

The main unsolved question in
mathematics is:

What is Mathematics?



(Archimedes in Manchester)↑

Sciences has natural objects to investigate
Object of math is Math itself

The common opinion: Objects of math are
numbers and figures.

↑
2000 years of using Euclid's Elements
as a major textbook

But: numbers are "God done" (Jacob Bernoulli)
figures are "invented" representing
ideas about "space".

Numbers are subject of paradox of Gödel theorems:

1) arithmetics is \sim to all mathematics

2) we have no way to be sure that arithmetics doesn't contain a contradiction

\Rightarrow Arithmetics \sim Mathematics =
= "objective faith" that it is correct.

Accidents in Mathematics defines civilization!

History of 0 and positional number system

positional numbers, 0 and negative numbers allows to calculate fast.

Since mid 19th cent. we know that Babilonias had base 60 positional system, developed geometry, astronomy etc...



3700 yo trigonometric clay table ↗

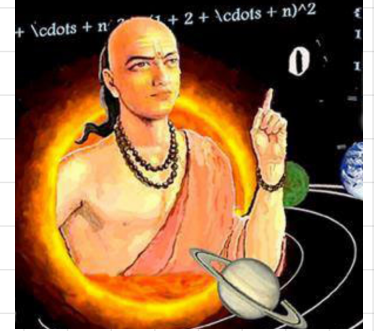
Greeks, founders of science had no positional system. About 0 they speculated "nothing can't have a name". The system was almost invented by Archimedes

«The greatest calamity in history of science was the failure of Archimedes to invent positional notation. To what heights would science now be rised if Archimedes had made this discovery»

C.F. Gauss

He speculated that 19th age of science could happen at the beginning of CE

The modern 10-based system was created in India in 6th century together with mathematical 0 treated as a number (Aryabhata, Brahmagupta, Mahavira, Bhaskara..)



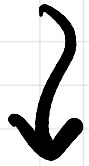
↓ (Survived Muslim invasion)
"Malabar" or "Kerala" or "Nil" School of Math, astronomy, analysis (!!!) - integration, differentiation, trigonometric series in 15-16 century, 200 years before Newton & Leibniz. Malayalam language on palm leaves



↓
Ramanujan?



India



Arabs (Al-khwarizmi
"On the Hindu art of
Reckoning")



↓ Fibonacci (Leonardo Pisano)

↓ Europe 13th century.

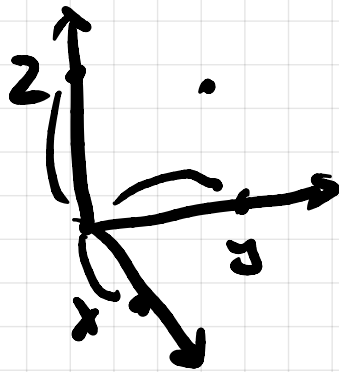
spreaded slowly, but finished
by the eyes of Enlightenment &
Progress

Numbers vs Figures ~ "Space"

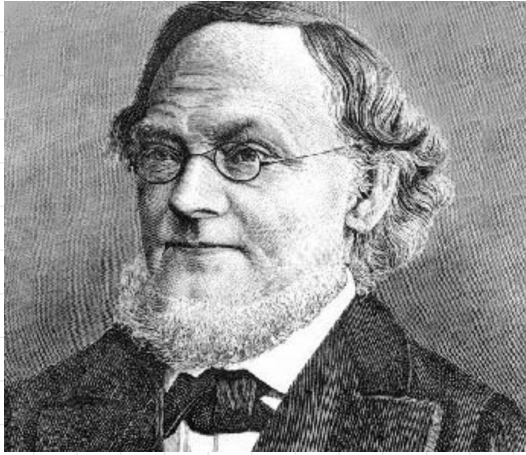
Numbers are "God done" Figures are
Invented as a view on "Space"

"Dimension" ~ the basic relation between
numbers and space

Aristotle proved that our "Space"
is 3D :



Up to 1845 "space" could have
dimension 1, 2, 3




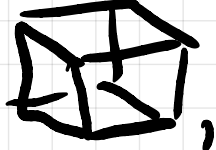
Hermann Grassmann -

- multimensional space
and tools describing its
geometry.

