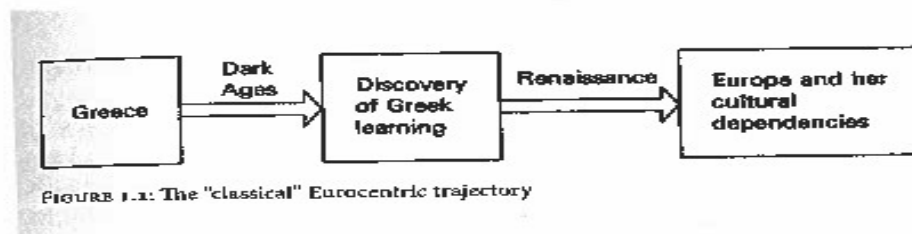# Mathematics after the Greeks

- As we have said, the Greek approach to deductive mathematics (a la Euclid) has been extremely influential

- But by roughly 500 CE, the Greek (and specifically Alexandrian) tradition of mathematical research and discovery was largely finished

- We want next to consider how the results of that tradition were transmitted to our time, and how our present-day mathematics evolved from it

Mathematics (before and) after the Greeks

- In the process, we will see some intriguing new angles on the history (both going back and going forward)

- For a long time, the standard "story" of how the main stream of mathematics developed (before and) after roughly 500 CE was very simple

Mathematics (before and) after the Greeks, the "classical" story

FIGURE 1.1: The "classical" Eurocentric trajectory

The "classical" story

- But wait a minute! Where are the Egyptians and the Babylonians??

- Morris Kline (from *Mathematics for the Nonmathematician*): Compared with the accomplishments of … the Greeks, the mathematics of the Egyptians and the Babylonians is the scrawling of children just learning to write as opposed to great literature … what the Greeks created differs as much from what they took over … as gold differs from tin."

Mathematics before and after the Greeks, a more inclusive story
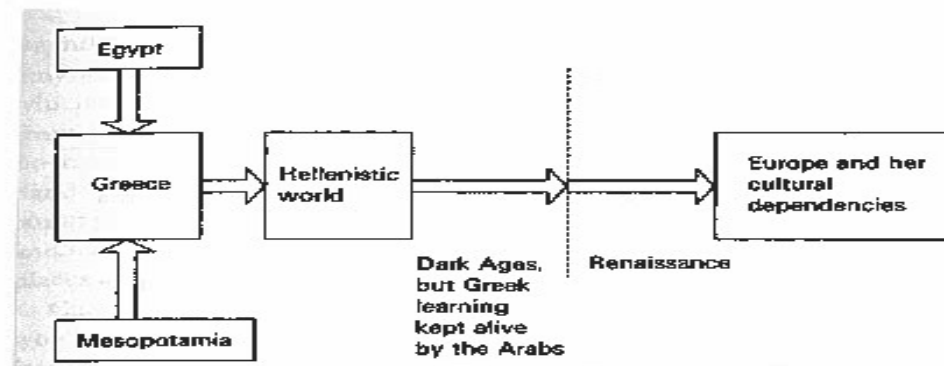
The "modified Eurocentric" story

- Of course, this looks a lot more like what we have said so far in this course

- But as some have started to see in your research for the paper, other parts of the world also had *rich mathematical traditions* and there were *interactions* between those traditions that we are only now starting to understand

- Three in particular – India, China, the Islamic world

One Piece of the Indian Tradition – The *Sulba Sutras*

- A collection of Indian religious/mathematical texts that can be traced back to the 8th century BCE – connected with construction of ritual fire altars for Vedic religion

- Questions involved are pure geometry, in a way

- On Monday, we will do a third discussion day related to the following diagram occurring in one of these texts

