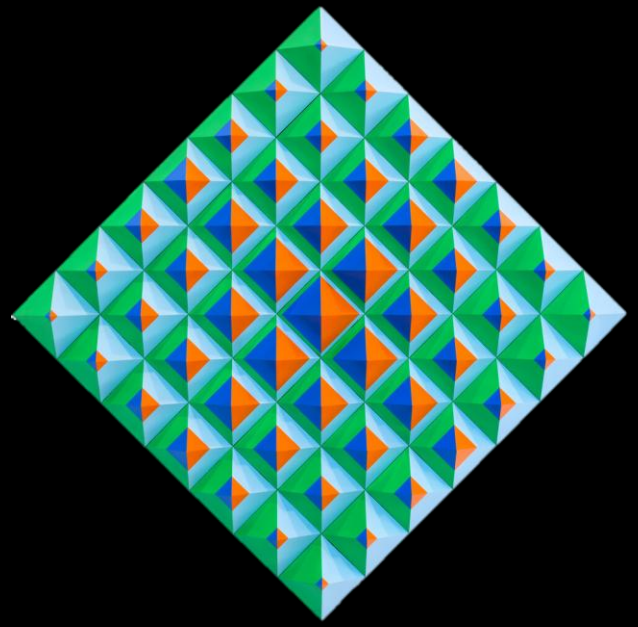
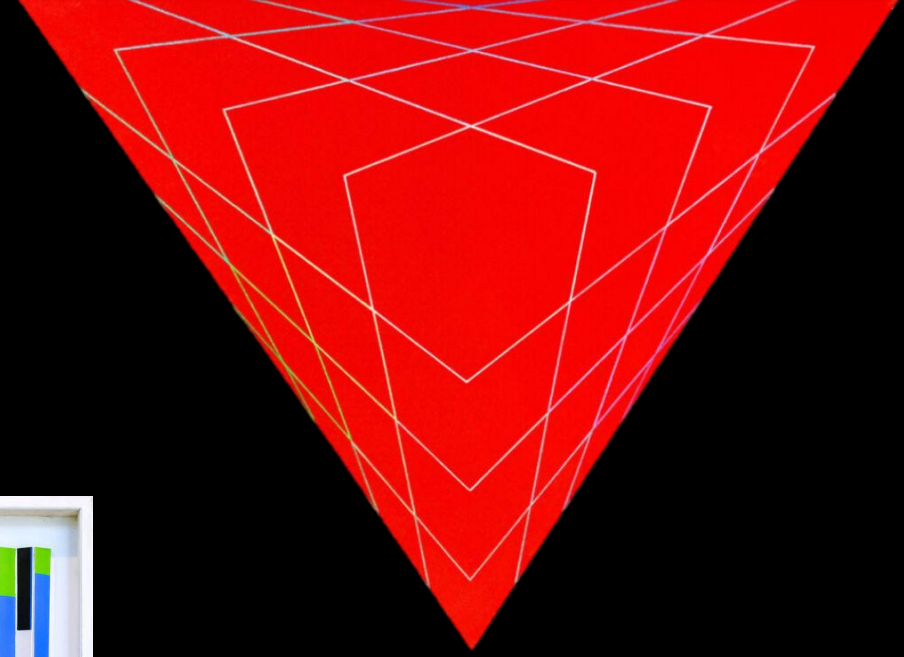
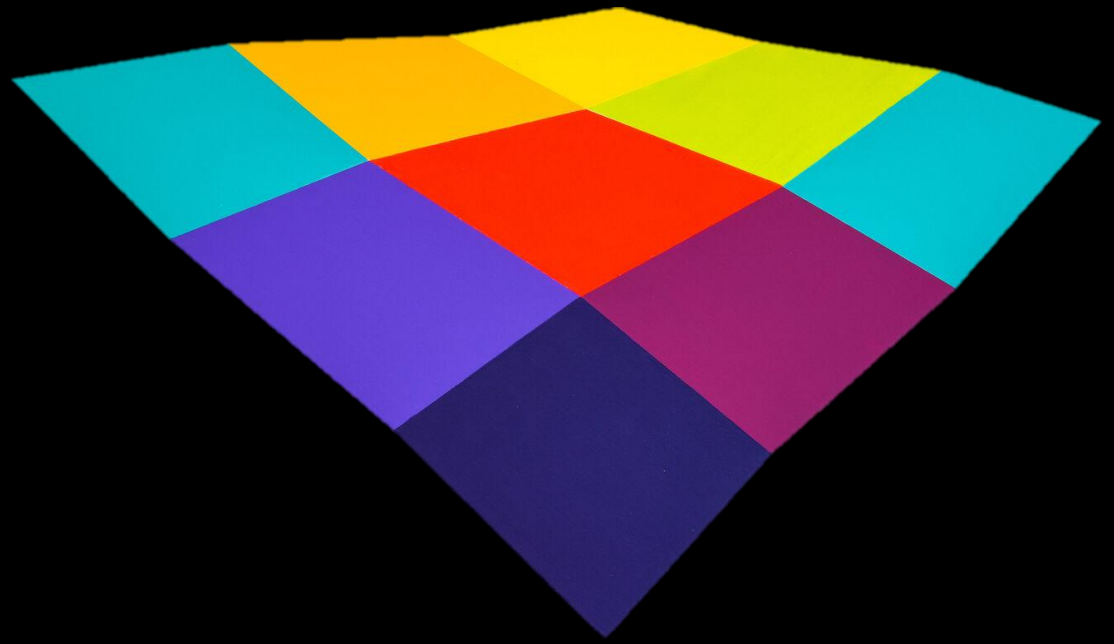
ARITHMEUM

