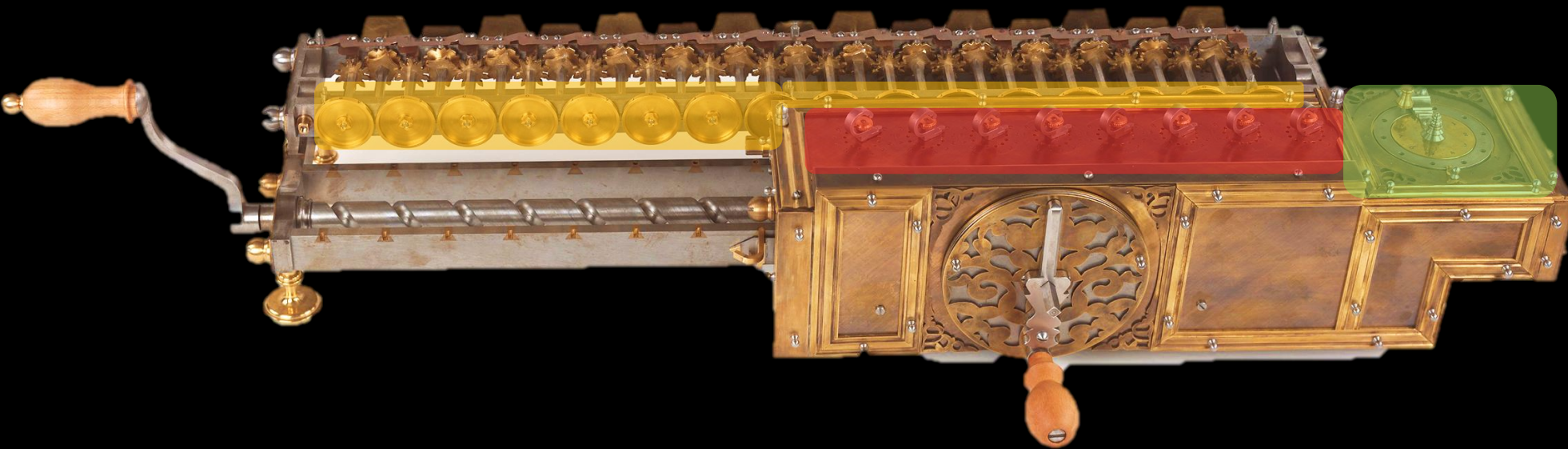


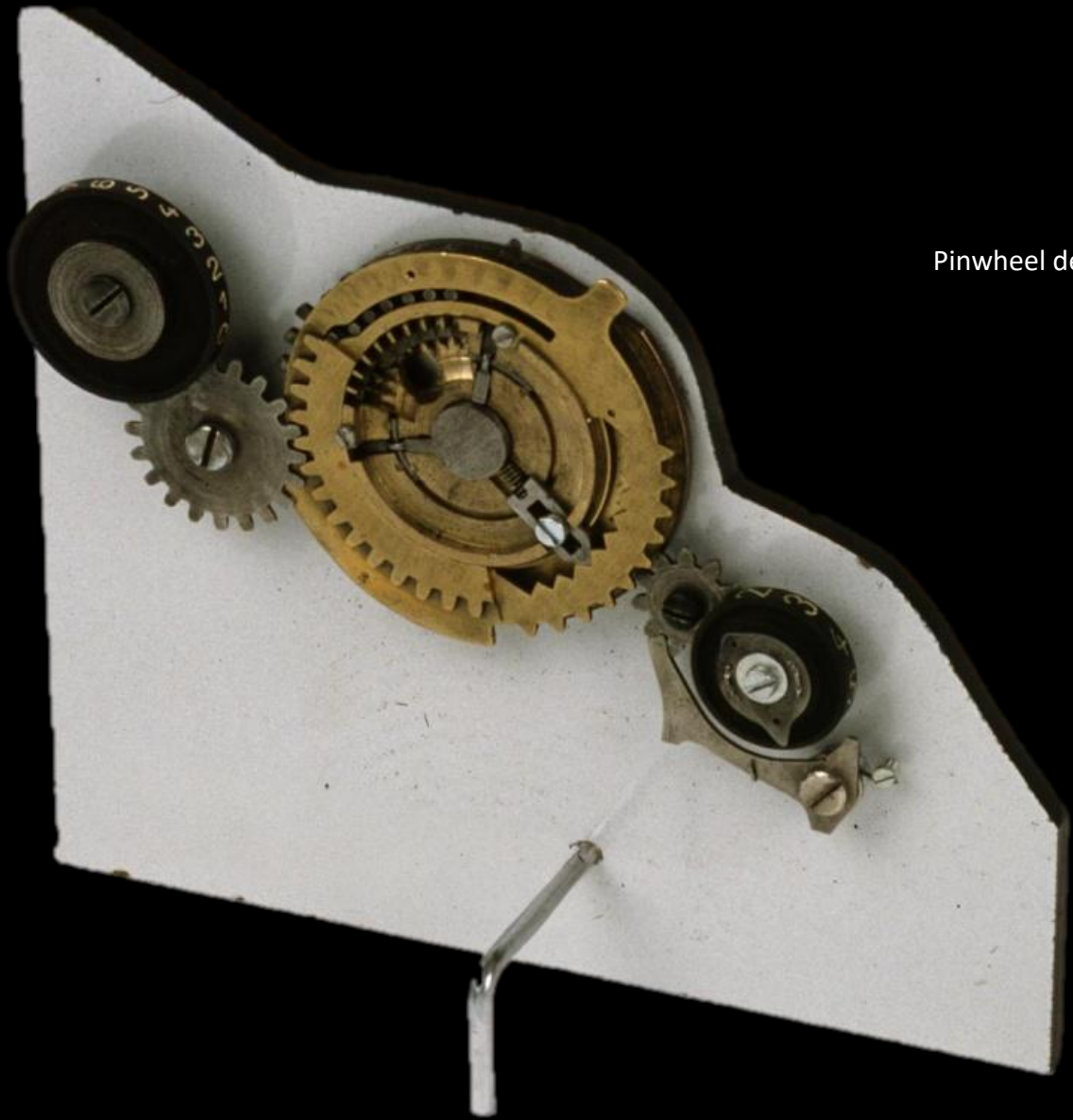
Stepped Drums



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Leibniz Machina Arithmetica, 1694



