Were the Chinese as advanced mathematically as the Greeks?
Mika Melvin

Why would they develop differently?

- Geography of China – China was isolated from other countries by mountains and seas
- When China was conquered by foreign invaders, they were assimilated into the Chinese culture rather than changing the culture to their own
- Chinese had little desire to embrace other approaches to mathematics
- Different worldviews and purposes for mathematics

Greek mathematical proofs → Follow a chain of reasoning from the initial assumptions to the final conclusion

Chinese mathematical proofs → Aim is generalization and deeper understanding and may "reason by words and explain by figures"

Different Worldviews and Purposes for Math

Greek society treasured knowledge and believed that “humans have an intellect that can discover truths through observation and experimentation.” Math was a tool to pursue truth and explain the world

Chinese mathematics was very concise, problem-based, and motivated by problems of the calendar, trade, land measurement, government records, and taxes.
Where does this idea stem from?

Eurocentric viewpoint
European domination and colonization of Africa and Asia gave an ideology of European superiority
Contributions of the colonized people were ignored or devalued

Think about it...Who are you more familiar with?

Euclid
Thales
Eratosthenes
Pythagoras

Li Chun Feng
Chin Chiu Shao
Chao Chun Chin
Liu Hui
What is advanced?

Ahead or far or further along in progress, complexity, knowledge, skill, etc.

Pertaining to or embodying ideas, practices, attitudes, etc., taken as being more enlightened or liberal than the standardized, established, or traditional.
History

Shang Dynasty
1500 BC – 1000 BC

- Earliest evidence of numeration in China
- Numbers range from 1 – 30,000 with special characters for 10, 100, 1000, and 10,000 and included negative numbers
- Use of counting rods for calculation
- *Chou Pei Suan Ching* book contains dialogue about Pythagorean theorem and simple rules of fractions and arithmetic operations

Zhou Period
11th Century BC – 221 BC

- Decimal numeration system in place
- *Suan Shu Shu* book contains information about operations with fractions, areas of rectangular fields, and fair taxes
Han Dynasty
206 BC – 220 AD

- Characters and notation for writing numbers is well-established and virtually the same as the numeration system used in China today
- Numbers written using decimal system and used powers of 10 (5 or less characters for numerals 1-9 with no need for a zero to indicate positional value
- *Chiu Chang Suan Shu* (Nine Chapters on the Mathematical Arts) compiled with information about root extraction, ratios (including the rule of 3 and the rule of false position), areas and volumes of various geometrical figures and solids, estimation of $\pi$
- Significant developments in Chinese science and technology, astronomy and calendar construction
- Evidence of carpenter’s square and compass in stone reliefs

Southern and Northern Dynasties
420 – 589 AD

- Problems solved using the Chinese Remainder Theorem
- Zhgang Qiujian wrote a mathematical manual with 92 illustrate the formula for summing an arithmetic progression and presents the “Hundred Fowls Problem”
- Zu Chongzhi and his son, Zu Geng, produce an accurate calendar based on a cycle of 391 years, proved $3.1415926 < \pi < 3.1415927$, and calculated the formula for the volume of a sphere using Cavalieri’s principle (1598 – 1647)
- Beginning of Chinese algebra with Wang Xiaotong who solved cubic equations
Greek Numeral Systems

- 1000 BC – Acrophonic system used with symbols based on an abbreviation of the word used for the number
- 800 - 400 BC – Alphabetical numerals used where letters of alphabet also represented numbers

Greek Classical Period
600 BC – 300 BC

- Ionian school – Thales is credited with first deductive proofs
- Pythagorean School – Study of proportion, plane and solid geometry, number theory, theory of proof
- Eleatic School – Zeno’s paradoxes (infinite and infinitesimal), Democritus’ work in geometry
- Sophist, Platonic, Eudoxus, and Aristotle’s Schools
- Euclid’s Elements
Greek Hellenistic Period
300 BC – 300 AD

- Archimedes – Conic sections, geometry, estimation of \( \pi \), levers, first law of hydrostatics
- Hipparchus – Table of sines, calendars, astronomy
- Eratosthenes – Prime numbers, proportions, measured radius of earth

So, what can we conclude?

The Greeks and Chinese had different purposes for math and developed different strengths, but I would conclude that the mathematics in China was as advanced as the Greeks, but Greek knowledge was used more commonly to build upon.
REFERENCES


Smith, Sanderson. Agnesi to Zeno.