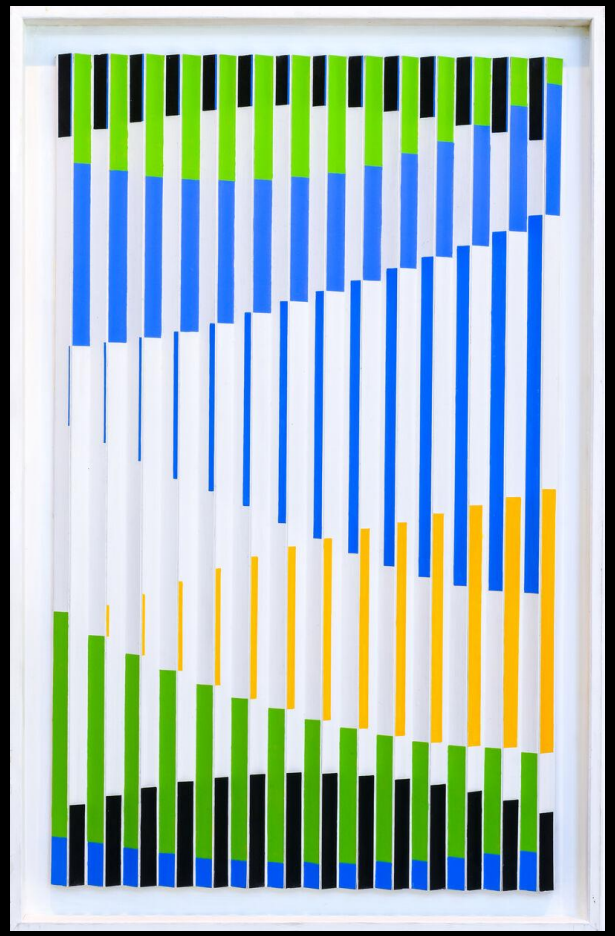
rechnen einst und heute

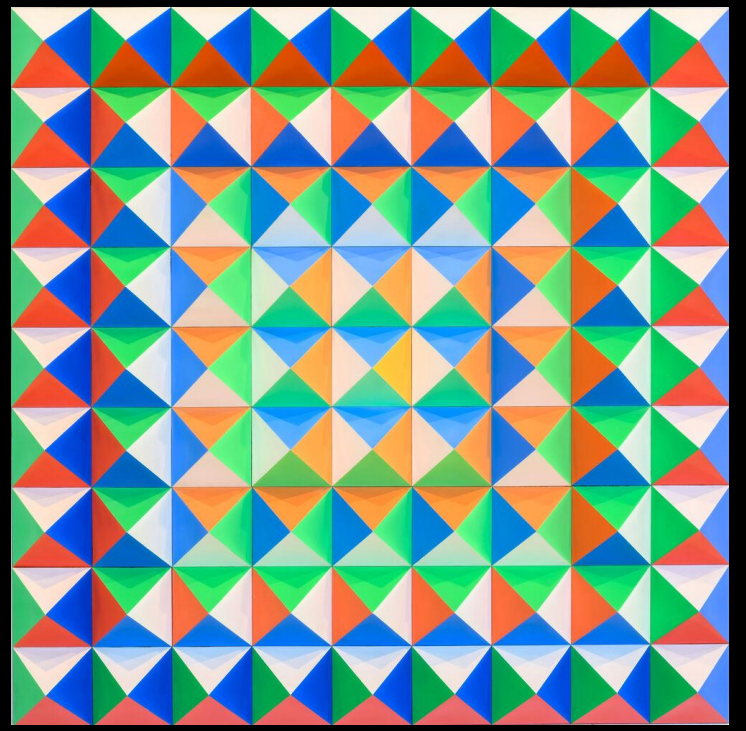

SKIDMARKS
DELUXE
IBM

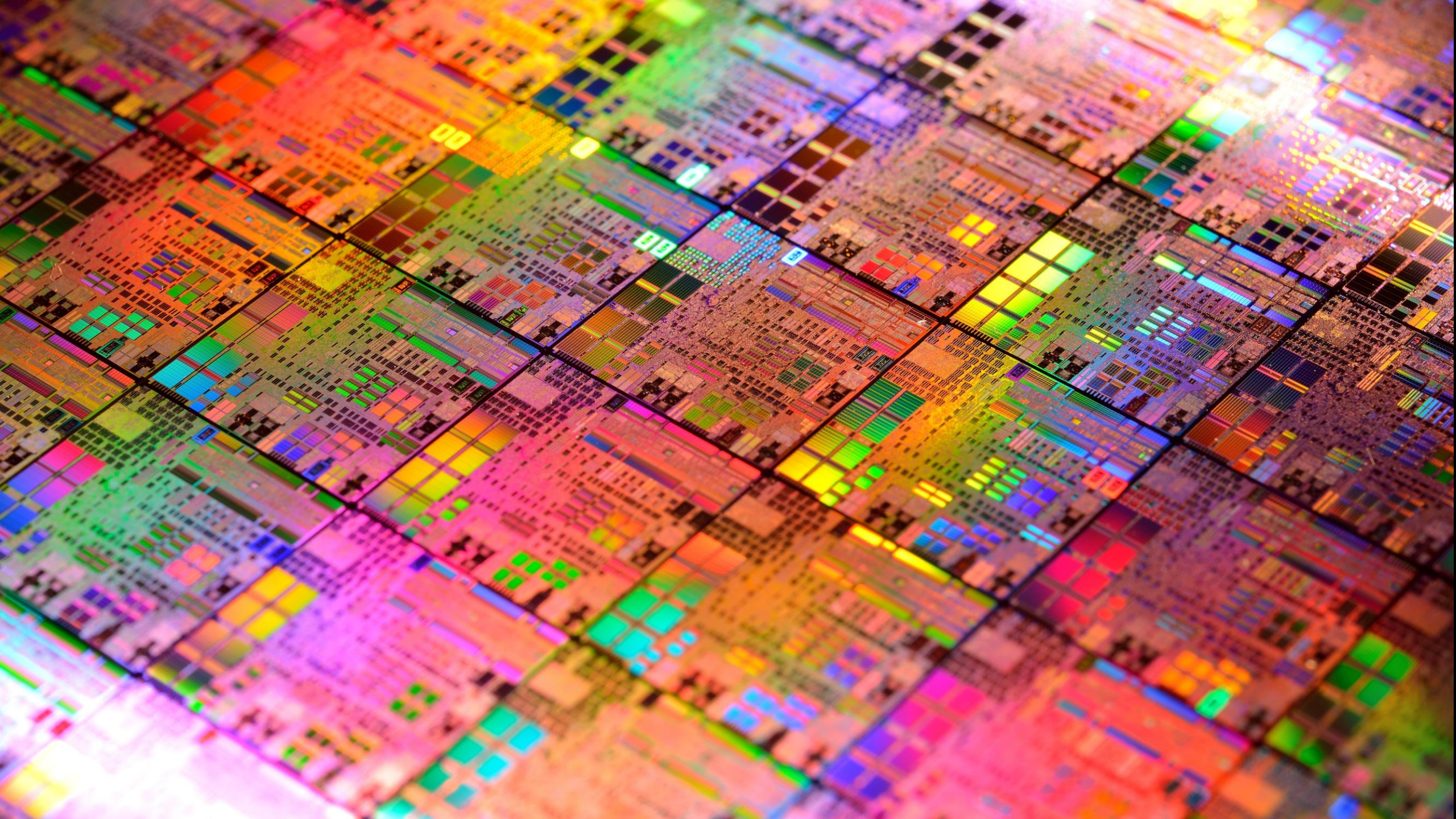






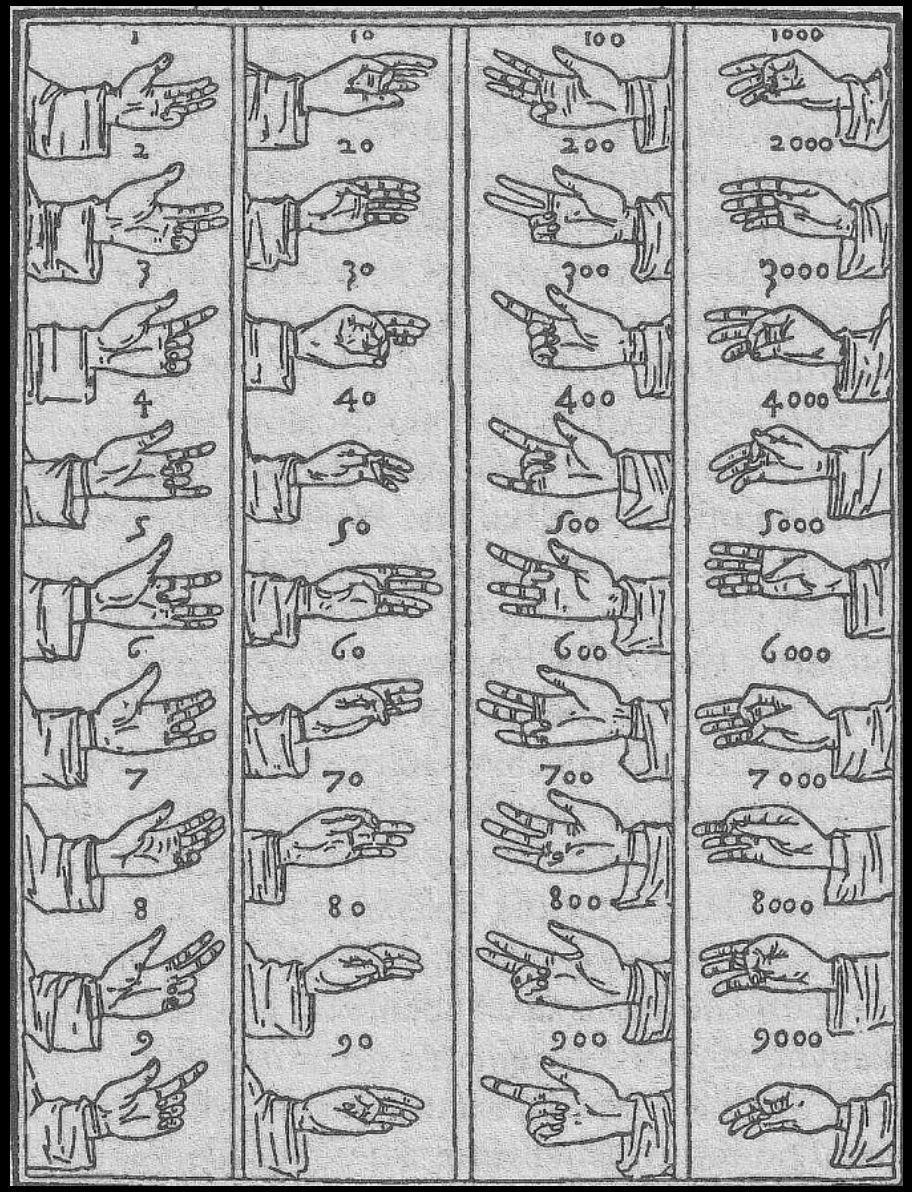






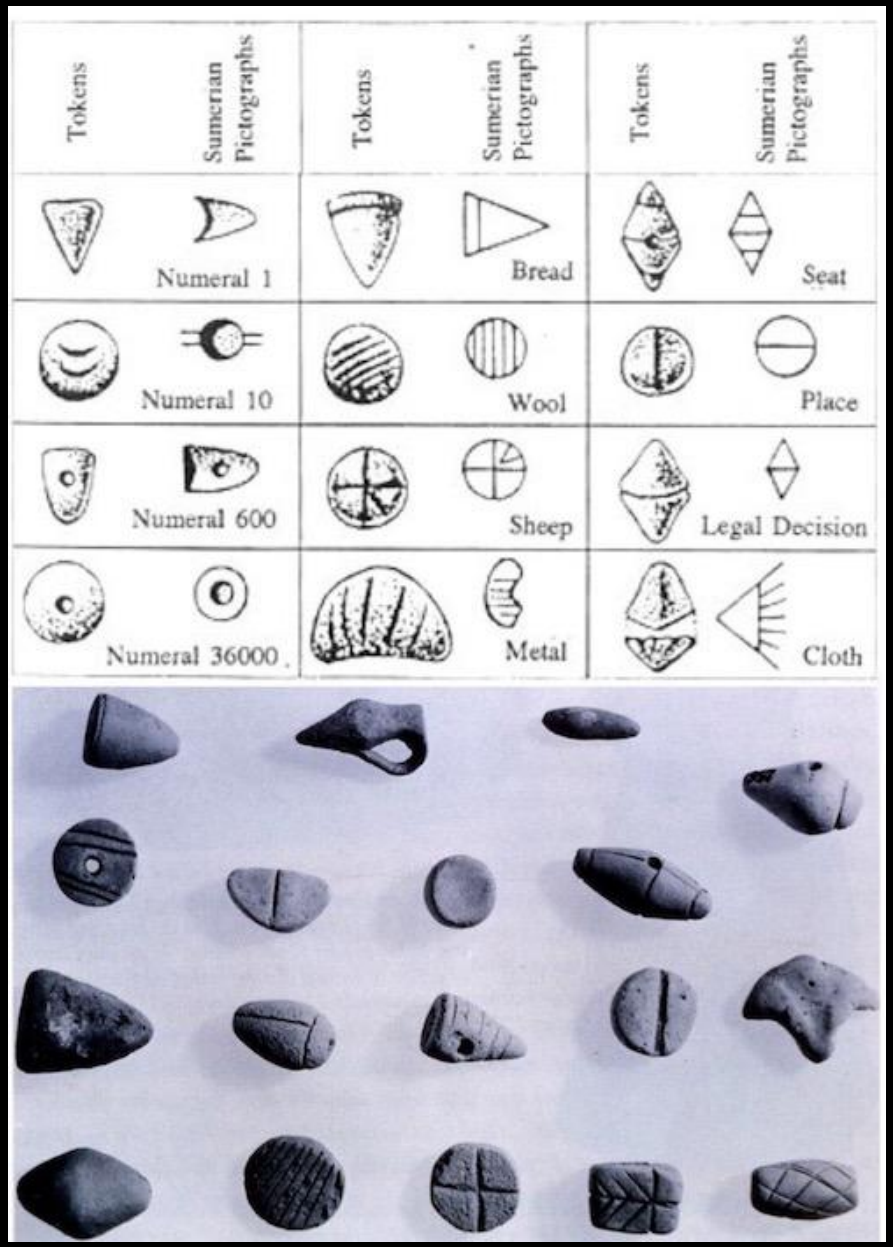
Calculating in olden times

Counting devices



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

Calculi (clay tokens), approx. *4000 BCE*

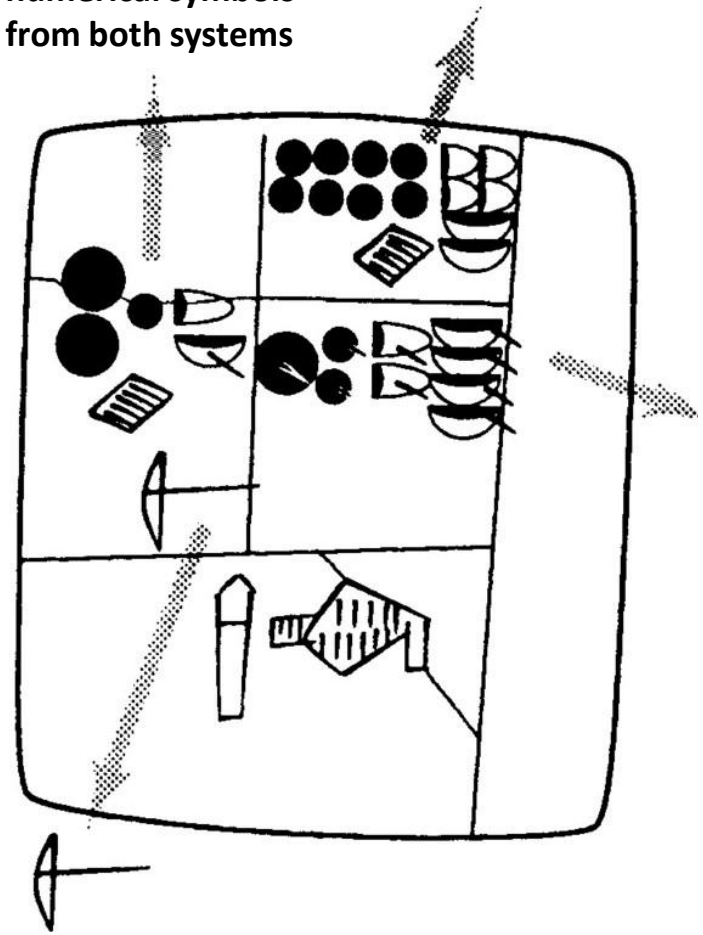


Clay tablet Uruk, approx. *3000 BCE*

This symbolizes Barley meal ->

quantified through these numerical symbols

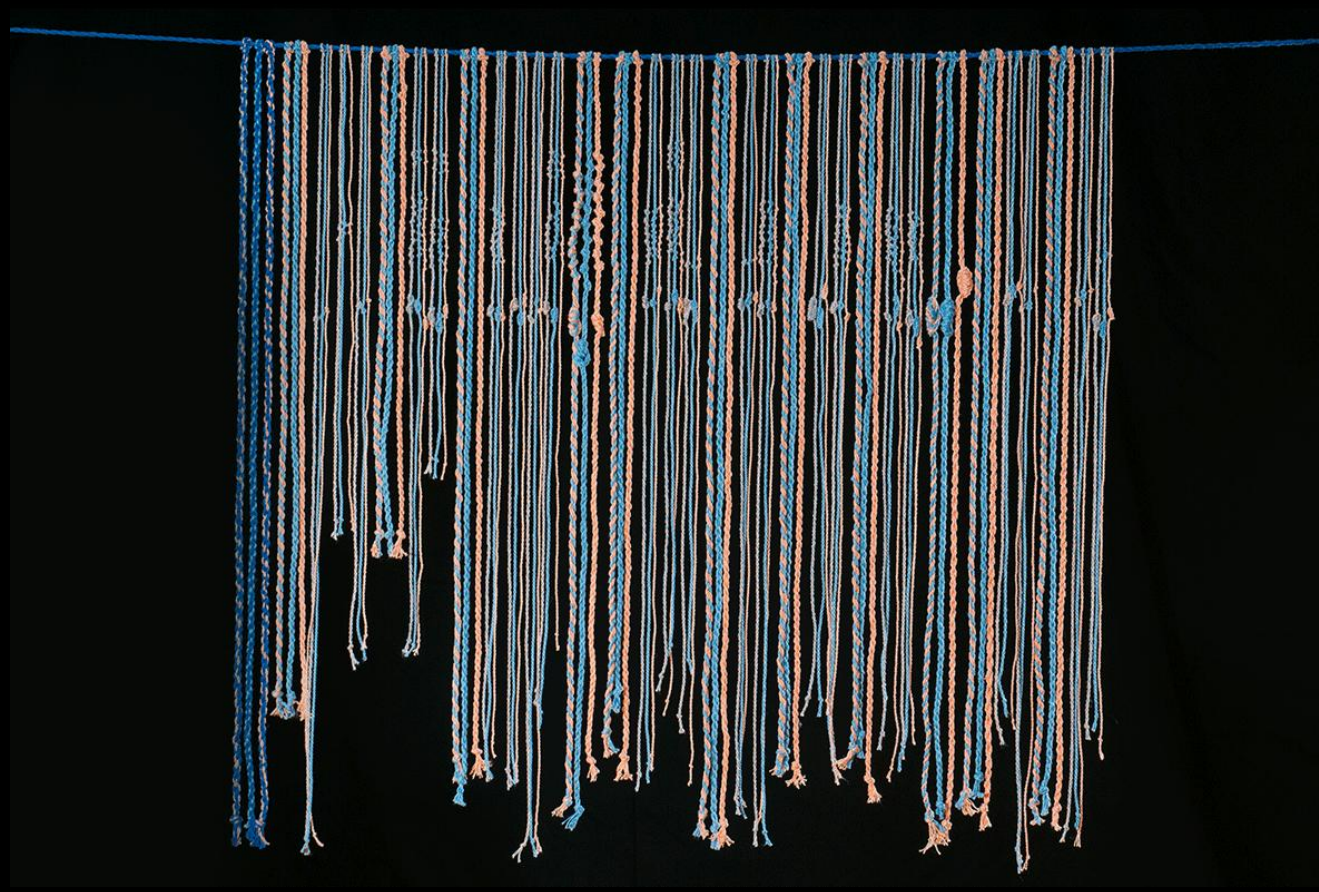
Total amount of barley meal and malt, noted through numerical symbols from both systems



Malt, signified through the following numerical symbols

Allocation (further processing?)