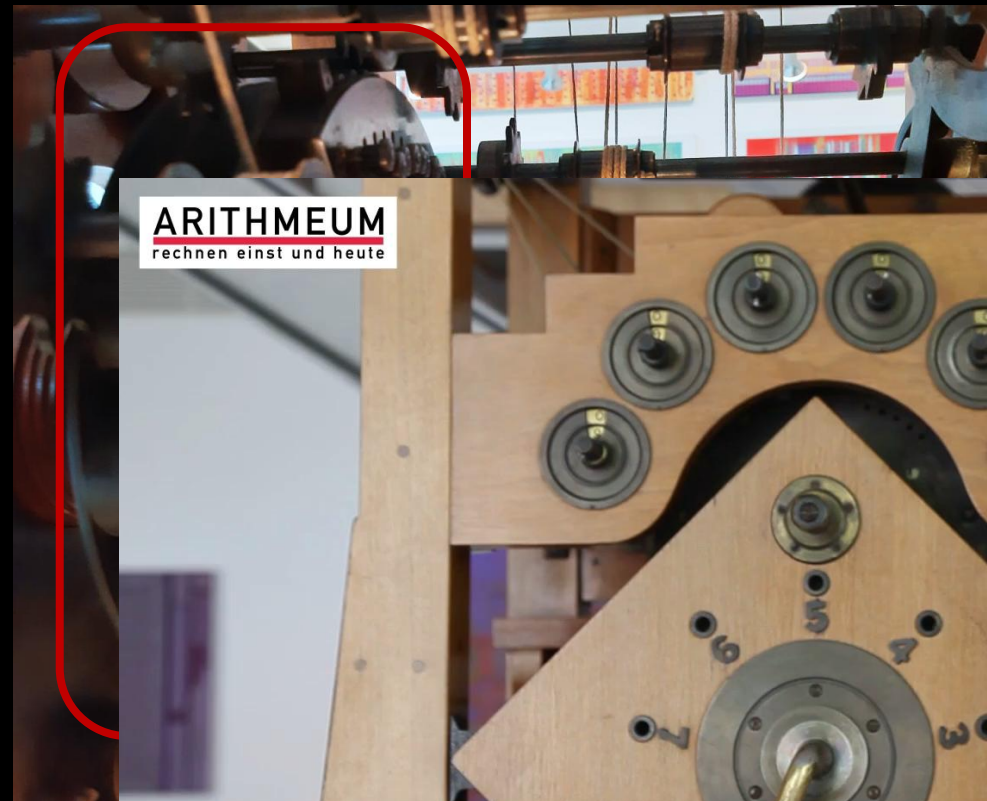


Pinwheel demonstration model

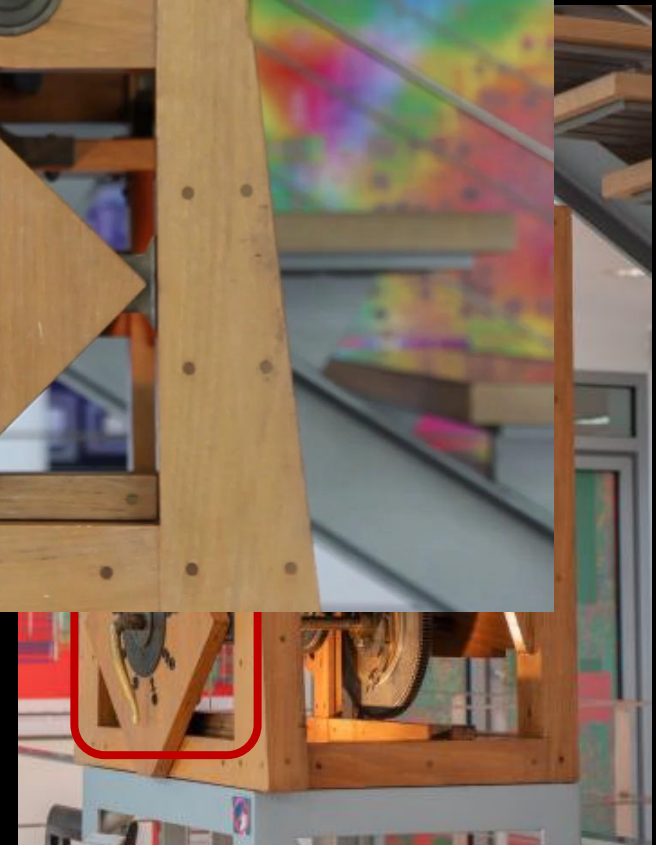


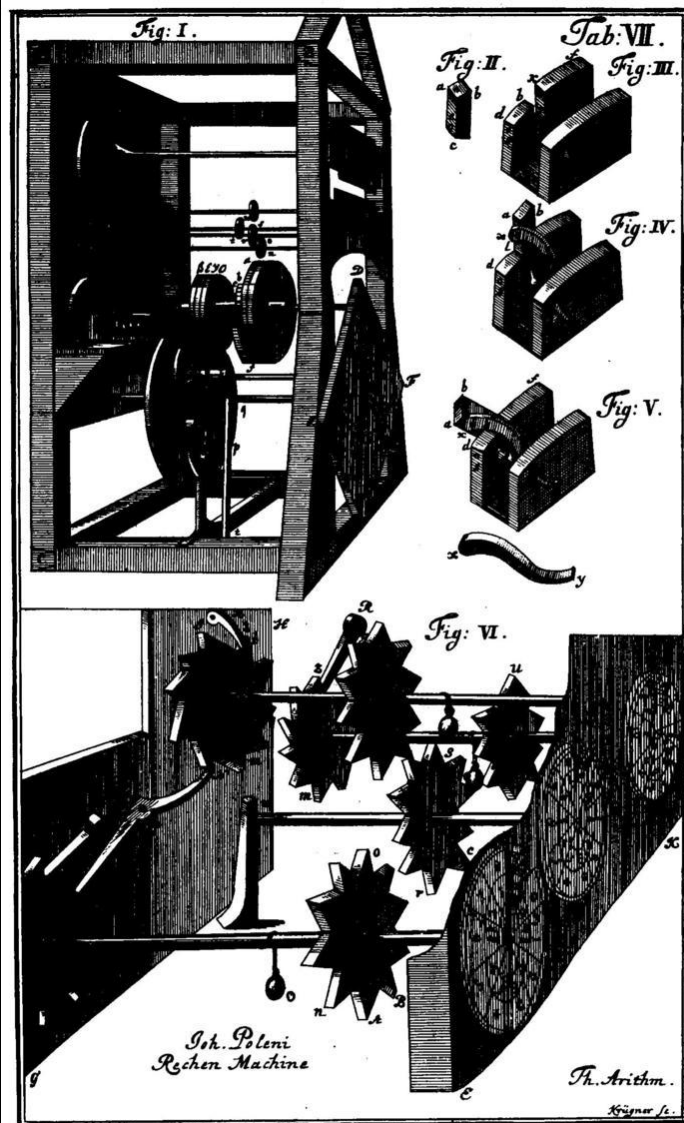


Poleni, 1704



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Die Rechenmaschine von Poleni, gezeichnet v. J. Leupold, 1727

JOANNIS POLENI
MISCELLANEA.
HOC EST

- I. Dissertatio de Barometris, & Thermometris,
II. Machinae Arithmeticae, ejusque usus Descriptio,
III. De Sectionibus Conicis Parallelorum in Horologiis
Solaribus Tractatus.



VENETIIS
Apud Aloysium Pavinum An. Dom. 1709.
Superiorum Permissu.