~ The solutions of equations
in mathematics and physics
obtained structure of "space"
and geometry

In 1877 Georg Cantor crushed Aristotle
argument: 1-1 correspondence
between interval



and , , ...
etc "space".

he wrote to Dedekind

"I see it but i don't believe it"

Physical "space" lost dimension

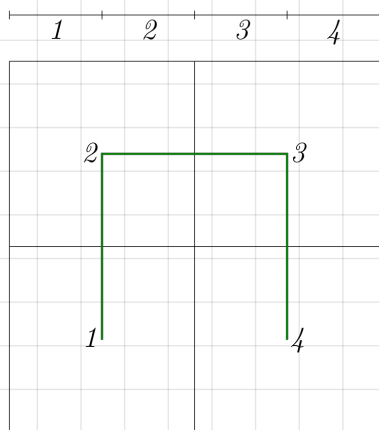


Fig. 1.

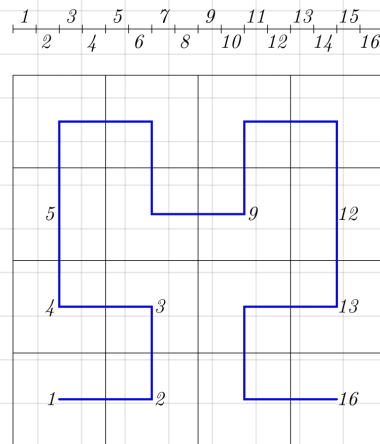


Fig. 2.

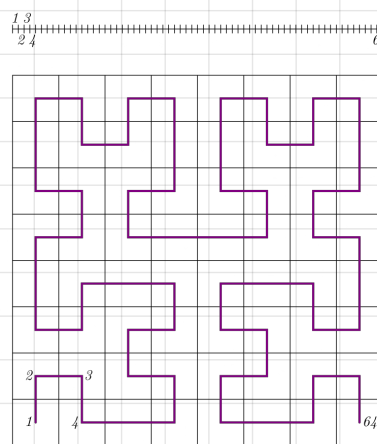
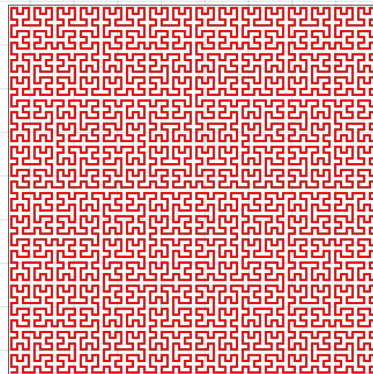
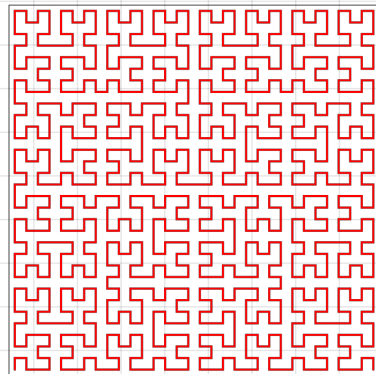
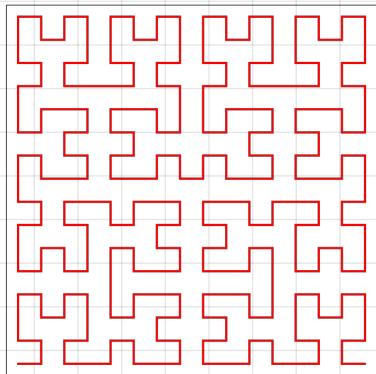


Fig. 3.



Space-filling interval after
Peano & Hilbert

Fierce activity to
save dimension



"Continuity" was formalized



"Topology"
(H. Poincaré)

"Topological Invariance of dimension"
was established by Dutch 29yo mathematician
Luitzen Egbertus Jan Brouwer
in 1910 using fresh tools
of algebraic topology
& homological algebra
but the correct "continuous"
mathematical space lost
to be absolute objective
and physical.