Quipu, approx. *13th – 15th century*



Workshop – Fingers, Stones and Knots

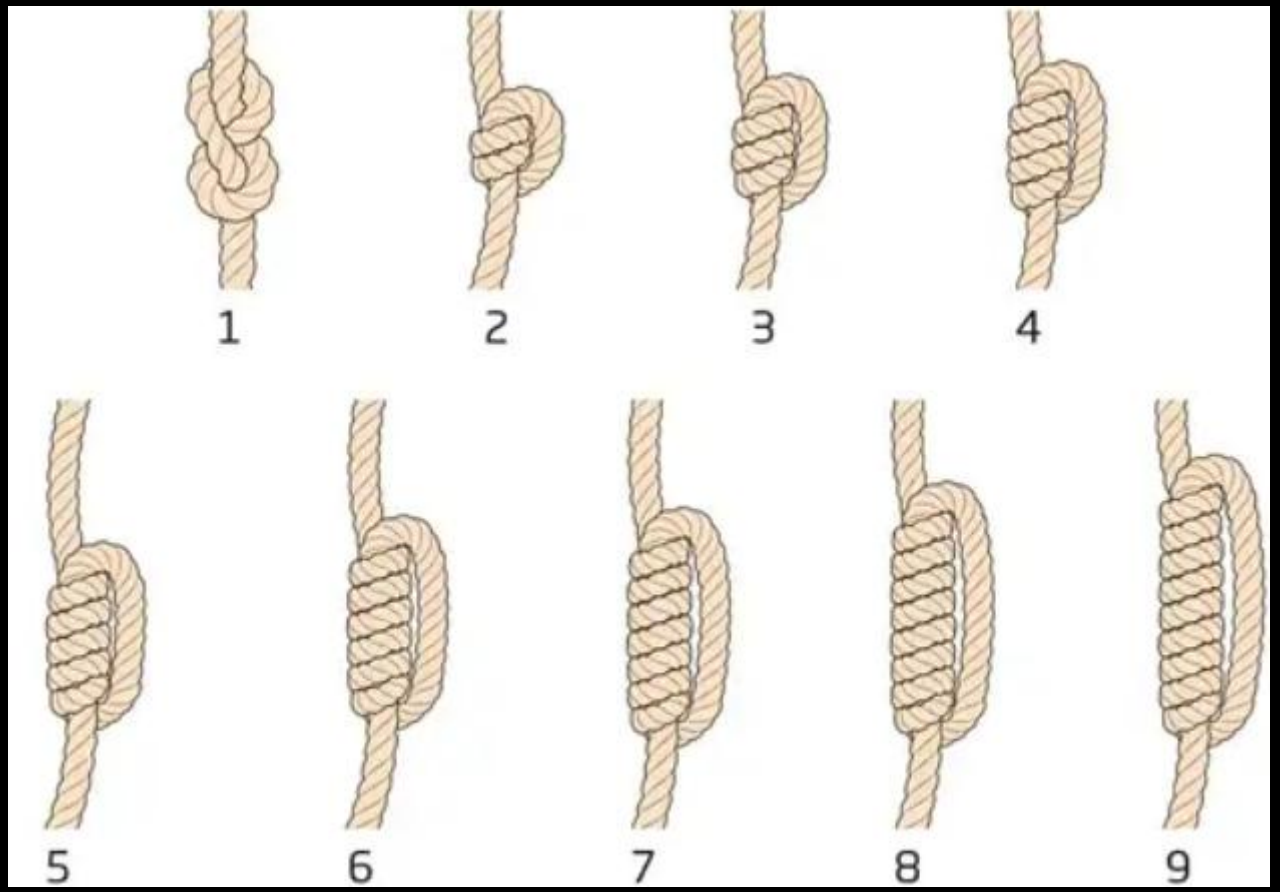
Ones

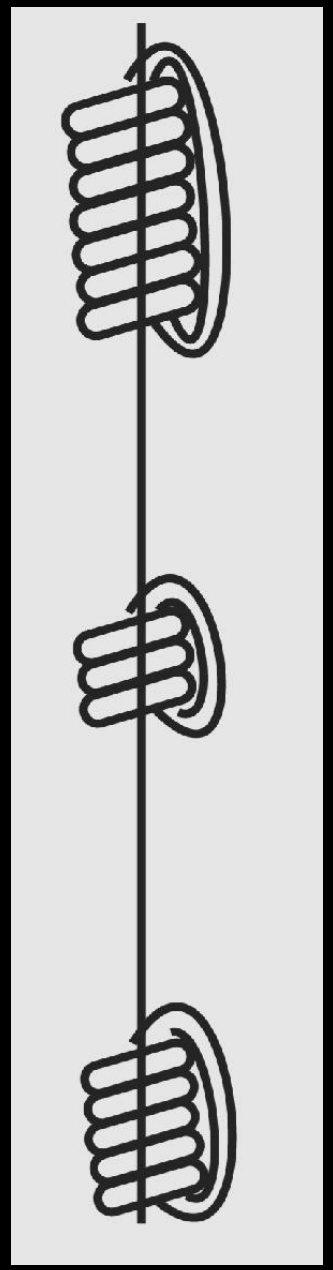
Tens

Hundreds

Thousands

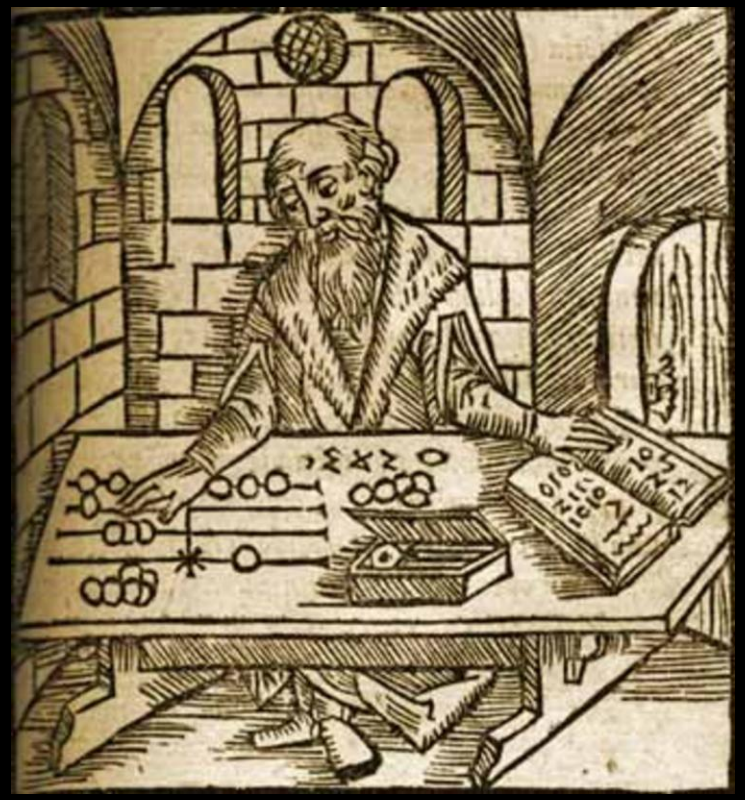
Ten Thousands



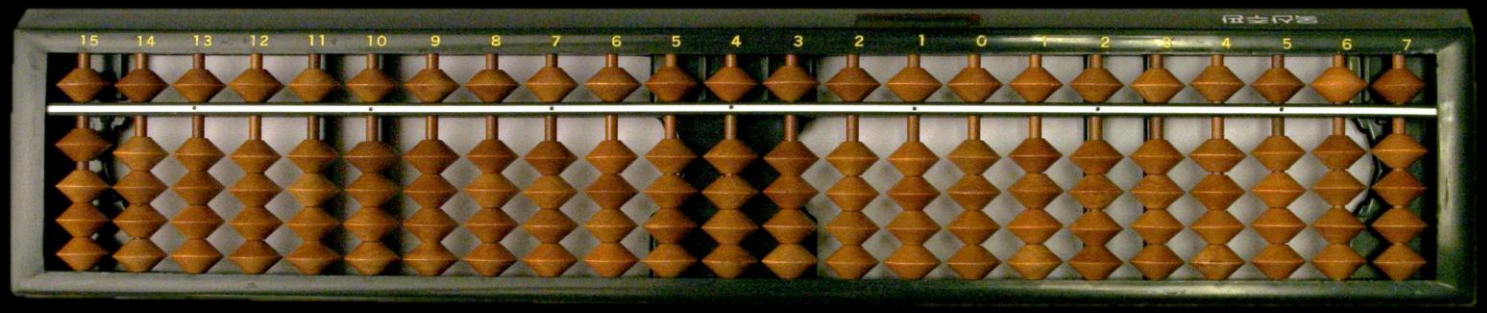


Calculating in olden times

Calculation Aides

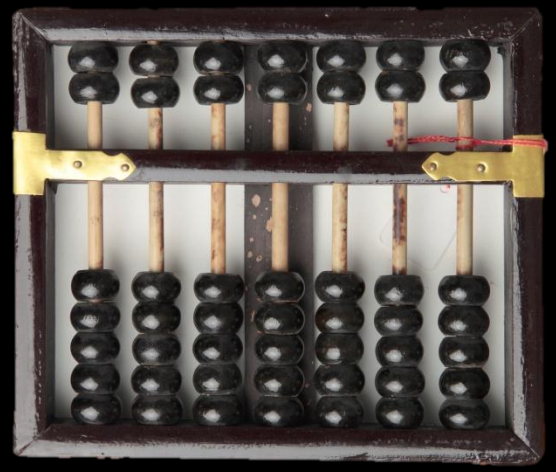


Reckoning table, original in Dinkelsbühl, approx. *15th century*



Chinese Suanpan, 4:1 version

Roman Abacus

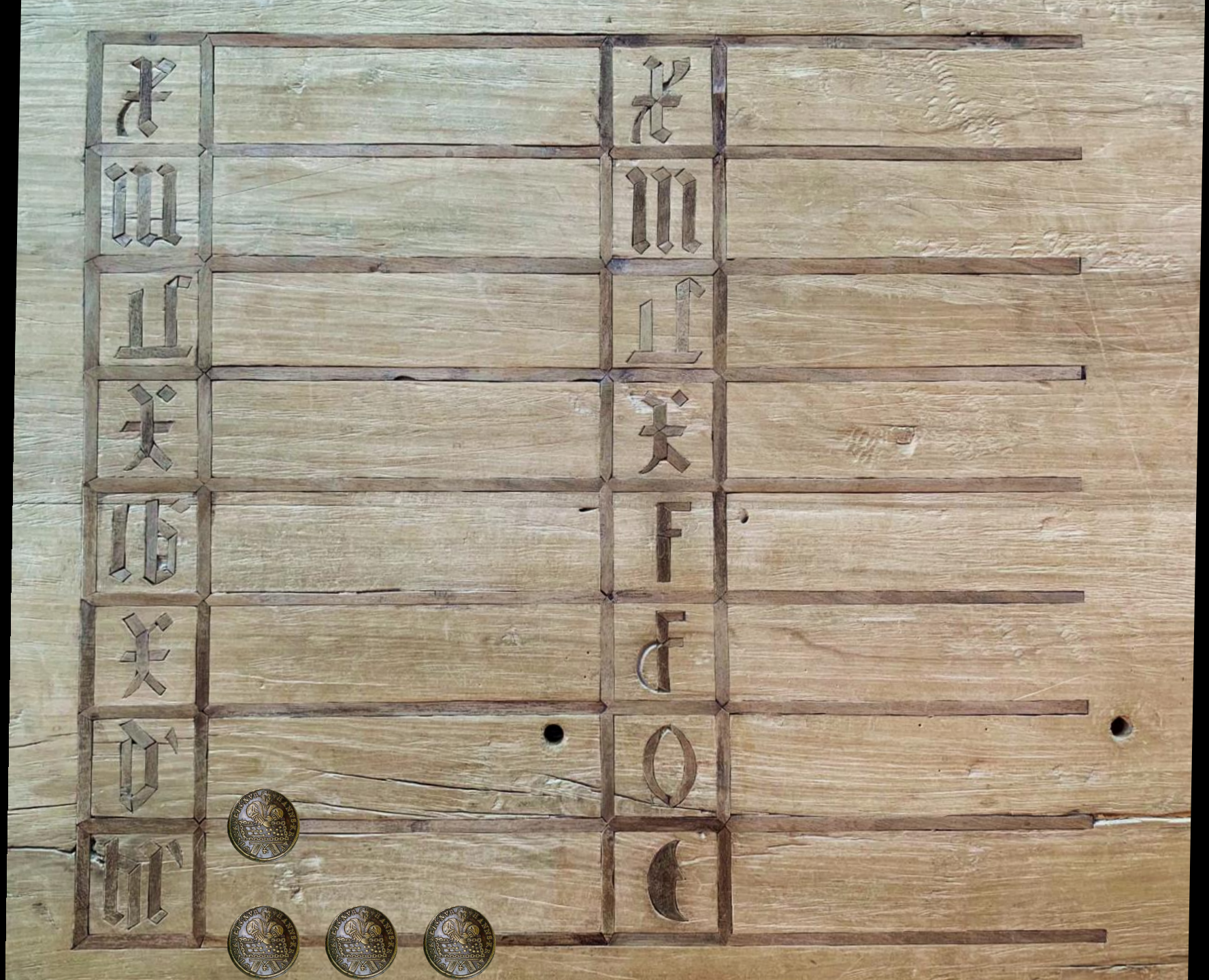


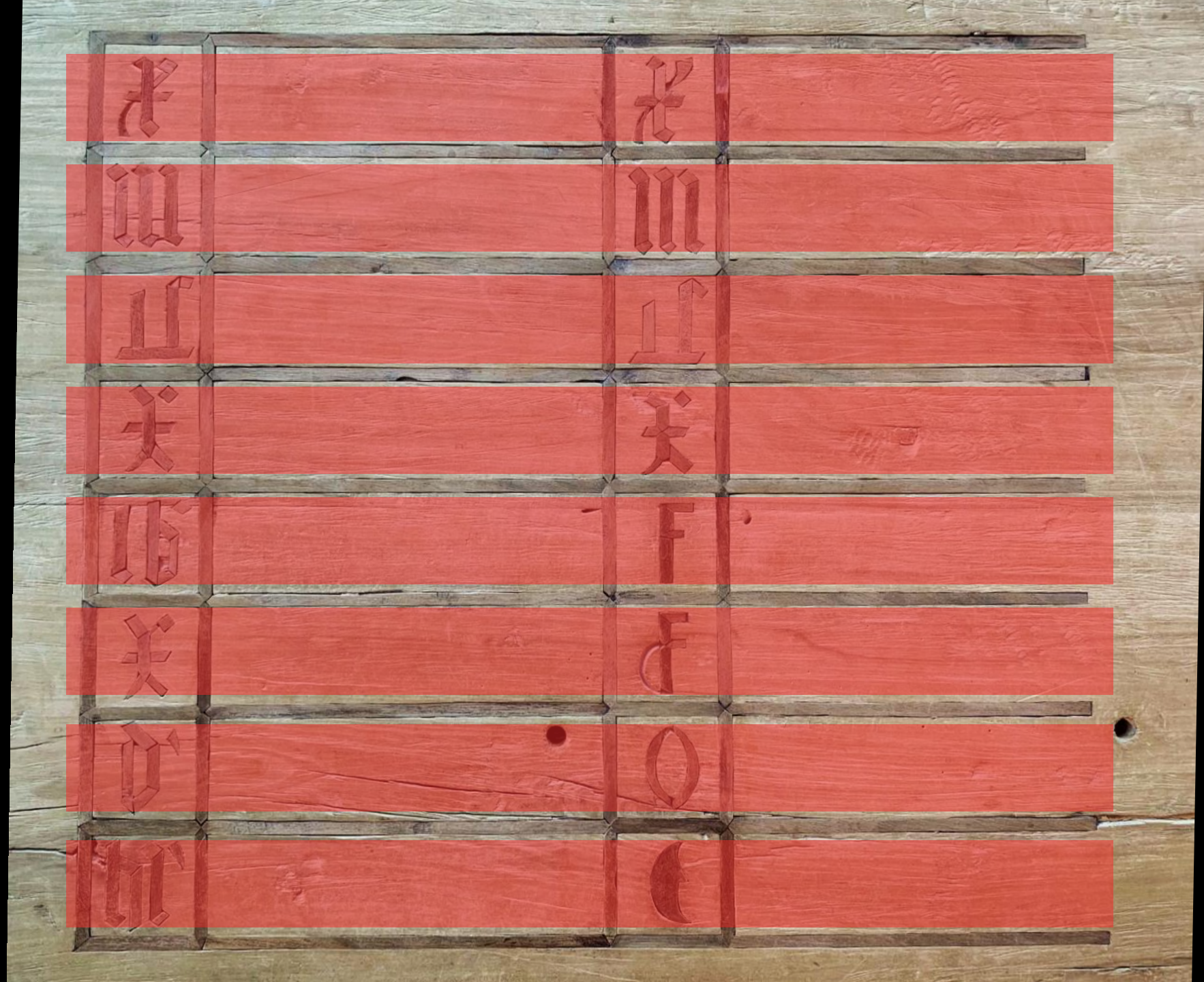
Chinese Suanpan, 5:2 version

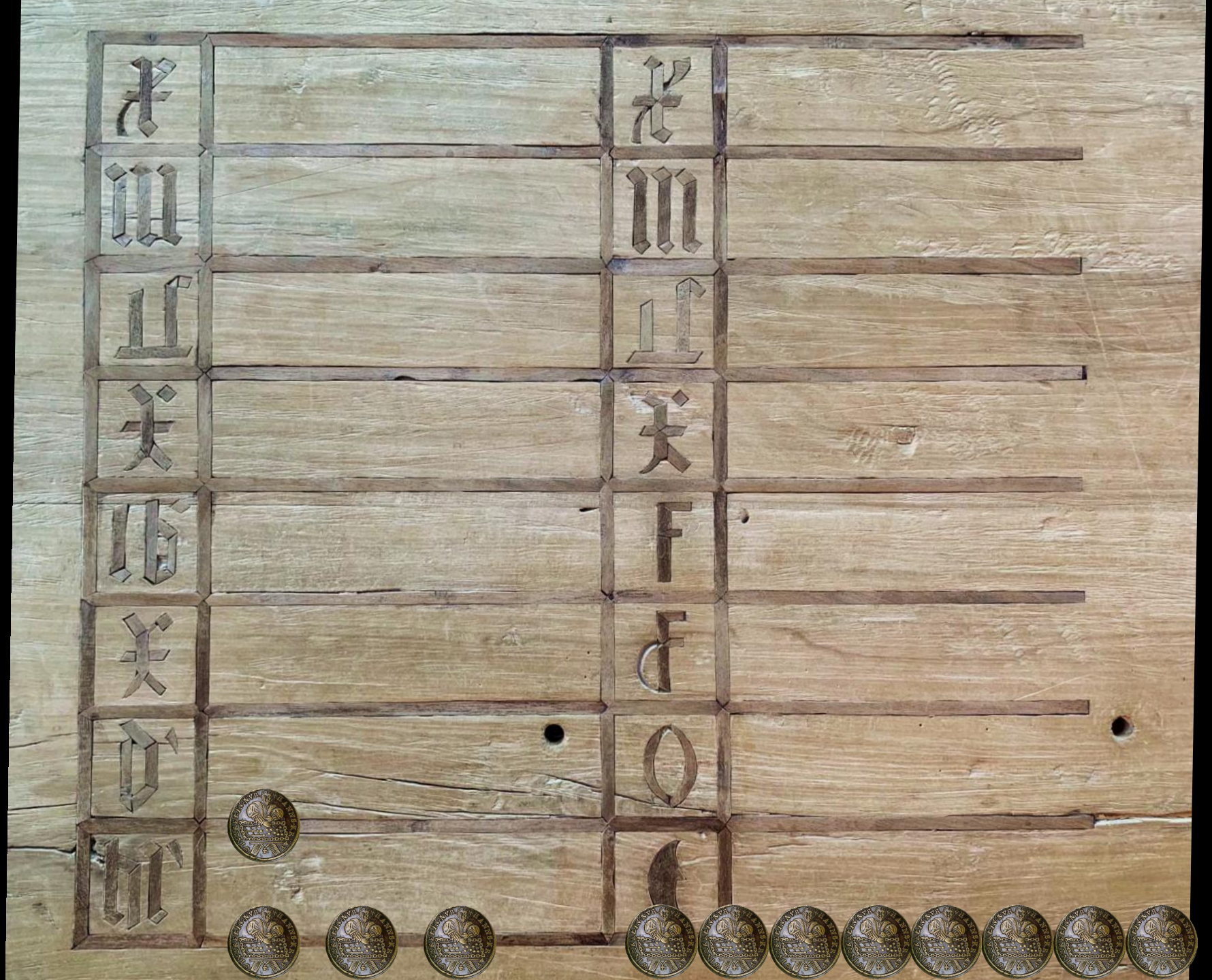
Japanese Soroban, modern version

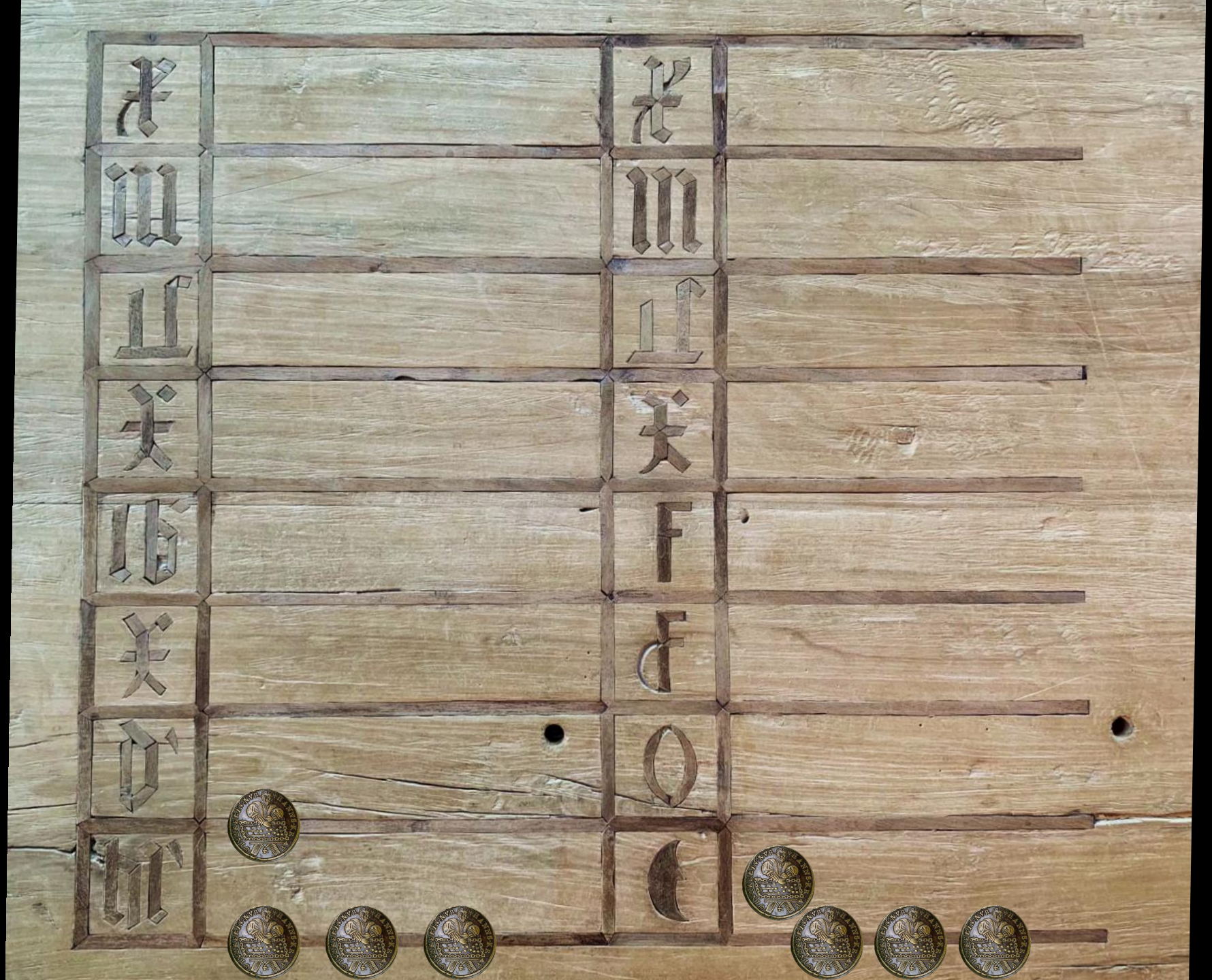
Workshop – Reckoning Master & Abacus

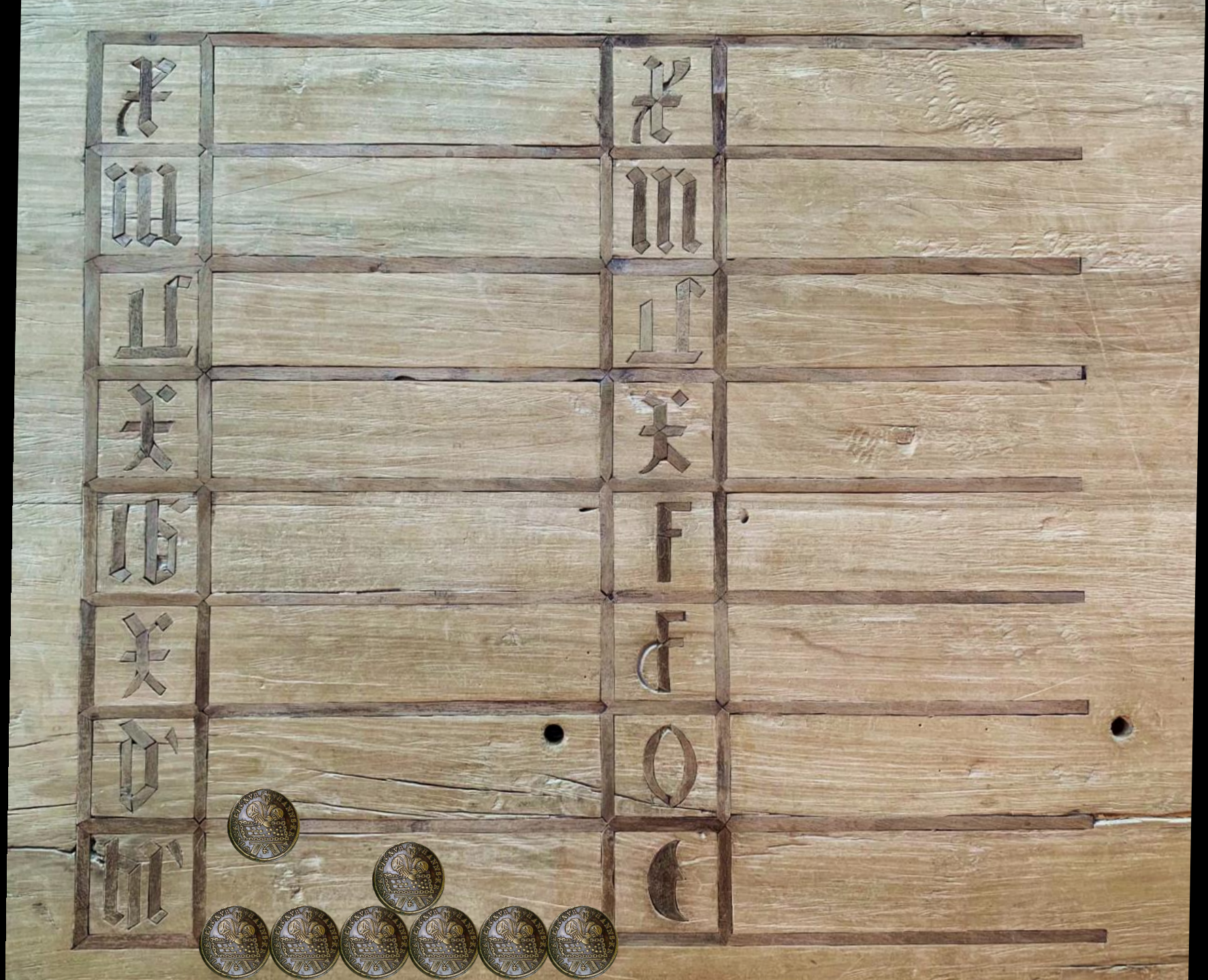
Rechenbüch/
Vff Linien vnd
Zyffren / In allerley Hand-
tierung/Geschäfften vnd Rauff-
mannschafft. Durch
Adam Risen.
Mit nüwen künstlichen Reglen vnd
Exemplen gemehret/ Innhalt fürs
gestelten Registers.
Viser vnd Wechselrüten künstlich vnd
gerecht zümachen / vß dem Quadrat / Durch
die Arithmetic vnnd Geometri. Von
Erhart Helm / Mathematico
zů Franckfurt beschriben.
Alles von nüwem yetzund widerumb
ersehen vnd corrigiert.