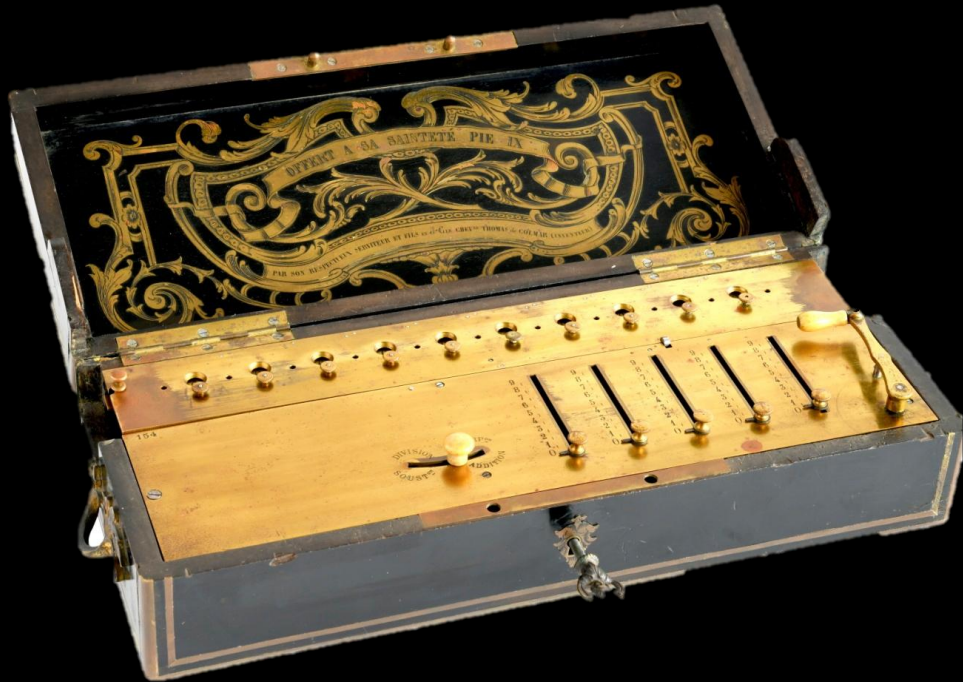


Braun Sprossenradmaschine, 1727



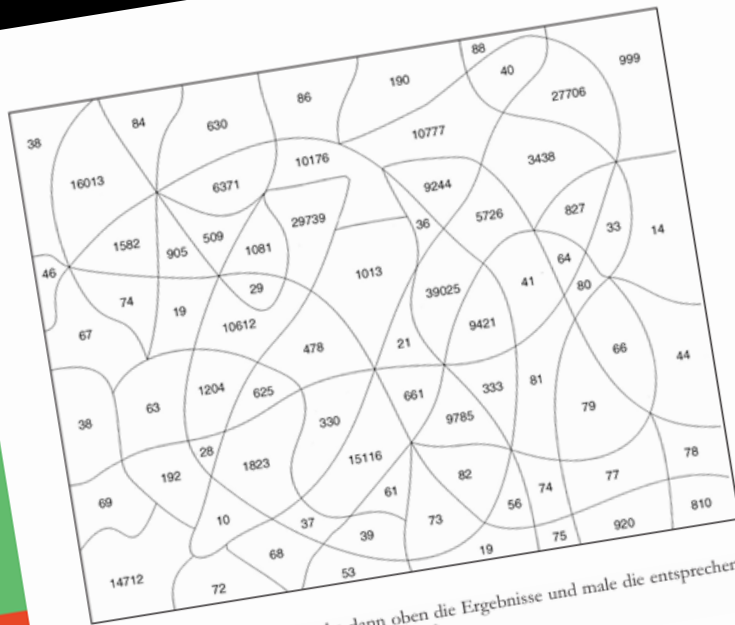


Thomas Arithmomètres, since 1850



Workshop – Calculating with Machines





Rechne zuerst die Aufgaben. Suche dann oben die Ergebnisse und male die entsprechenden Felder mit Bleistift aus. Welche Figur erhältst du?

- | | | | |
|-------------|---------------|-----------------|-------------------|
| $23 + 6 =$ | $114 + 78 =$ | $600 + 413 =$ | $8147 + 1638 =$ |
| $14 + 7 =$ | $243 + 87 =$ | $725 + 356 =$ | $10029 + 147 =$ |
| $34 + 3 =$ | $411 + 250 =$ | $987 + 836 =$ | $6399 + 4213 =$ |
| $29 + 7 =$ | $156 + 322 =$ | $314 + 890 =$ | $3778 + 1948 =$ |
| $18 + 10 =$ | $216 + 117 =$ | $845 + 737 =$ | $7291 + 3486 =$ |
| $17 + 16 =$ | $609 + 218 =$ | $1047 + 2391 =$ | $11098 + 4018 =$ |
| $40 + 28 =$ | $304 + 205 =$ | $4225 + 2146 =$ | $14216 + 13490 =$ |
| $23 + 17 =$ | $728 + 177 =$ | $3233 + 6011 =$ | $16271 + 13468 =$ |
| $64 + 18 =$ | $406 + 219 =$ | $7422 + 1999 =$ | $24617 + 14408 =$ |

