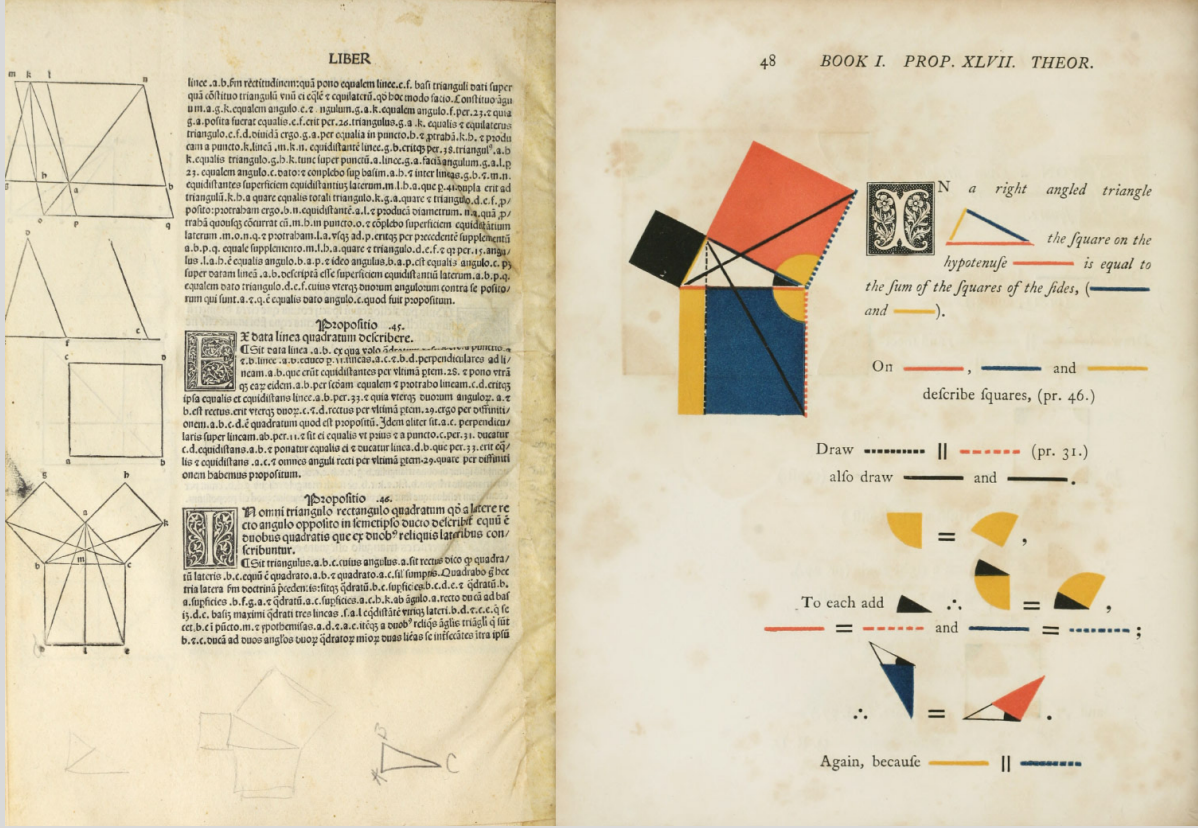


# 算額 vs Euclidean Geometry: History of Tangents or Parallel Lines?



Euclidean geometry was Europe’s poster child...

- Euclidean geometry transformed science, art and philosophy in Europe
- His *Elements* propose a system that logically deducts complex theorems from simple axioms
- Euclid’s mathematics was a part of Jesuit education in Europe; the Jesuit College in Coimbra even features tiles with Euclidean theorems on them
- In the 16th century, Coimbra’s Jesuit missionaries brought Euclid’s *Elements* to Japan
- Jesuit astronomy has an afterlife in Japan, whereas Euclid’s geometry did not become popular at all – but why were Japanese people so uninterested?

... but Edo Japan developed its own mathematics!

- The Edo period witnessed the rise of *wasan* (和算), Japanese mathematics.
- Many *wasan* books published unsolved problems in the appendix, as a challenge to other mathematicians. This practice was called *idai* (遺題).
- *Sangaku* (算額), votive tablets with mathematical problems dedicated in temples and shrines, became a popular custom that mirrored the idea of *idai* on wood.
- Wasan school students dedicated *sangaku* to thank the Gods for solving a problem, but even more so to challenge passers-by to find a solution themselves
- Not only learned samurai participate but also peasants, merchants, even women and children
- During the Edo period, scholars also travelled to collect *sangaku* problems – some of these collections were published in print
- Of several thousand *sangaku*, ca. 1000 tablets survive in temples and shrines in Japan today; ca. 1700 *sangaku* problems are recorded in books



Visual similarity but different methodology

- On the surface, the diagrams on *sangaku* resemble Euclidean figures but the methodology differs from Western geometry
- High-level equations rather than logical deduction were used to solve *sangaku* problems
- The level of difficulty found on *sangaku* is broad – some problems are easy, others have still not been solved.
- Often there is more than one possible solution; not just the correctness but also the elegance matters.
- In some cases, the same problem appears on several *sangaku*, but is solved with different techniques

A social network of math enthusiasts

- Sangaku were dedicated almost everywhere in Japan over a period of 250 years by a large group of people
- Each *sangaku* functions as a dataset which contains the name of the problem contributor, his/her school, the year of dedication, location and problem (question, answer, technique – but not the solution!)
- By collecting and analysing the data from all *sangaku*, we will be able to study the movements in this network

## Project Scope:

- Collect data and images for all *sangaku* (both tablets and print) in an open-access digital archive with high-resolution photos and metadata in English and Japanese

## Project Goal:

- Preserve and promote a uniquely Japanese heritage
- Study knowledge transmission across the sangaku network
- Understand *sangaku*’s cultural role in Japan, compared to Euclid’s impact in Europe