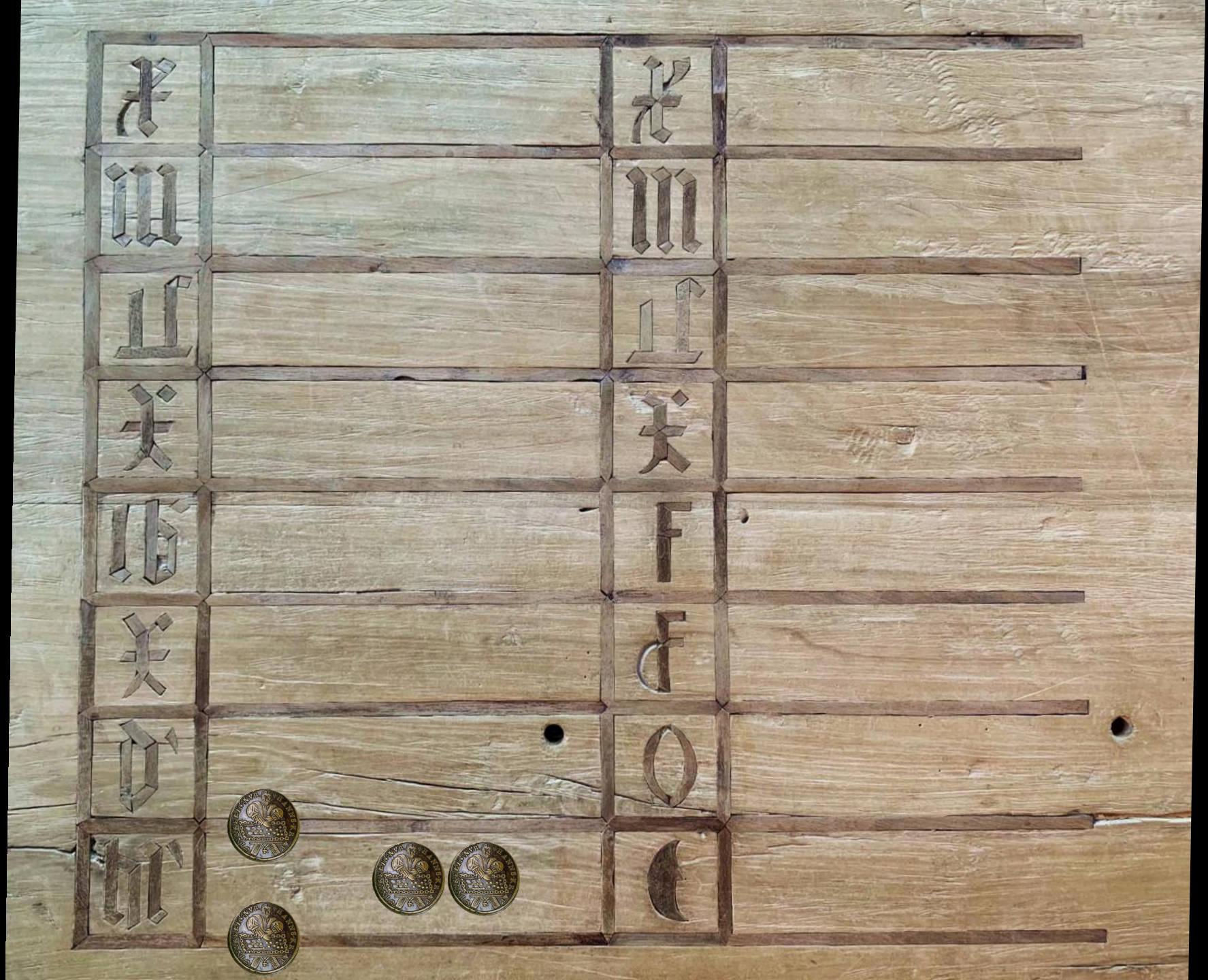


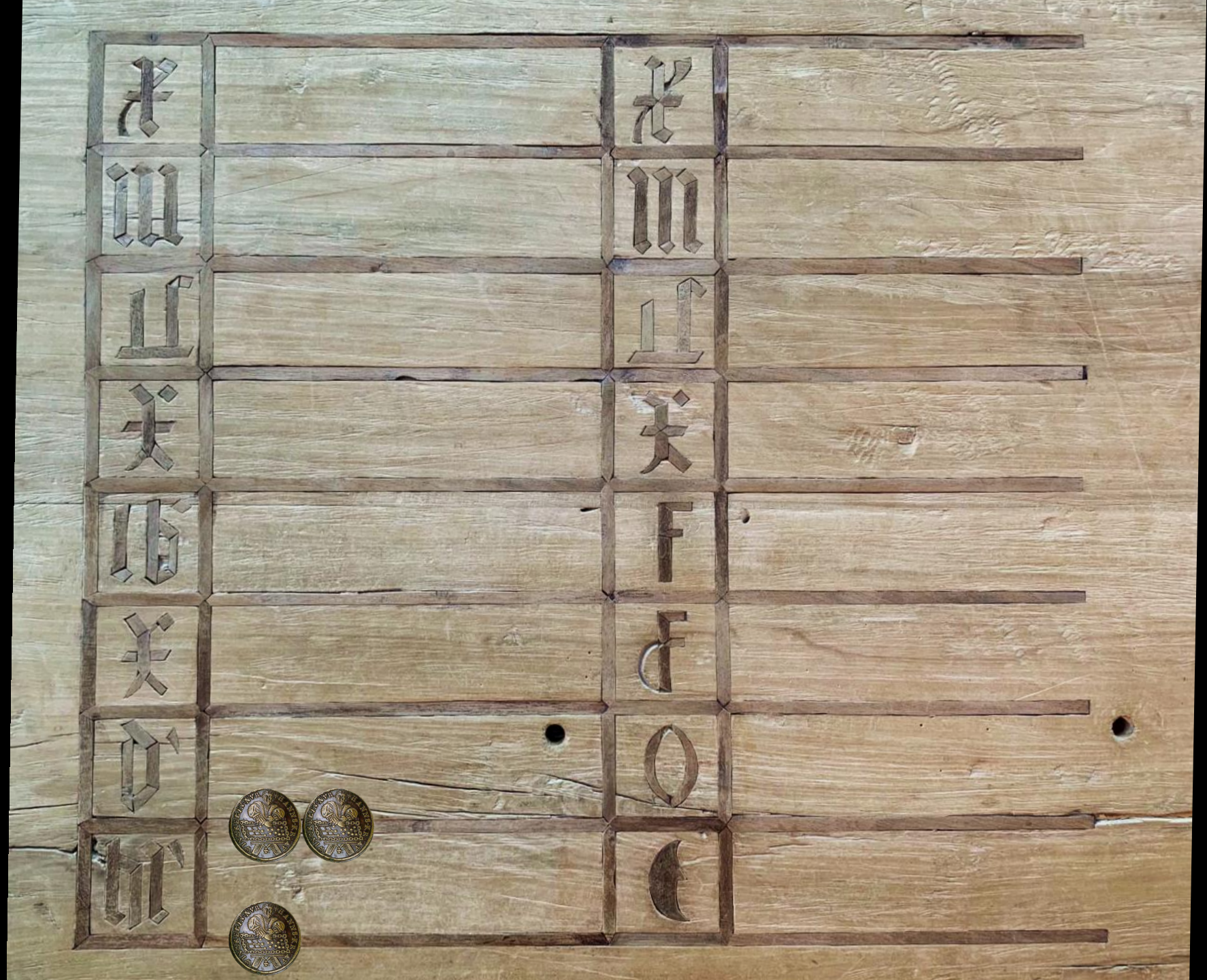


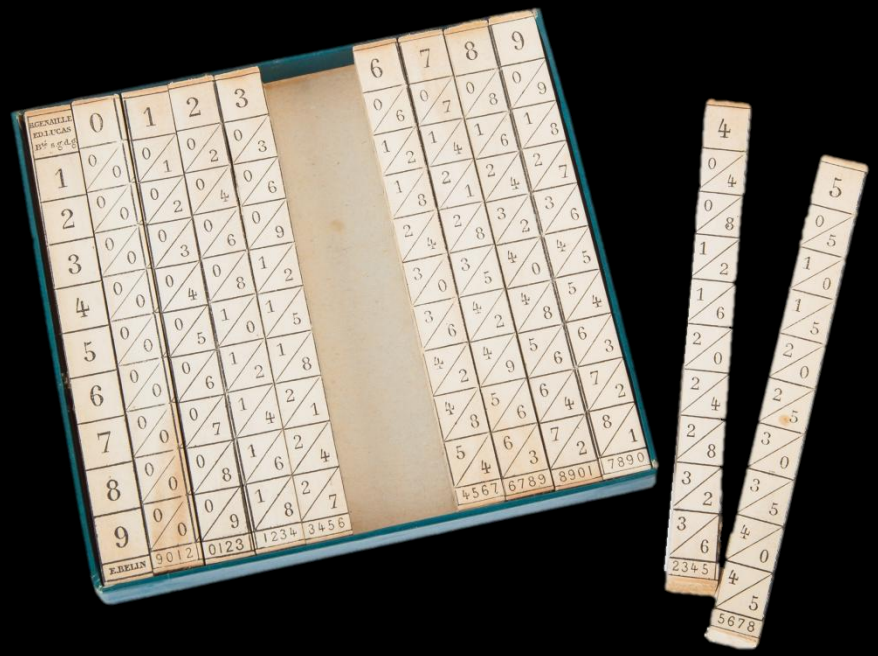




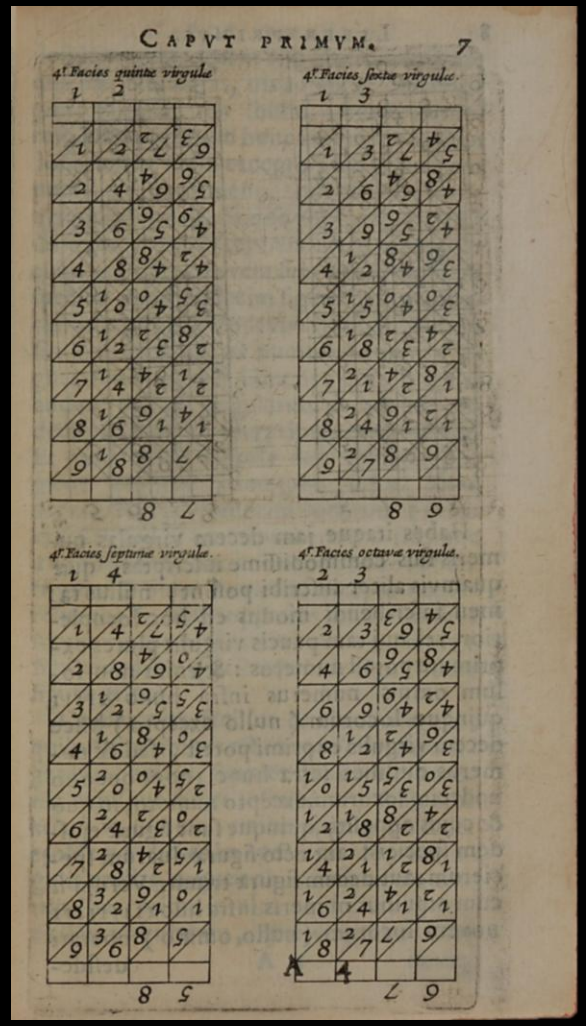








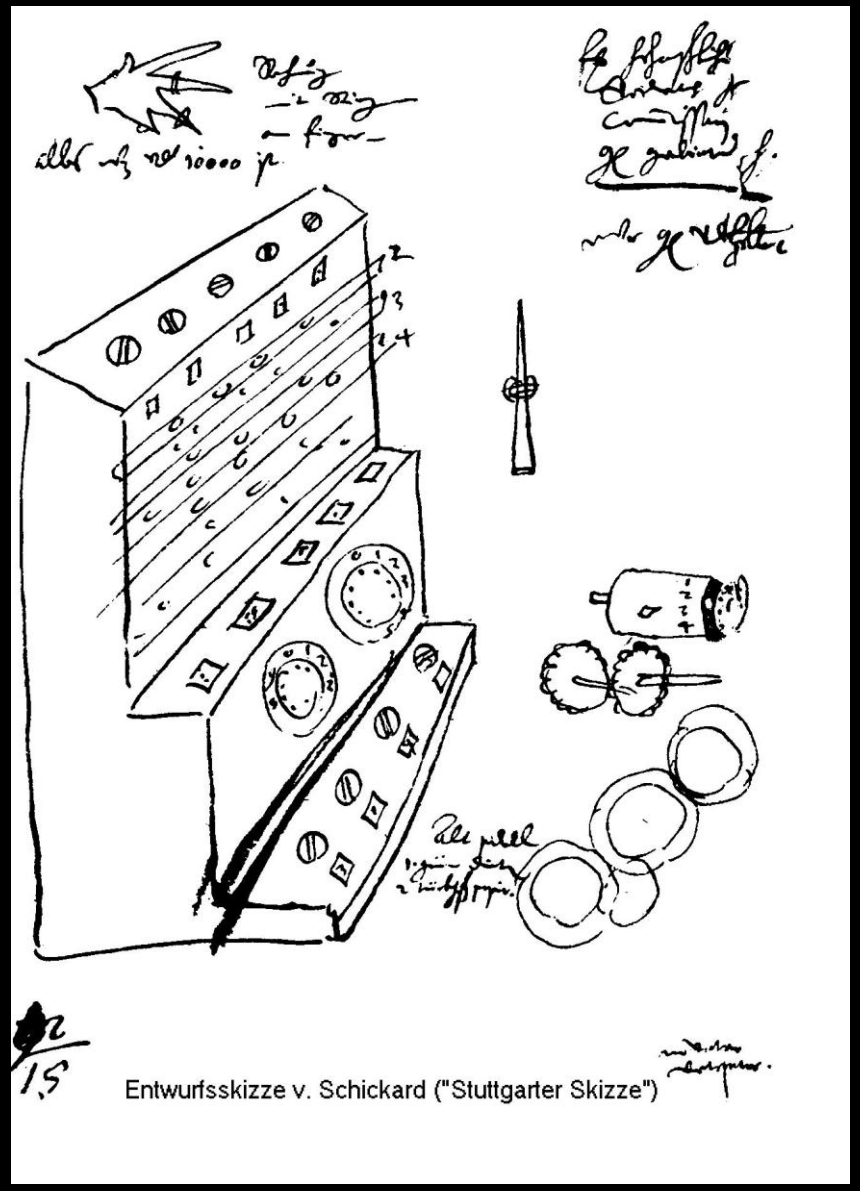
Napier's rods, since approx. *1700*



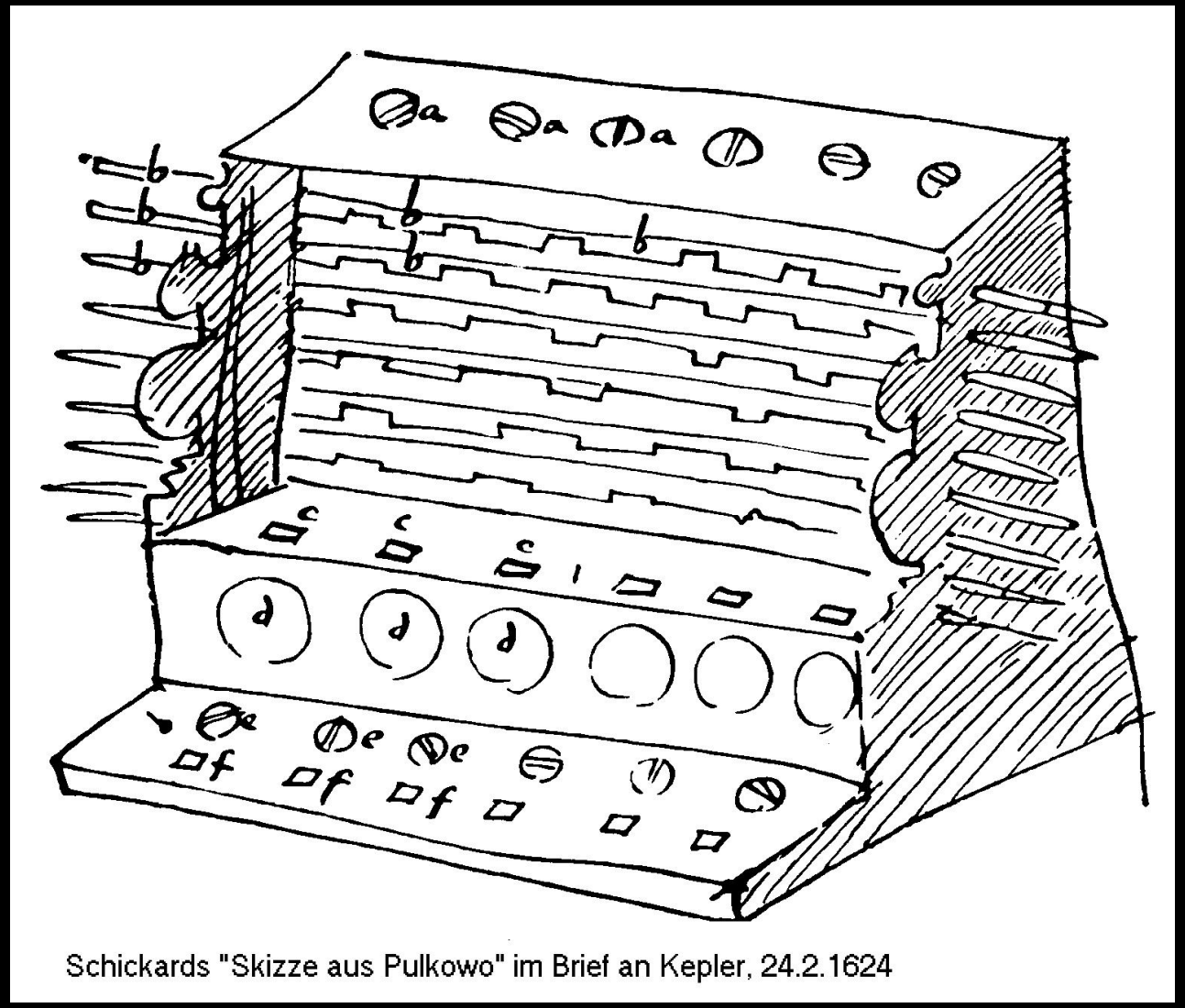
Excerpt from Napier, Rabdologiae seu numeratio per virgulas libri duo, published since 1617