A piece of the Indian tradition

AX = XD = 12 *padas*
BY = YC = 15 *padas*
XP = 5 *padas*
PR = 23 *padas*
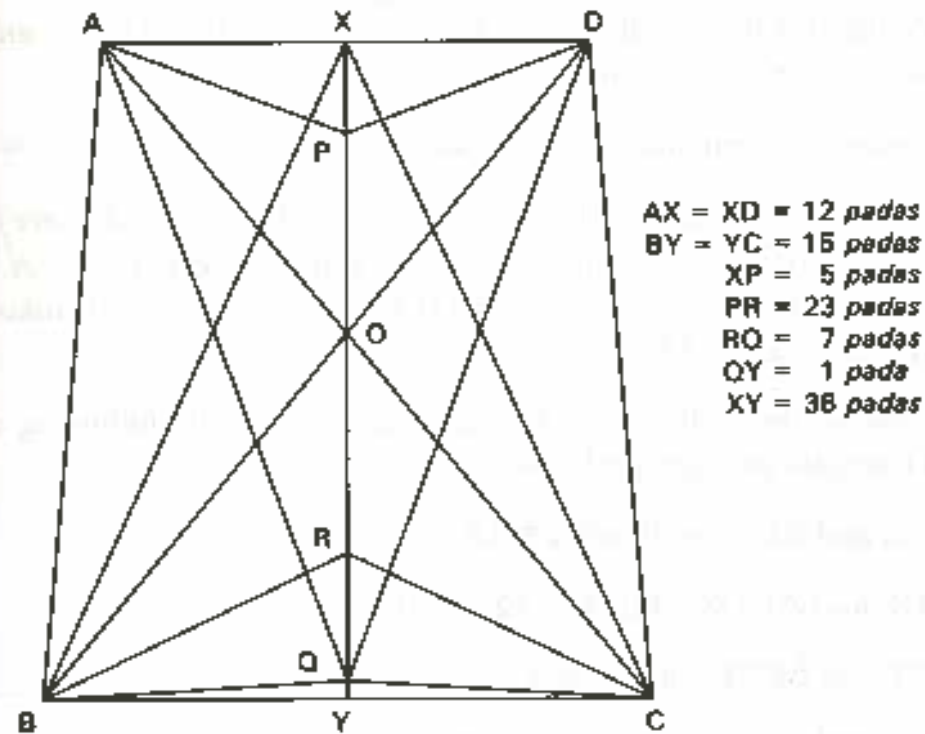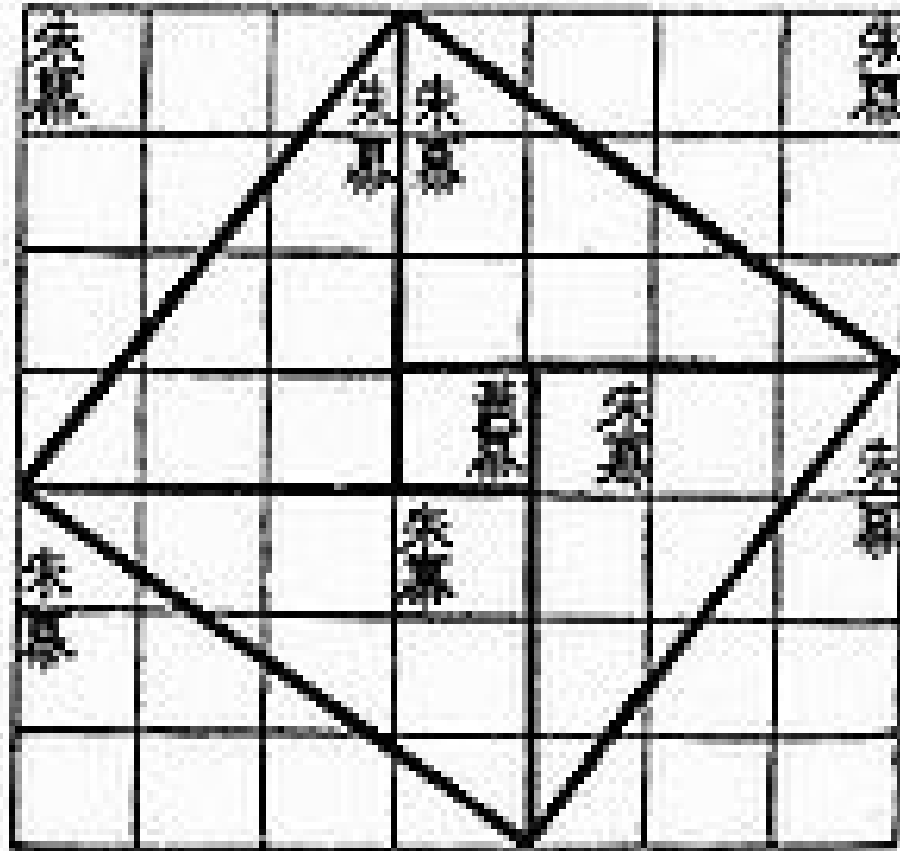RQ = 7 *padas*
QY = 1 *pada*
XY = 36 *padas*

FIGURE 8.3: The layout of the *Mahavedi* (Great Altar)

From the *Zhou Bi Suan Jing*

- Thought to date from about 500 – 200 BCE (ultimate sources perhaps much earlier, too)

- Devoted mostly to astronomical questions

- Also contains a discussion of a result called the *"go-gou"* theorem

The "*go-gou*" theorem

The "Dark Ages" weren't *uniformly* dark

- The period 600 – 1100 CE or so, only looks "dark" from the perspective of western Europe

- Rise of Islam starting with the prophet Muhammad, 570 – 632 CE

- Umayyad caliphate, 661 – 750 CE – Islamic empire extends from Persia to Spain

- Abbasid caliphate 750 – 1258 CE – capital Baghdad, sponsored *Bayt al-Hikma* ("House of Wisdom") included scholars working with Greek, Indian texts, Chinese too?

What actually happened in the "Dark Ages" (according to G. Joseph)