Addition

$27 + 56 =$

$25819 + 2841 =$

Subtraktion

$139 - 72 =$

$954460 - 536774 =$

Multiplikation

$541 \times 23 =$

$4546 \times 87 =$

$589 \times 241 =$

$568,03 \times 122 =$

$64,225 \times 674,432 =$

Division

$36 : 9 =$

$217 : 6 =$

$53482 : 286 =$

$75999,5 : 48,5 =$

$49579,587 : 181,81 =$

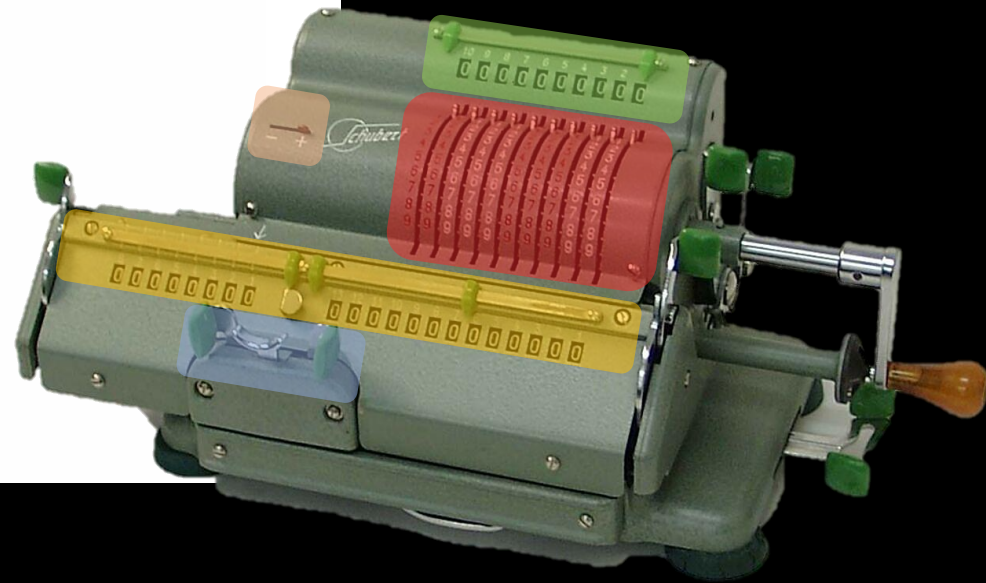
Wurzel

$\sqrt[3]{81} =$

$\sqrt[3]{7921} =$

$\sqrt[3]{189225} =$

$\sqrt[3]{279841} =$



Calculating in olden times

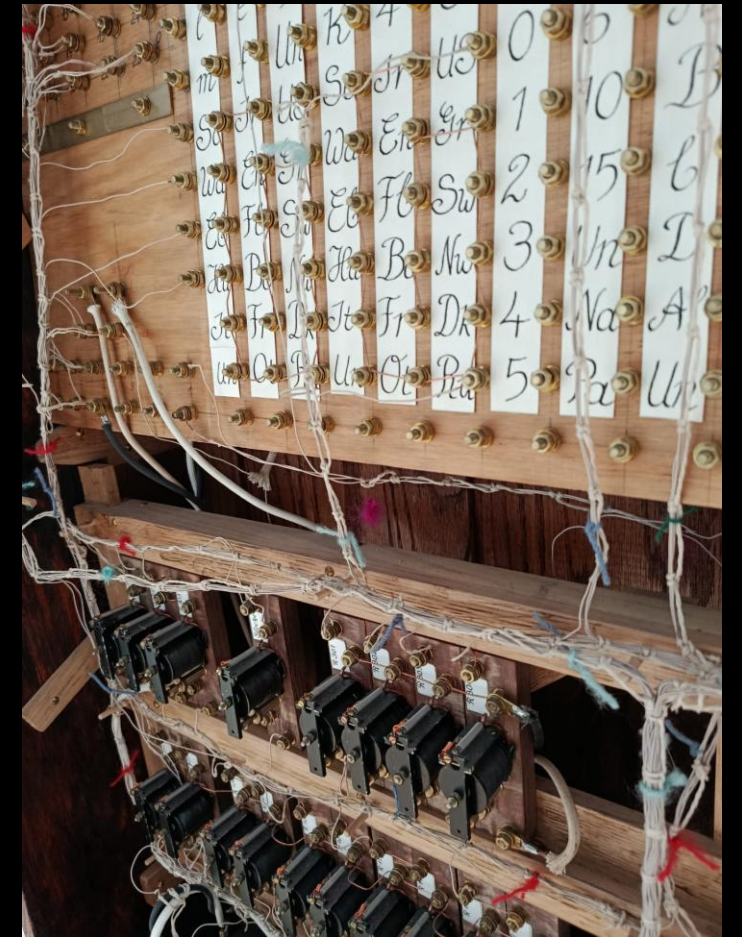
Boolean Logic, Data Storage & Encryption