Calculating in olden times

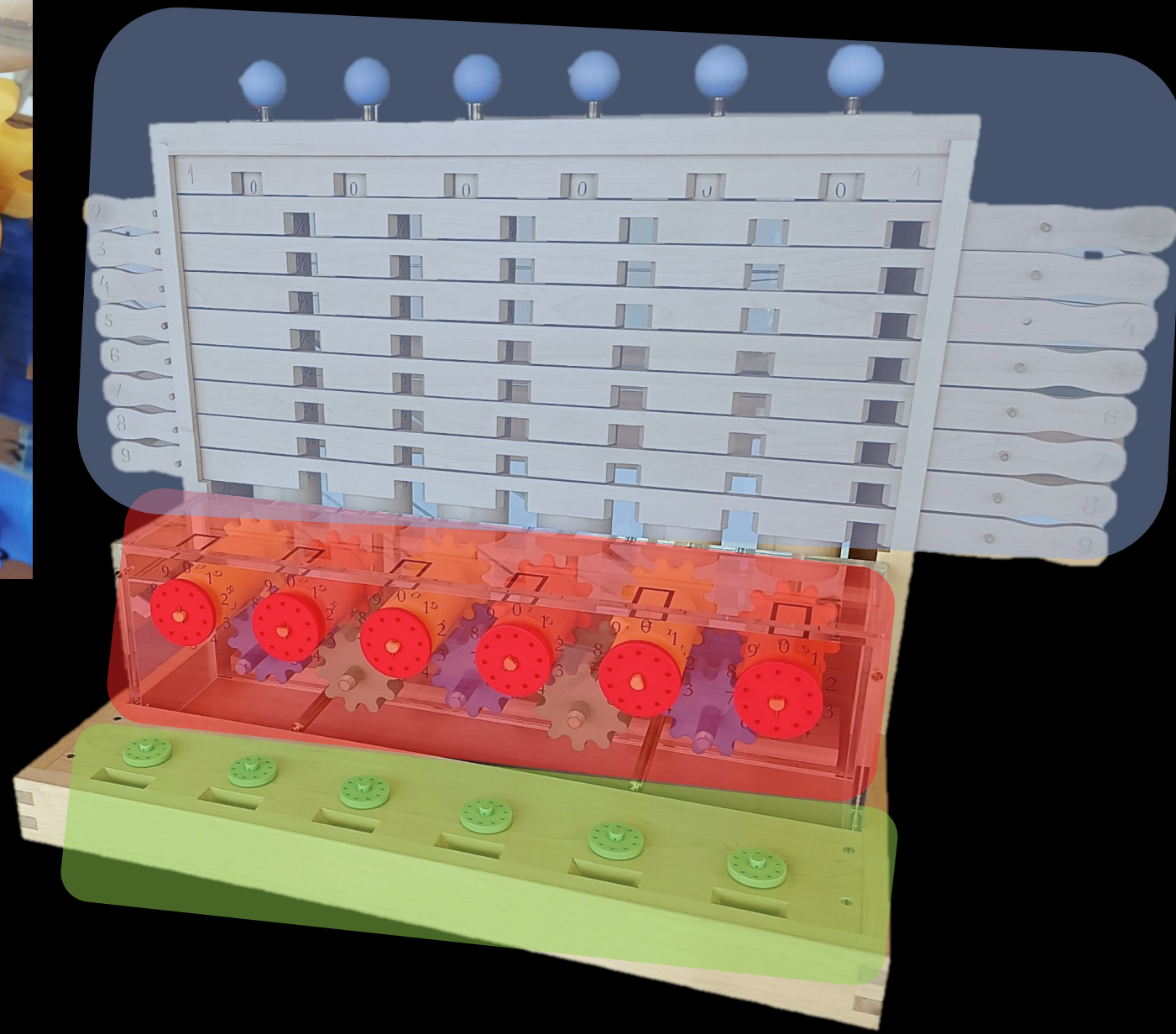
Calculating Machines – Addition & Subtraction



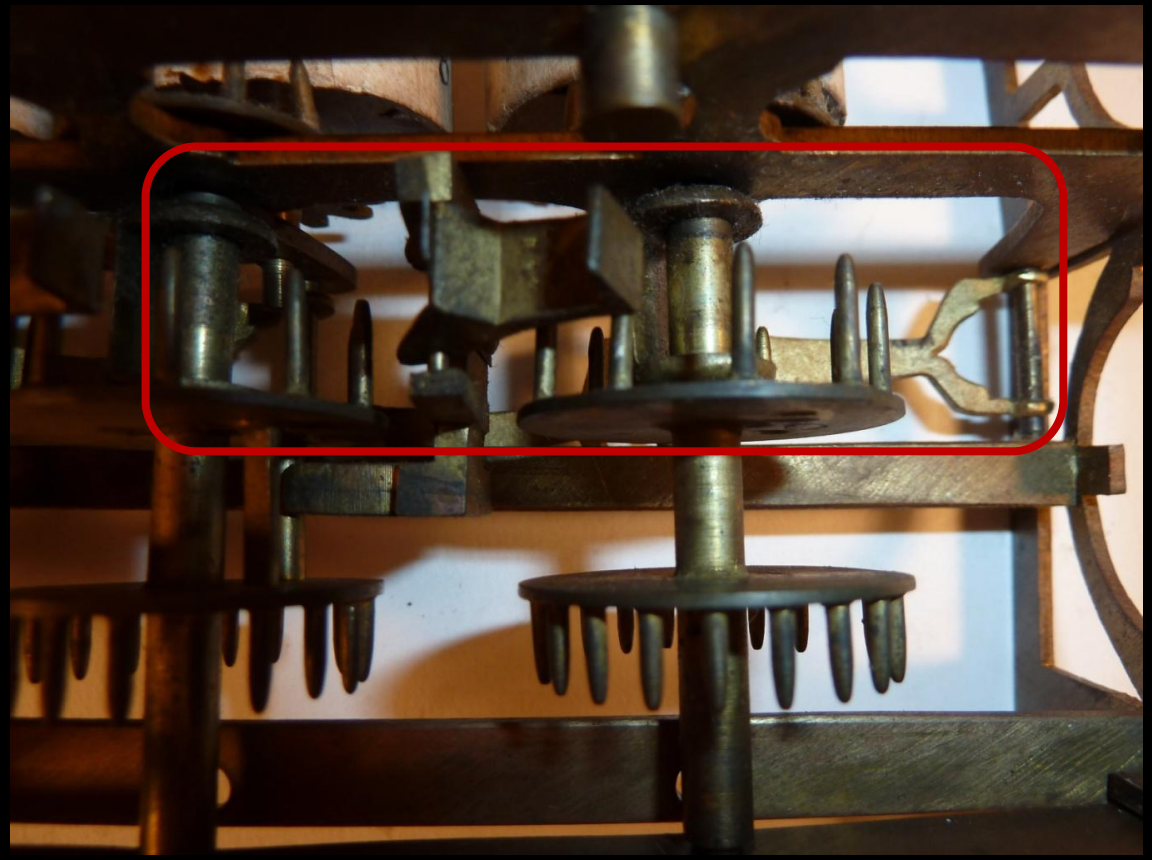
Entwurfsskizze v. Schickard ("Stuttgarter Skizze")



Schickards "Skizze aus Pulkowo" im Brief an Kepler, 24.2.1624



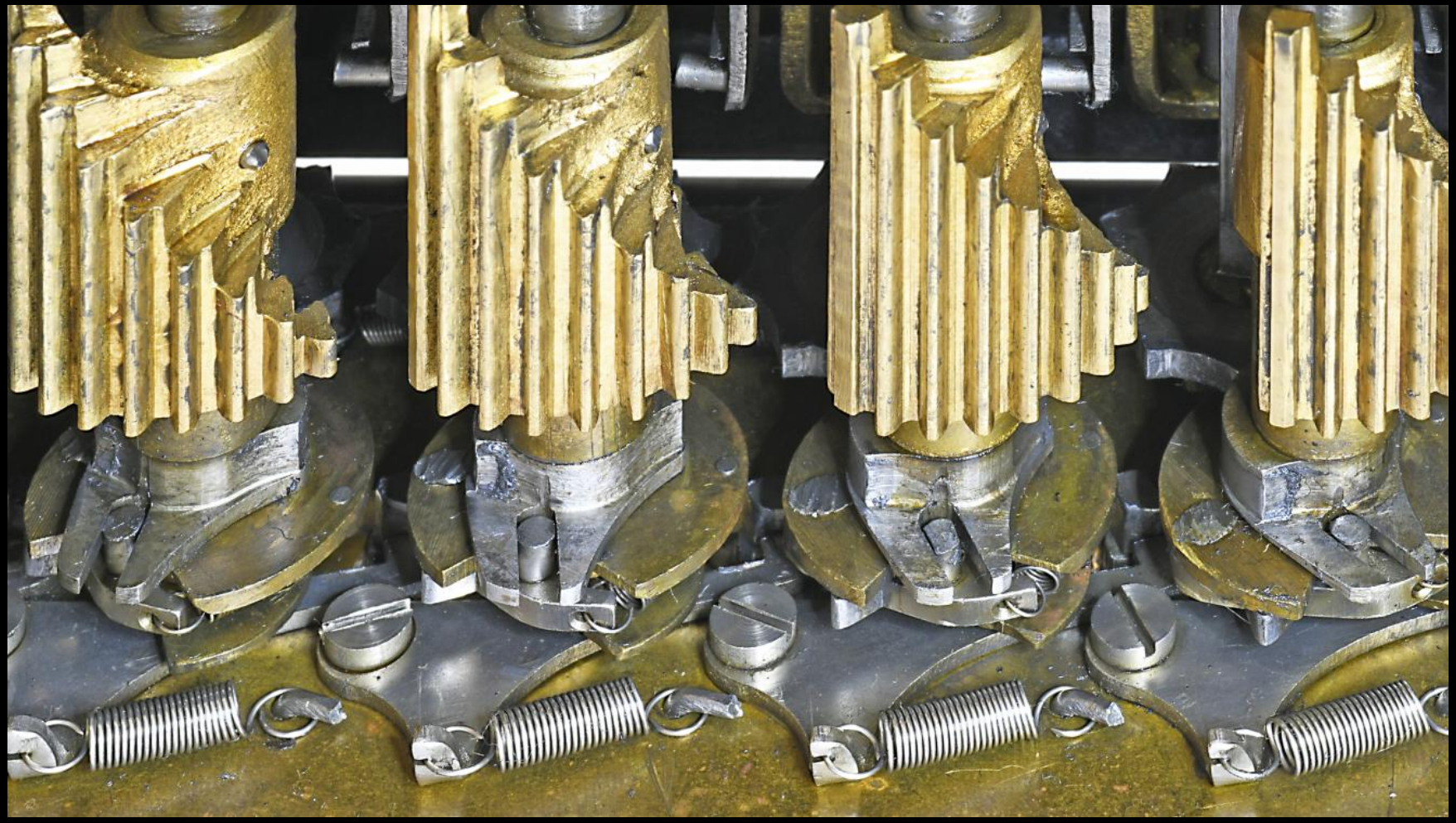
Reconstruction of Schickard’s calculating machine, *1623*



Pascaline, since *1642*

Calculating in olden times

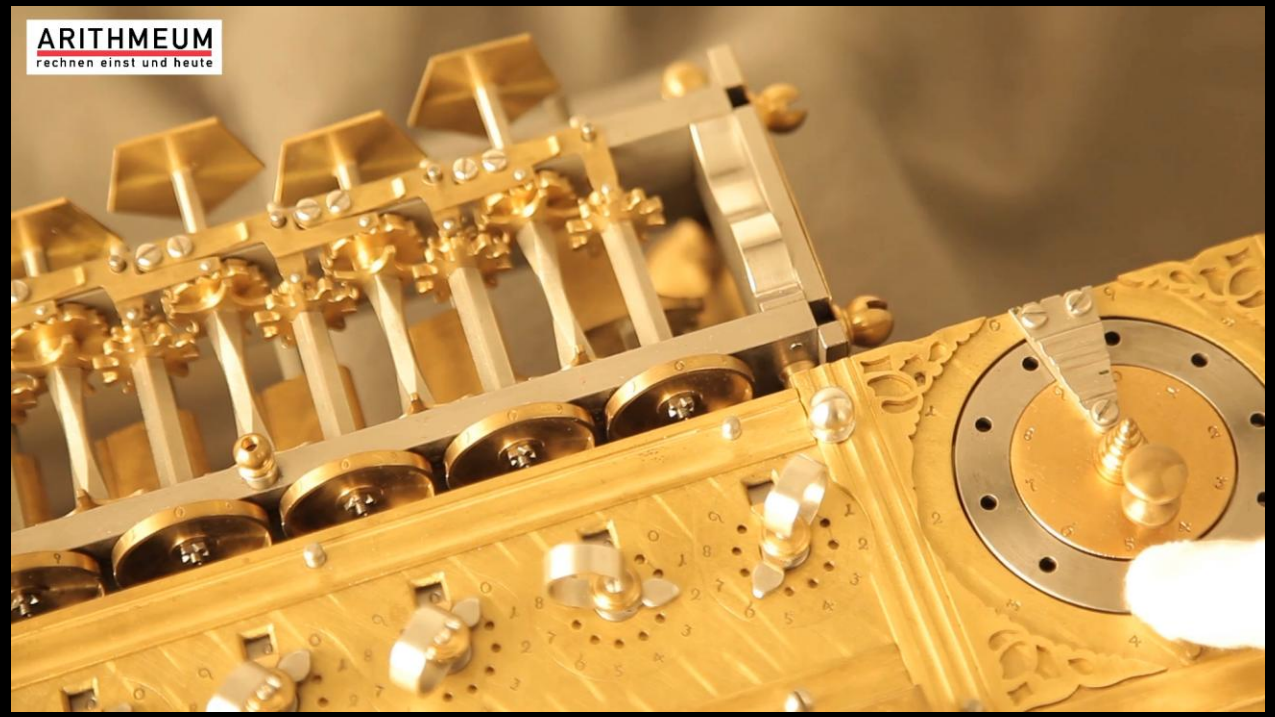
Calculating Machines – 4 Species

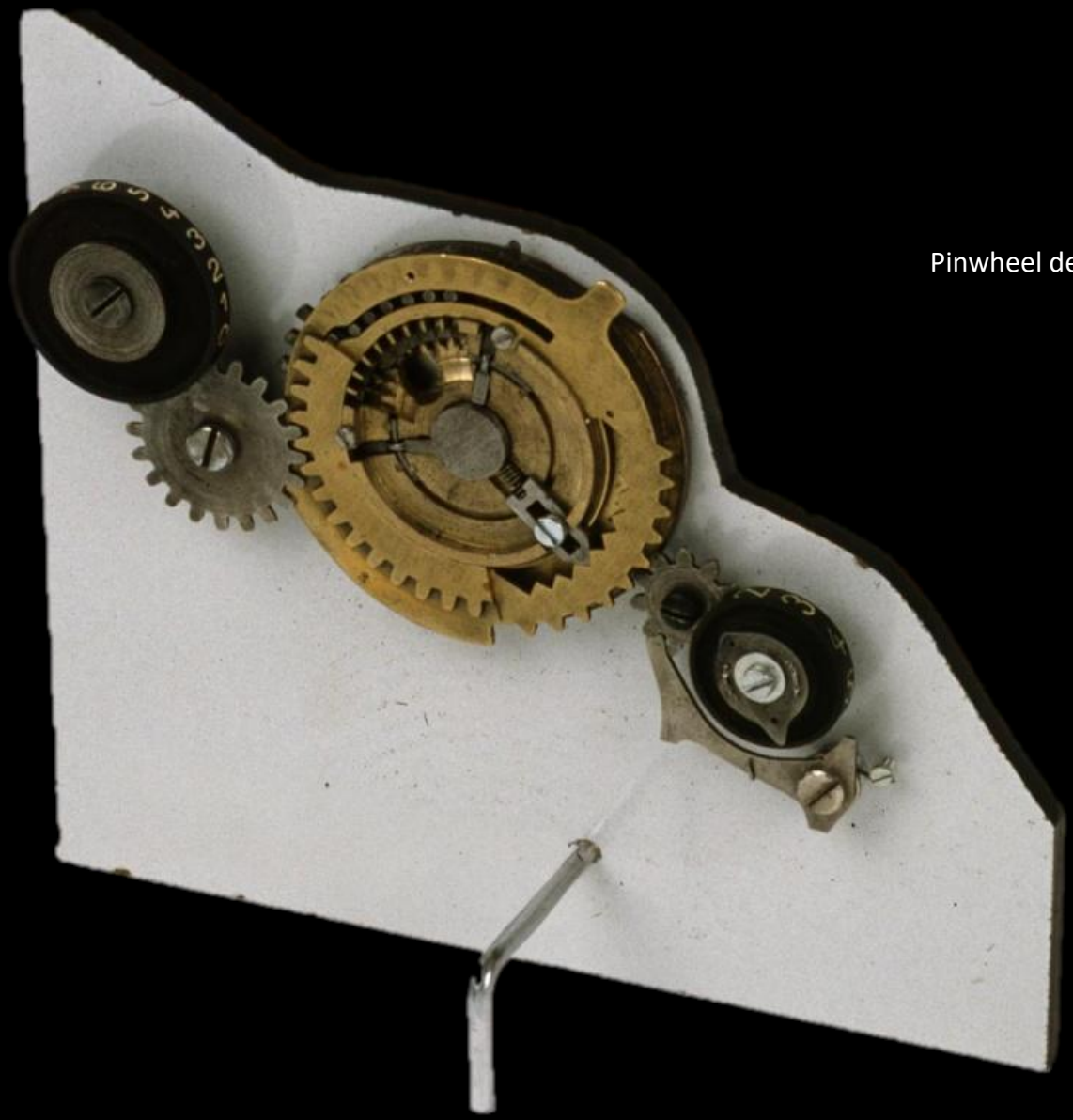


Stepped Drums

ARITHMEUM
rechnen einst und heute

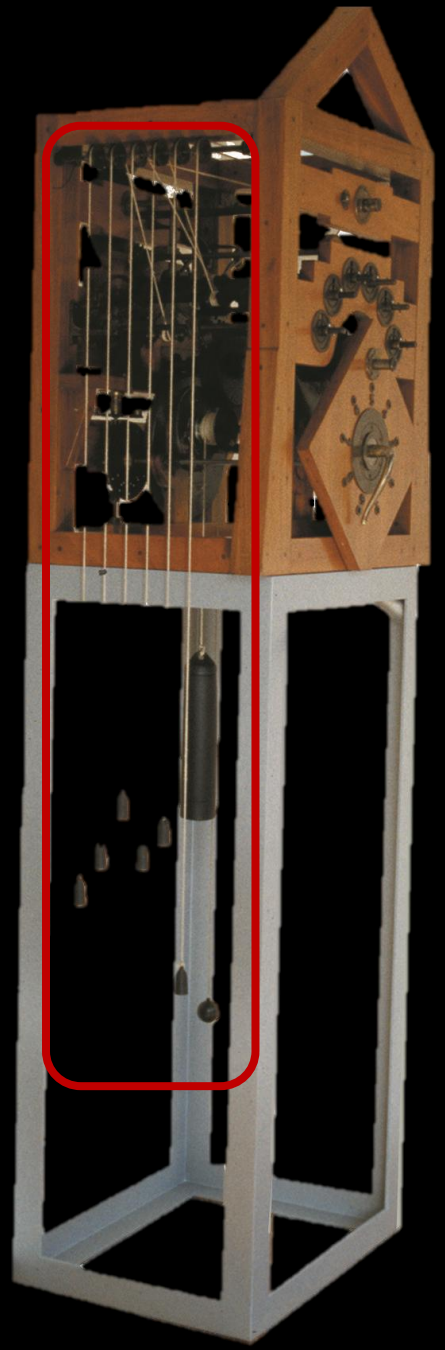
Leibniz Machina Arithmetica*, 1694*



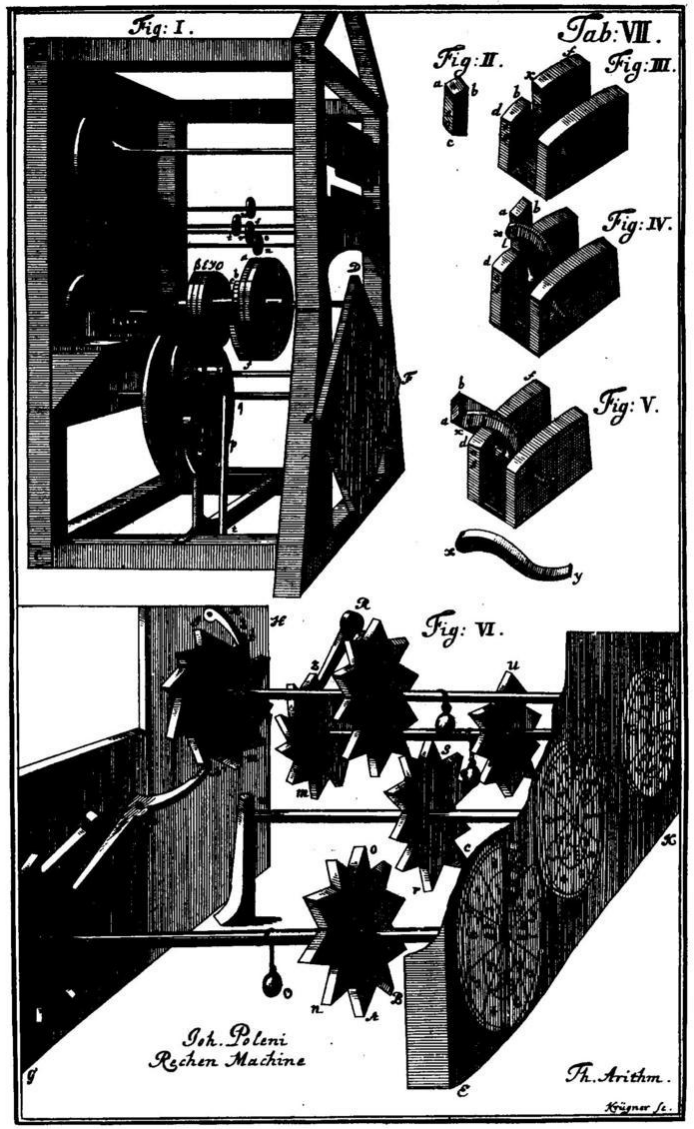


Pinwheel demonstration model

ARITHMEUM
rechnen einst und heute



Poleni, *1704*



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

JOANNIS POLENI
MISCELLANEA.

HOC EST

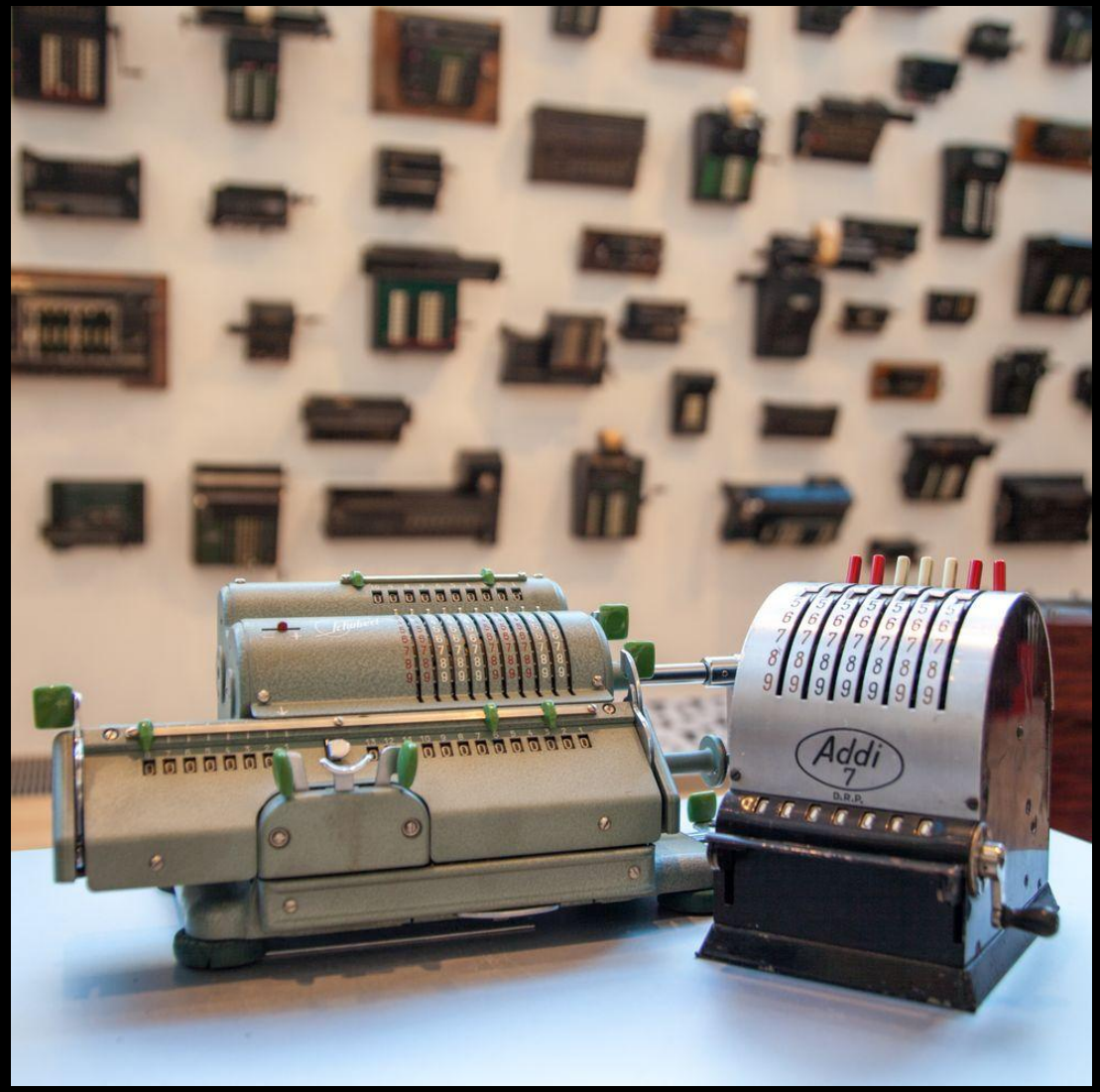
I. Dissertatio de Barometris, & Thermometris,
II. Machinæ Aritmeticæ, ejusque usus Descriptio,
III. De Sectionibus Conicis Parallelorum in Horologiis Solaribus Tractatus.