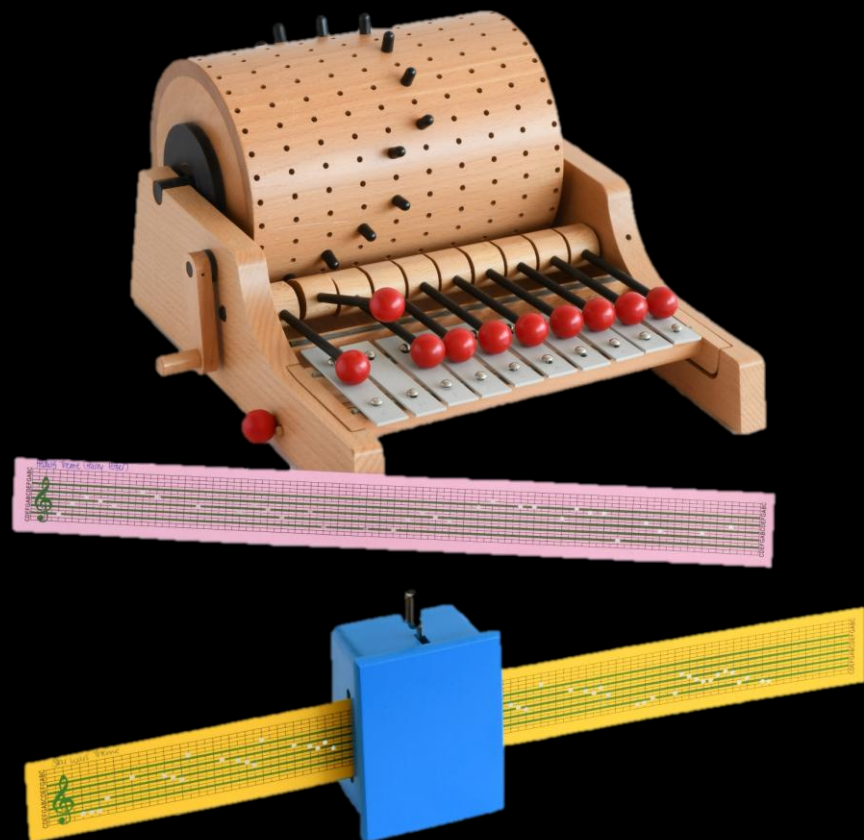
1	1	3	0	2	4	10	On	S	A	C	E	a	c	e	g	EB	SB	Ch	Sy	U	Sh	Hk	Br	Rm
2	2	4	1	3	E	15	Off	IS	B	D	F	b	d	f	h	SY	X	Fp	Cn	R	X	Al	Cg	Kg
3	0	0	0	0	W	20		0	0	0	0	0	0	0	0	●	0	0	0	0	0	0	0	0
A	1	1	1	1	0	25	A	1	1	1	1	1	1	1	1	1	●	1	1	1	1	1	1	1
B	2	2	2	2	5	30	B	2	2	●	2	2	2	2	2	2	2	●	2	2	2	2	2	2
C	3	3	3	3	0	3	C	3	3	3	●	3	3	3	3	3	3	3	●	3	3	3	3	3
D	4	4	4	4	1	4	D	4	4	4	4	●	4	4	4	4	4	4	4	●	4	4	4	4
E	5	5	5	5	2	C	E	5	5	5	5	5	●	5	5	5	5	5	5	5	●	5	5	5
F	6	6	6	6	A	D	F	6	6	6	6	6	6	●	6	6	6	6	6	6	6	●	6	6
G	7	7	7	7	B	E	G	7	7	7	7	7	7	7	●	7	7	7	7	7	7	7	●	7
H	8	8	8	8	a	F	H	8	8	8	8	8	8	8	8	●	8	8	8	8	8	8	8	●
I	9	9	9	9	b	c	I	9	9	9	9	9	9	9	9	9	●	9	9	9	9	9	9	9



Hollerith, 1890



Workshop – Musical Punch Cards





Wheatstone Cryptograph, 1854



Hagelin B-21, 1925

Enigma & its Rotors, 1934

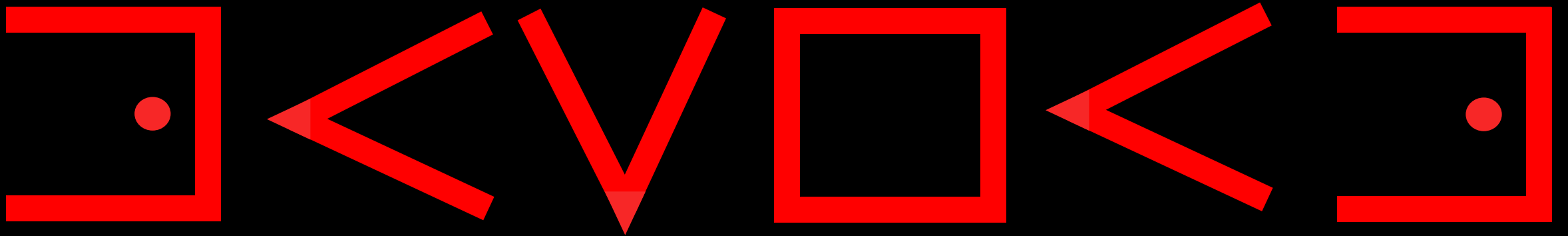


A	B	C	J.	K.	L.
D	E	F	M.	N.	O.
G	H	I	P.	Q.	R.