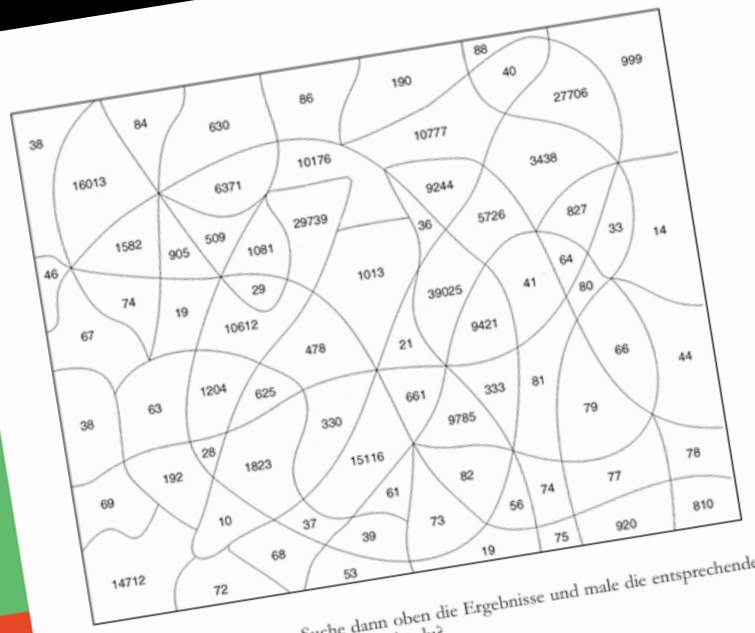
VENETIIS
Apud Aloysium Pavinum An. Dom. 1709.
Superiorum Permissu.

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 erhälst du?

23 + 6 =

14 + 7 =

34 + 3 =

29 + 7 =

18 + 10 =

17 + 16 =

40 + 28 =

23 + 17 =

64 + 18 =

114 +78 =

243 + 87 =

411 + 250 =

156 + 322 =

216 + 117 =

609 + 218 =

304 + 205 =

728 + 177 =

406 + 219 =

600 + 413 =

725 + 356 =

987 + 836 =

314 + 890 =

845 + 737 =

1047 + 2391 =

4225 + 2146 =

3233 + 6011 =

7422 + 1999 =

8147 + 1638 =

10029 + 147 =

6399 + 4213 =

3778 + 1948 =

7291 + 3486 =

11098 + 4018 =

14216 + 13490 =

16271 + 13468 =

24617 + 14408 =

Addition

27 + 56 =

25819 + 2841 =

Subtraktion

139 - 72 =

954460 - 536774 =

Multiplikation

541 x 23 =

4546 x 87 =

589 x 241 =

568,03 x 122 =

64,225 x 674,432 =

Division

36 : 9 =

217 : 6 =

53482 : 286 =

75999,5 : 48,5 =

49579,587 : 181,81 =

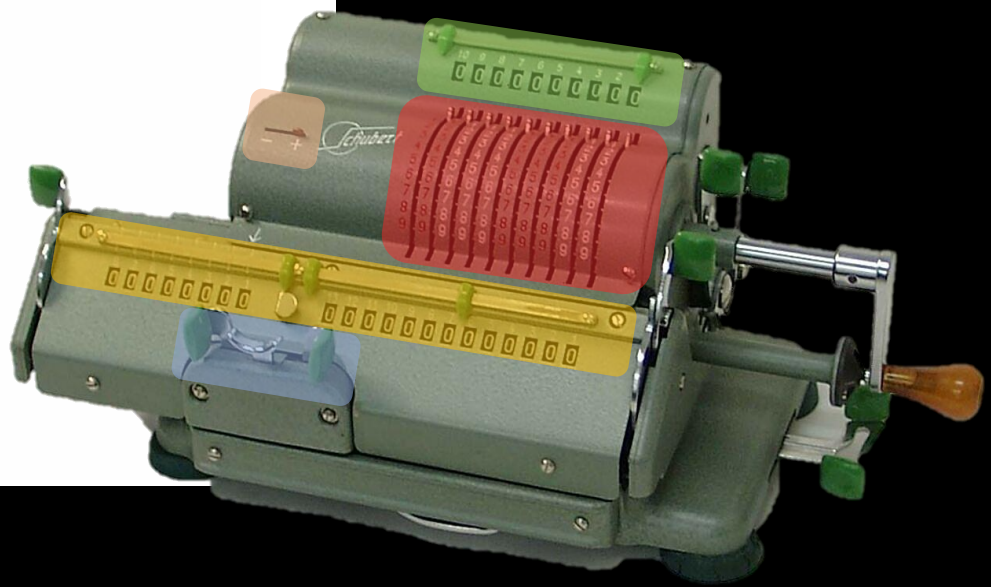
Wurzel

$\sqrt[3]{81}$ =

$\sqrt[3]{7921}$ =

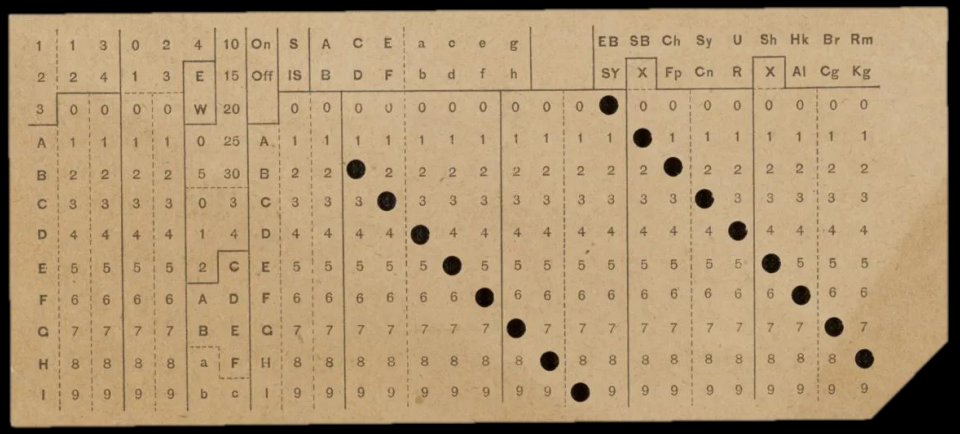
$\sqrt[3]{189225}$ =

$\sqrt[3]{279841}$ =

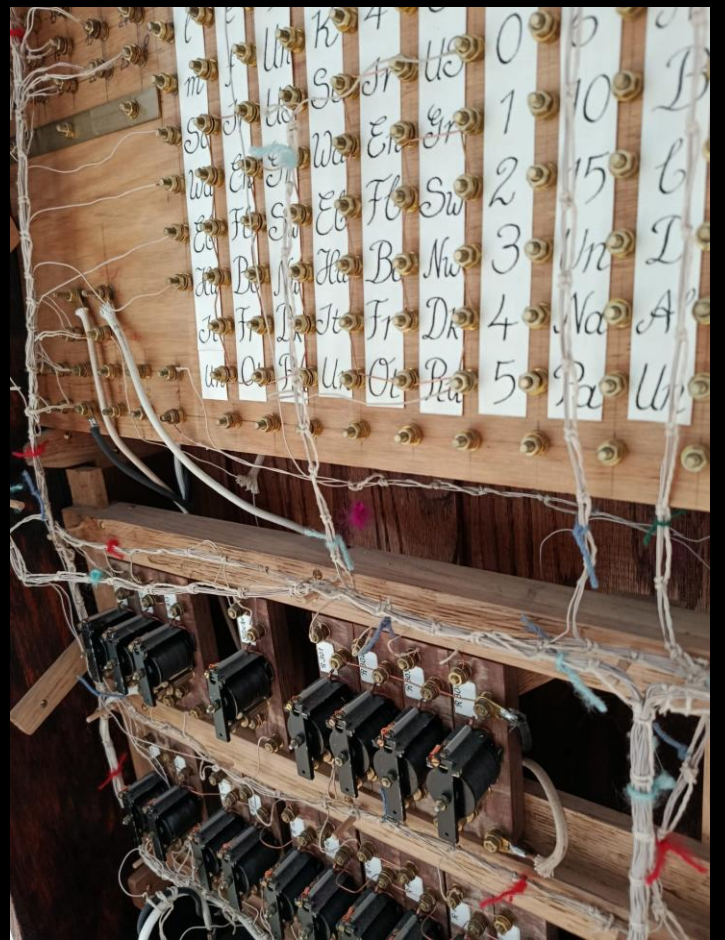


Calculating in olden times

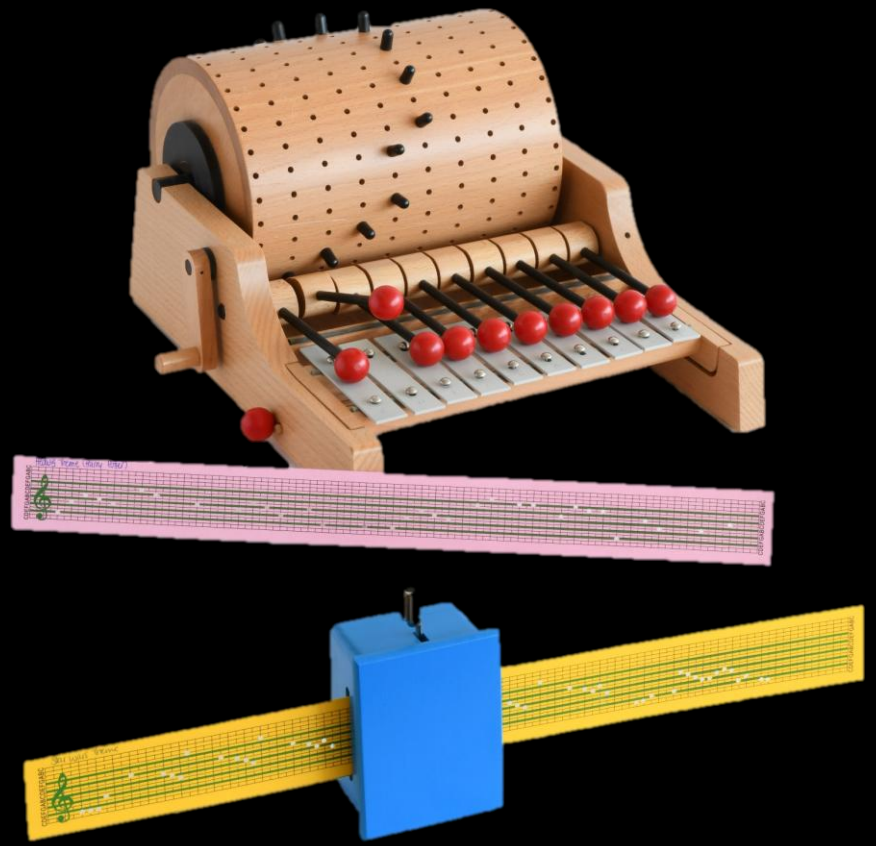
Boolean Logic, Data Storage & Encryption



Hollerith, 1890



Workshop – Musical Punch Cards

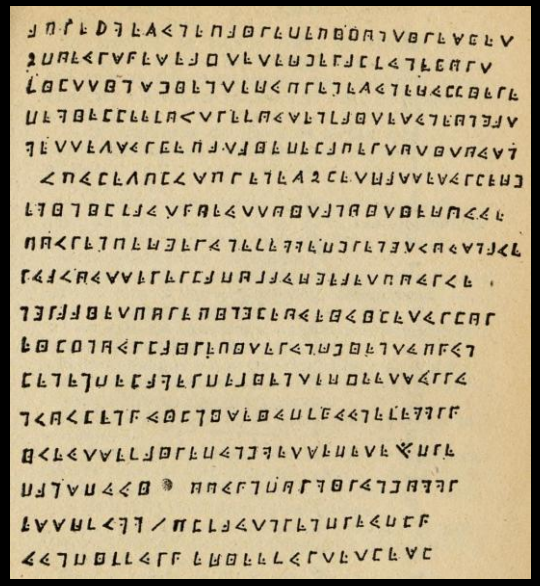


Wheatstone Cryptograph, 1854

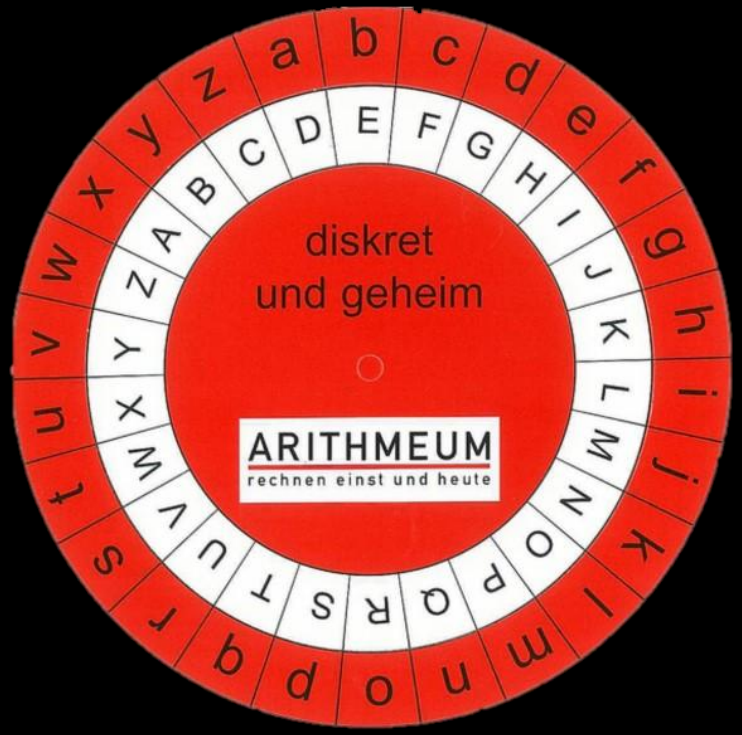
Hagelin B-21, 1925

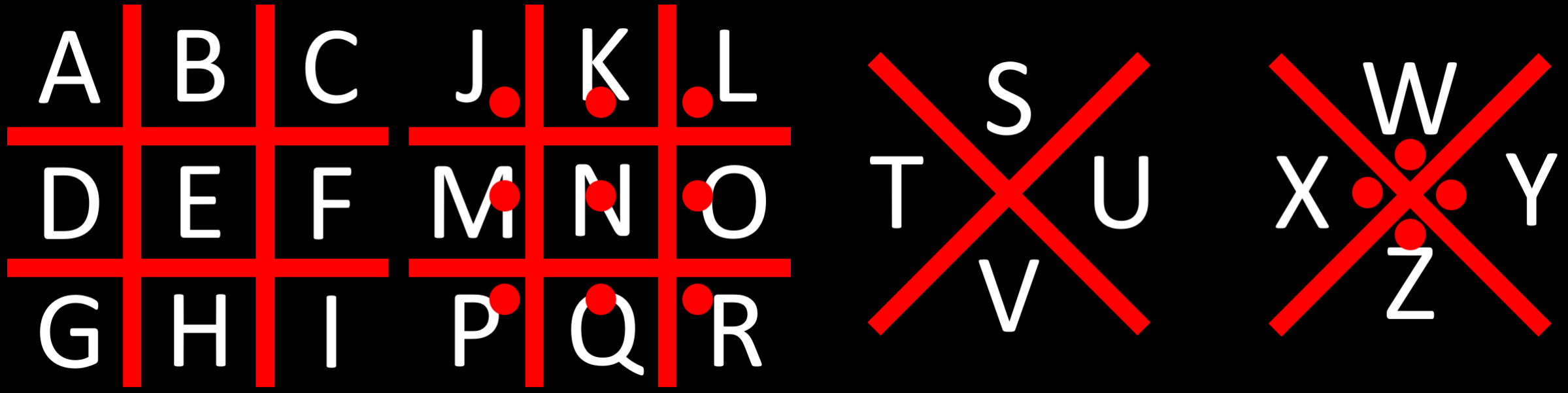
Enigma & its Rotors, 1934

Workshop – Discrete and Secret

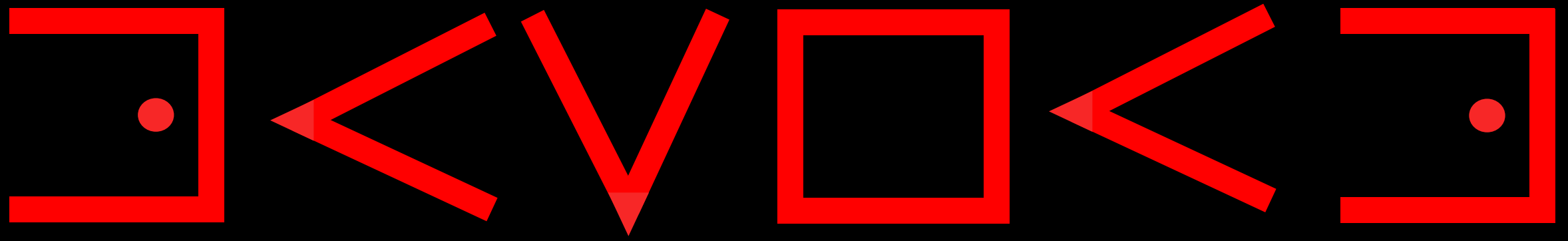


	1	2	3	4	5
1	Α	Β	Γ	Δ	Ε
2	Ζ	Η	Θ	Ι	Κ
3	Λ	Μ	Ν	Ξ	Ο
4	Π	Ρ	Σ	Τ	Υ
5	Φ	Χ	Ψ	Ω	




A B C J K L
D E F M N O
G H I P Q R
S
T U
V
W
X Y
Z

Workshop – Discrete and Secret

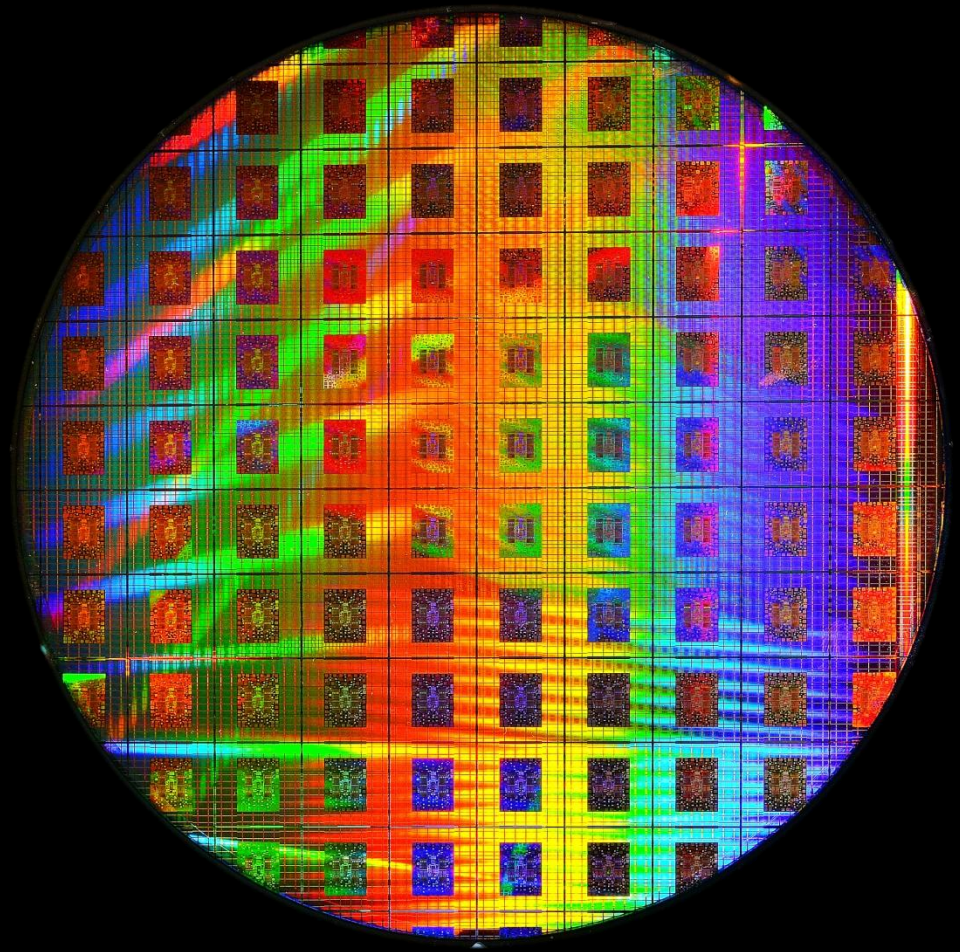


MUSEUM

Calculating in modern times

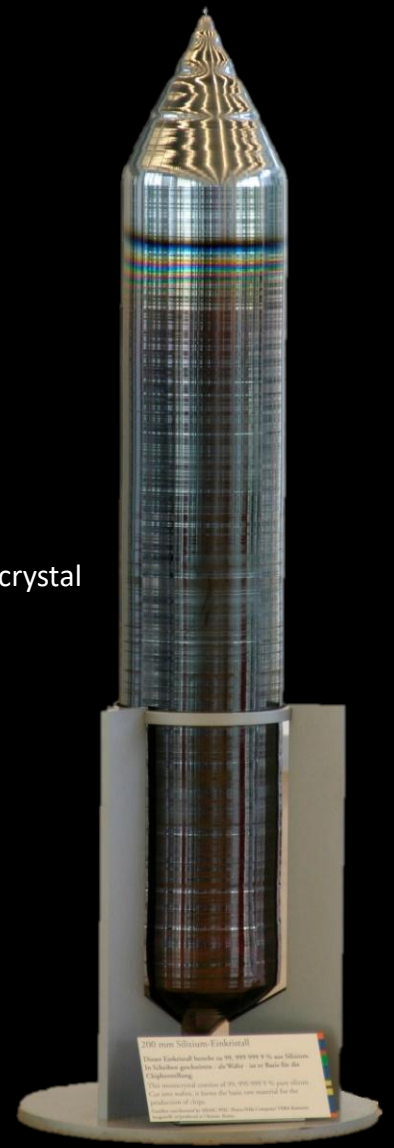
Binary Calculation & Chip Design

Leibniz Binary Calculator
demonstration model



Waver

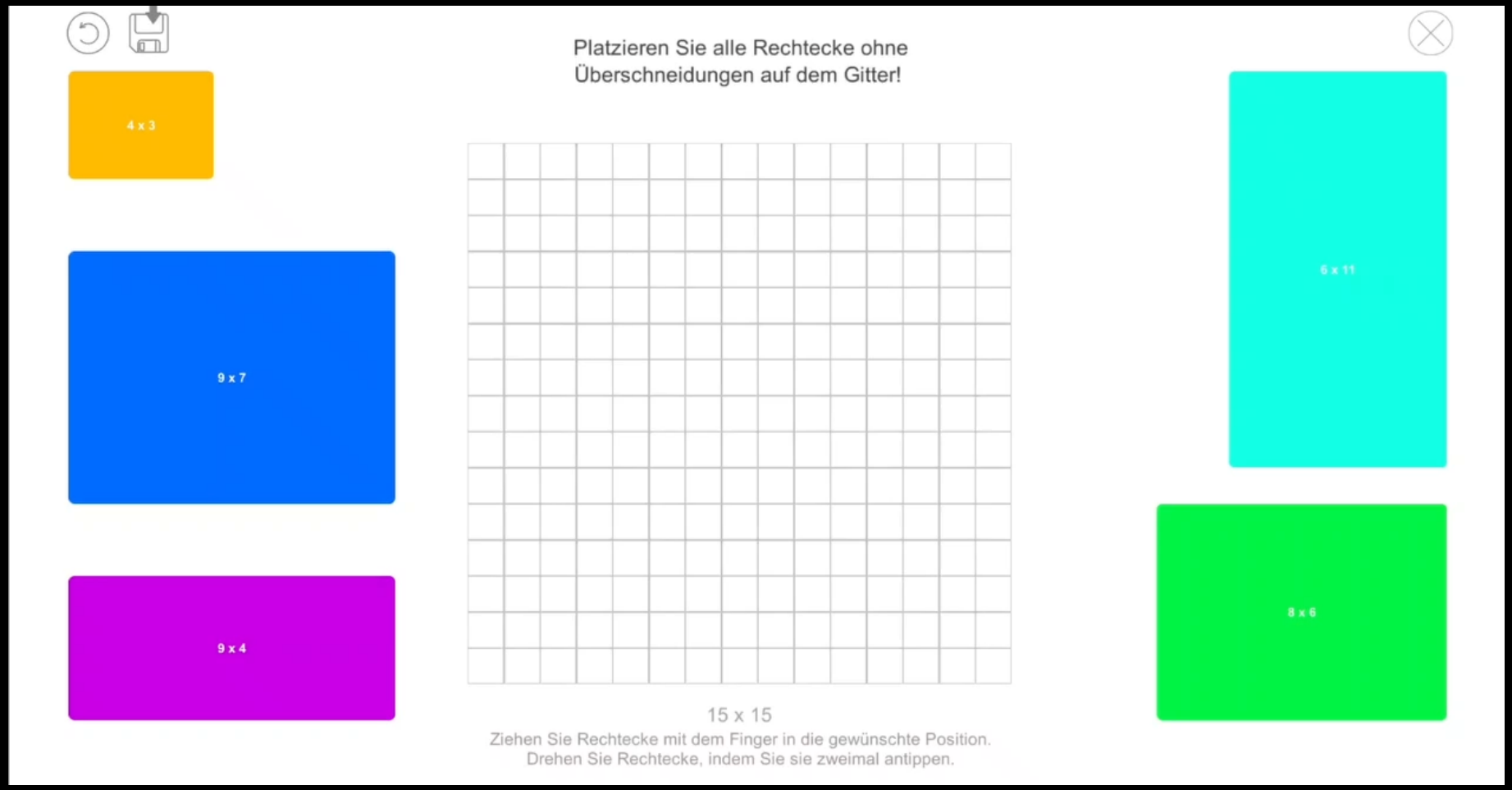
Silicon Monocrystal



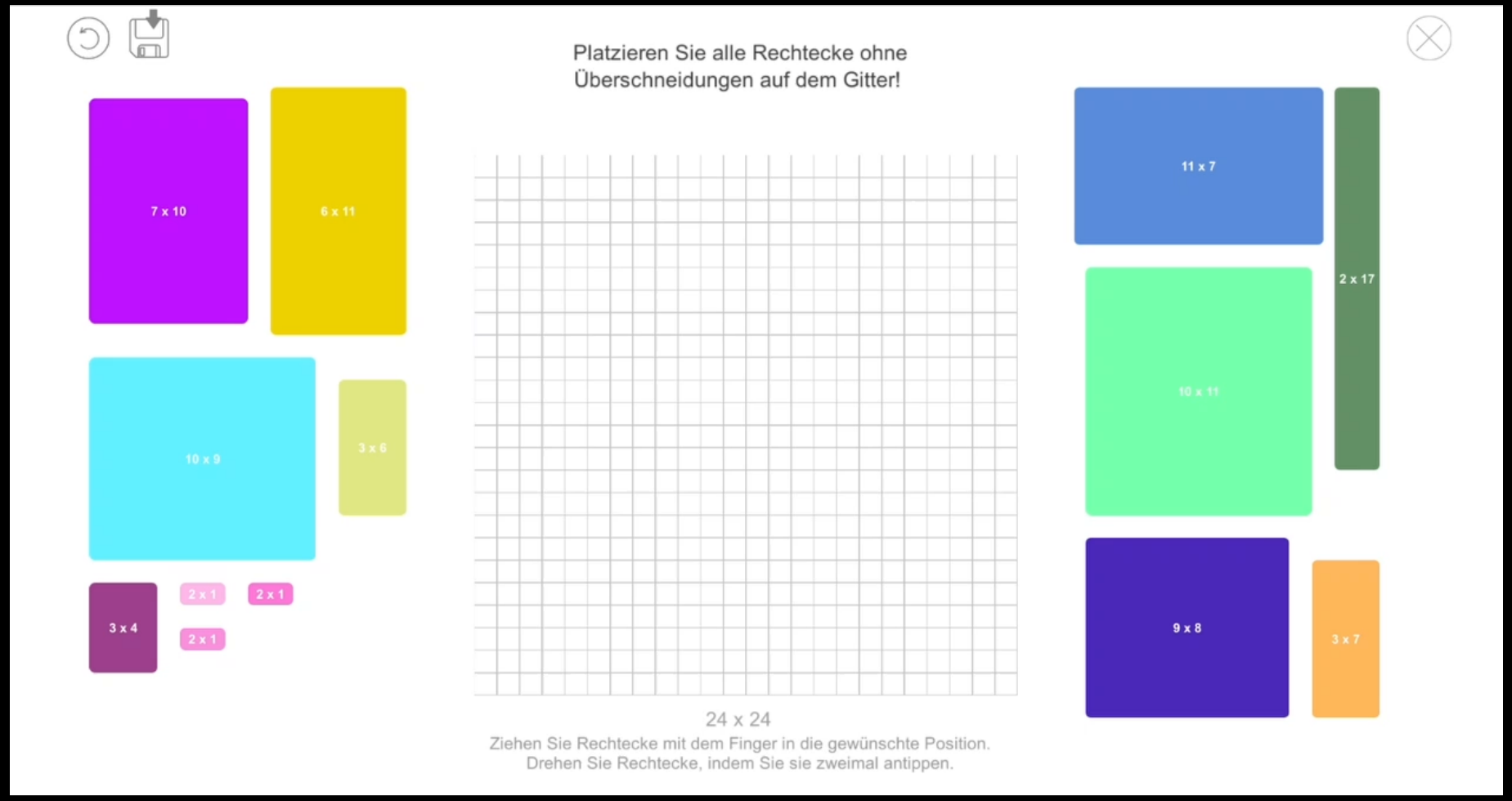
Workshop – The Binary System

Workshop – Discrete Mathematics

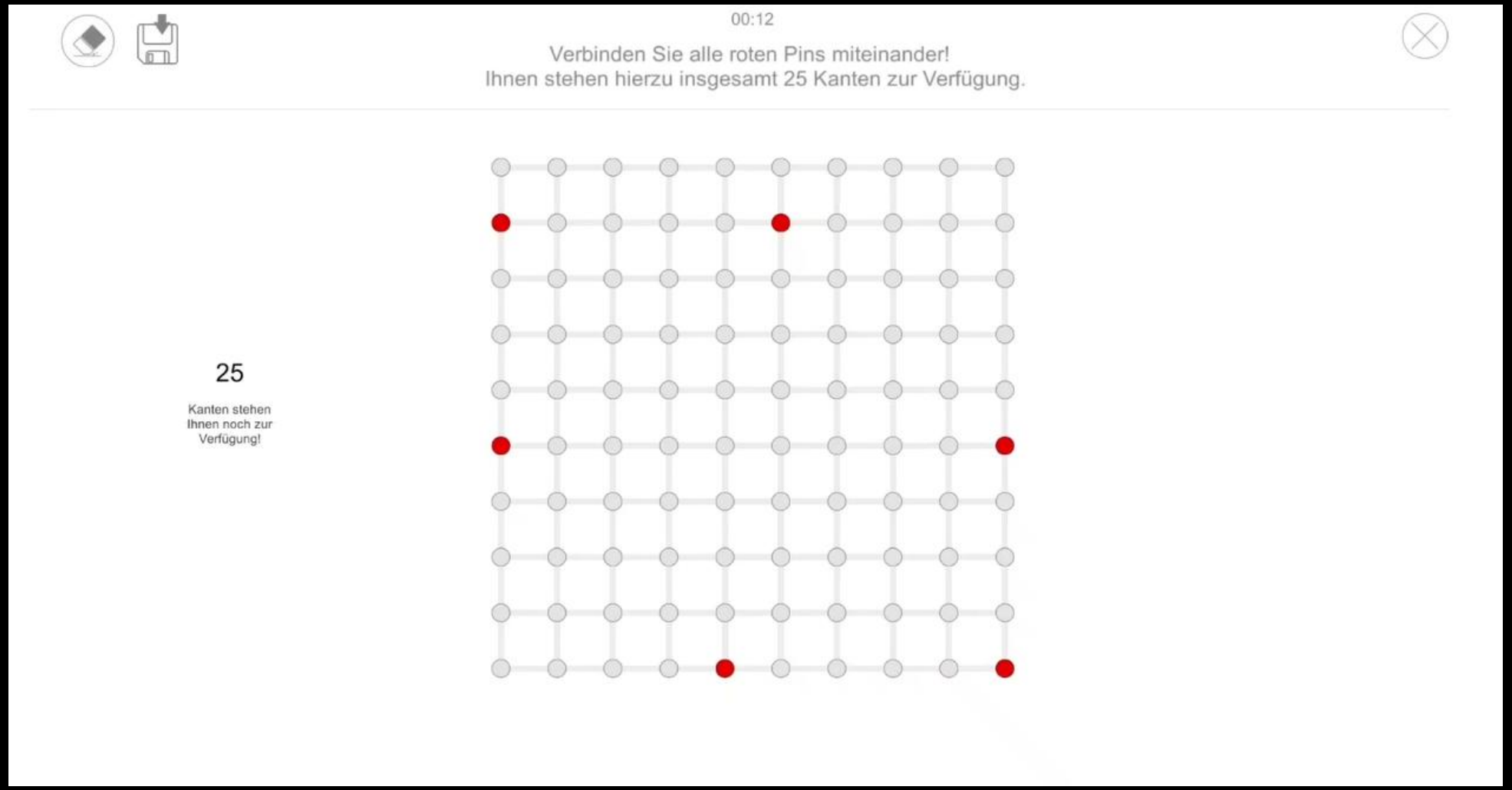
Workshop – Discrete Mathematics



Workshop – Discrete Mathematics



Workshop – Discrete Mathematics



Thank you for your attention!