~~T S U~~
V

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X Z Y

Workshop – Discrete and Secret

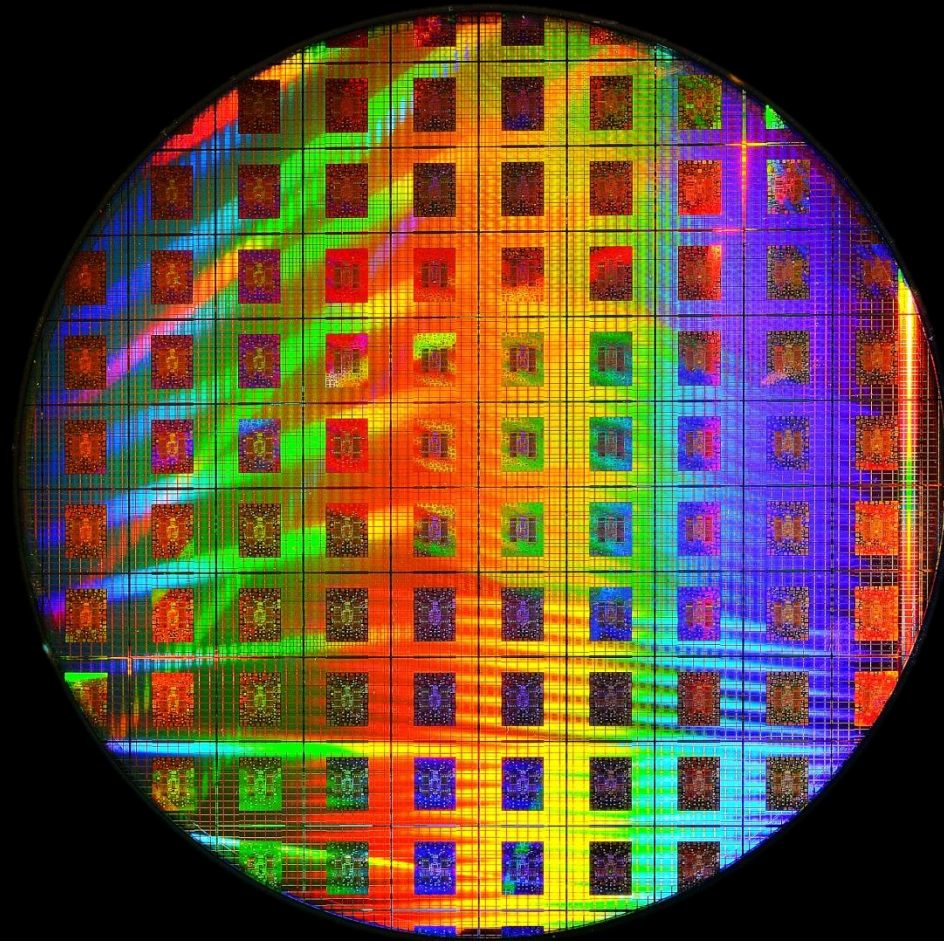


MUSEUM

Calculating in modern times

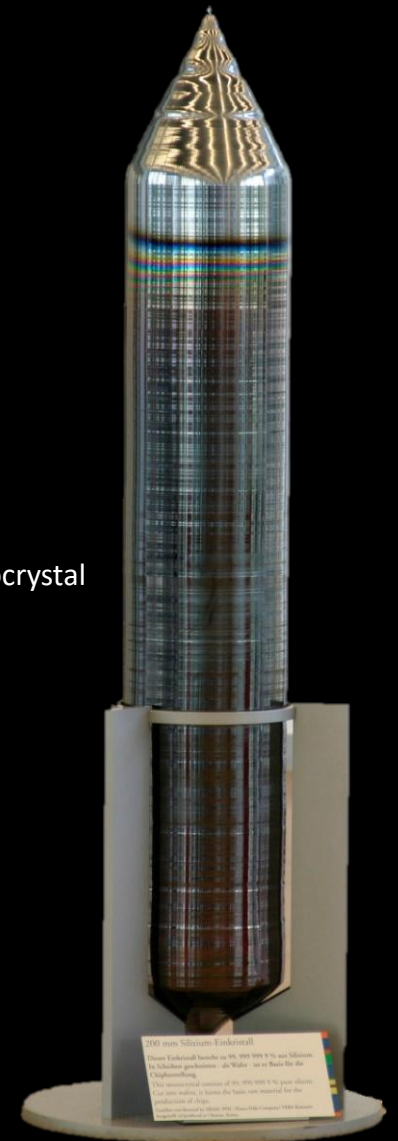
Binary Calculation & Chip Design

Leibniz Binary Calculator
demonstration model



Waver

Silicon Monocrystal



Workshop – The Binary System

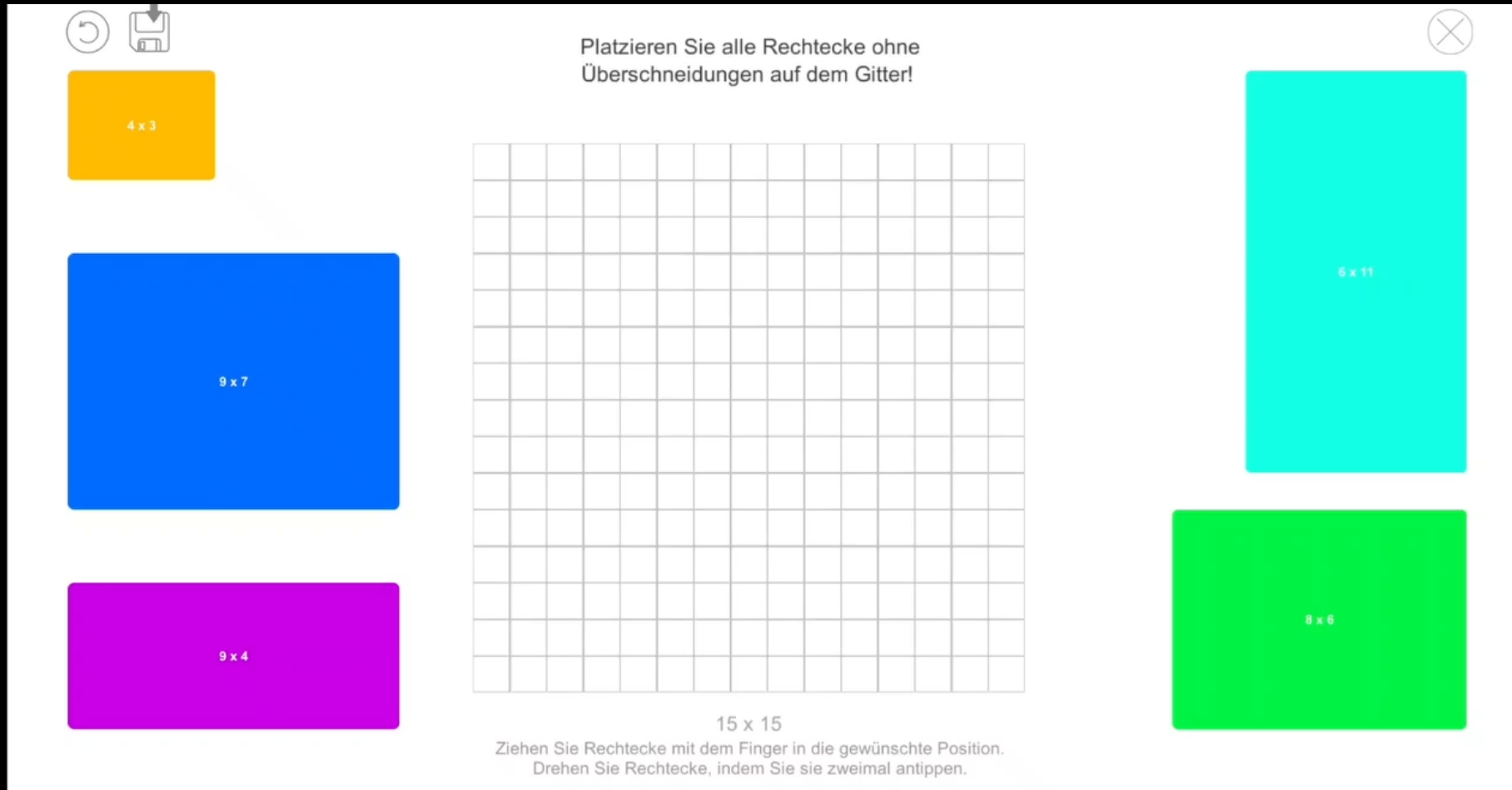


Workshop – Discrete Mathematics



Workshop – Discrete Mathematics

Platzieren Sie alle Rechtecke ohne Überschneidungen auf dem Gitter!



4 x 3

9 x 7

9 x 4

15 x 15

6 x 11

8 x 6

Ziehen Sie Rechtecke mit dem Finger in die gewünschte Position.
Drehen Sie Rechtecke, indem Sie sie zweimal antippen.

Workshop – Discrete Mathematics

Platzieren Sie alle Rechtecke ohne Überschneidungen auf dem Gitter!

24 x 24

Ziehen Sie Rechtecke mit dem Finger in die gewünschte Position.
Drehen Sie Rechtecke, indem Sie sie zweimal antippen.

7 x 10

6 x 11

10 x 9

3 x 6

3 x 4

2 x 1

2 x 1

2 x 1

11 x 7

10 x 11

2 x 17

9 x 8

3 x 7

Workshop – Discrete Mathematics

00:12

Verbinden Sie alle roten Pins miteinander!
Ihnen stehen hierzu insgesamt 25 Kanten zur Verfügung.

25
Kanten stehen
Ihnen noch zur
Verfügung!

The diagram shows a 10x10 grid of pins. Four pins are highlighted in red: one at the top-left corner (row 1, column 1), one at the top-right (row 1, column 5), one at the bottom-left (row 5, column 1), and one at the bottom-right (row 10, column 10). A set of 25 grey edges is shown, representing the available connections between these red pins. These edges form a path that visits every red pin exactly once, starting from the top-left, moving right to the top-right, then down to the bottom-right, and finally left to the bottom-left.

Thank you for your attention!

