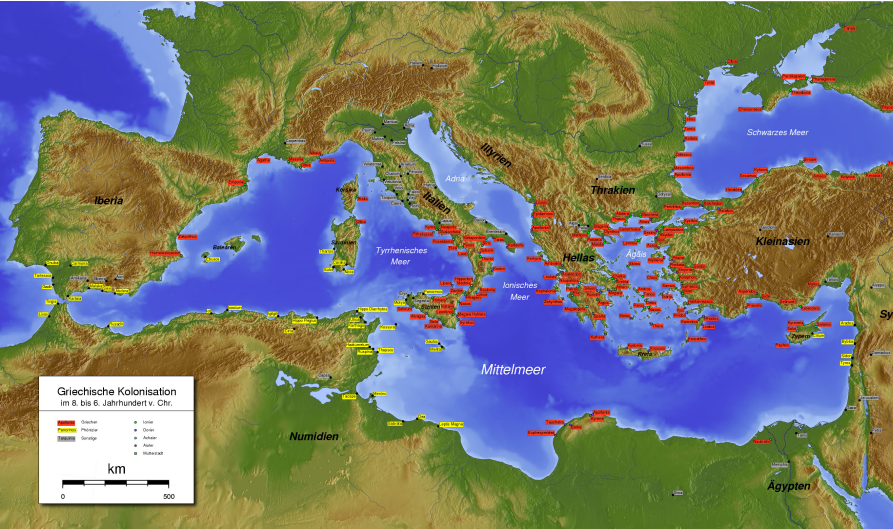


# Greek mathematics

Jan P. Hogendijk

# Map



## Jan's periodisation

Ca. 600 BCE - 350 BCE: early period. Development of deductive reasoning in mathematics. Discovery of irrational ratios. Very little is known in detail. Historians have done their best to reconstruct this period on the basis of later information and fragments.

Ca. 350-150 BCE Hellenistic period. The great Greek geometers: Eudoxus, Euclid, Archimedes, Apollonius. Pure geometry. Important works have been preserved in Byzantine editions (and some in Arabic texts).

ca. 150 BCE - 150 CE: Astronomical period. Hipparchus, Ptolemy. Applied geometry, trigonometry.

ca. 150 -550 CE: Period of decline. Pappus, Diophantus, Theon of Alexandria.

ca. 800-900 CE: A little interest in Greek mathematics in Byzantium (now Istanbul). Oldest extant manuscript of Euclid's *Elements* dates back to this period.

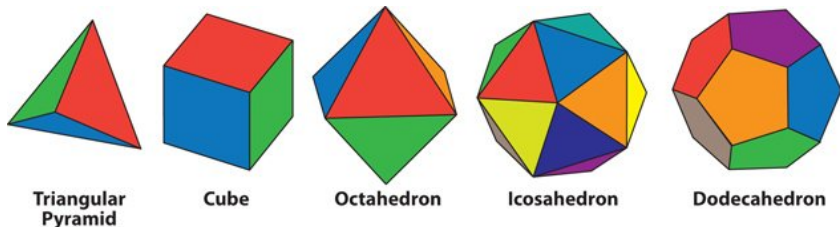
End of Greek mathematics: Hagia Sophia in Istanbul, constructed 532 CE by Anthemius of Tralles and Isidorus of Milete (not the minarets, which were added after 1453 CE)



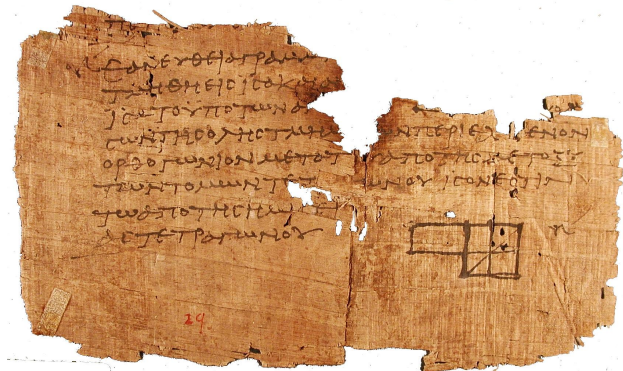
The most important mathematical work of Greek antiquity: Euclid's *Elements*, ca 300 BC. Used for more than 2000 years!

In 13 "Books" (large chapters).

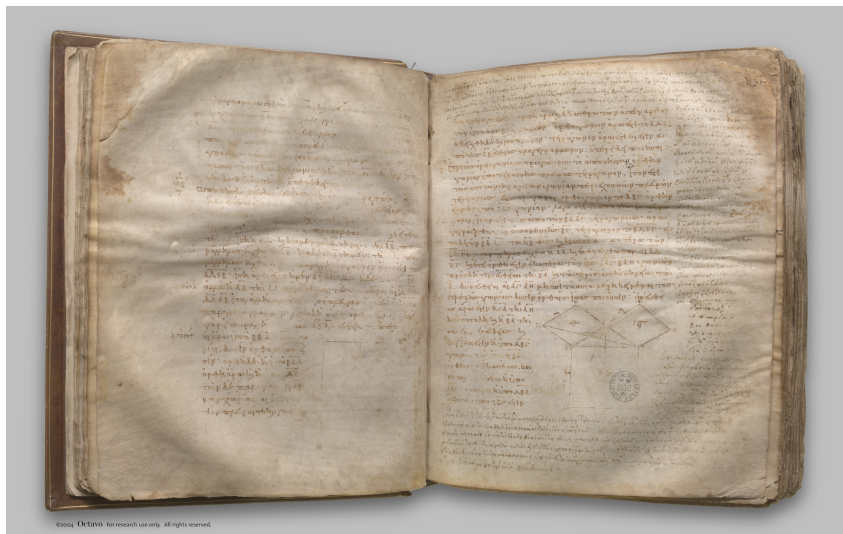
Books 1-4: plane geometry; books 5-6: proportions; books 7-9: (natural) numbers; book 10: irrationalities; books 11-12: three-dimensional geometry; book 13: the five regular polyhedra.



Papyrus fragment of Euclid's *Elements* (from garbage dump in the desert at Oxyrhynchus, Egypt), ca 100 CE



# Oldest extant Greek ms. of Euclid's *Elements*, vellum, from Byzantium, dated 888 CE, now in Oxford.

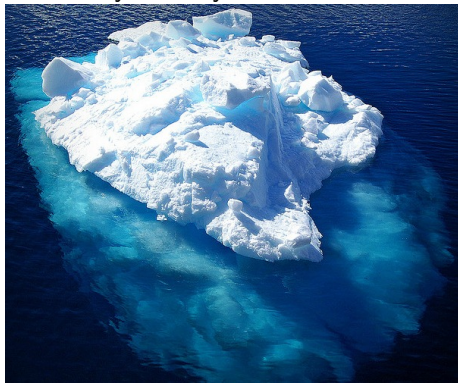






# The iceberg theory of the history of mathematics (and exact sciences) in antiquity and the middle ages

Only part of the scientific achievements of earlier cultures has been preserved. Especially in the case of ancient Greek science, what we know may be only a fraction of what once existed.



# The iceberg theory of the history of mathematics

Early scientists and scribes were not writing for us. They only transmitted what was interesting in their own time.

# The iceberg theory of the history of mathematics

By accident one may find something that does not fit in the general picture

Example: the Antikythera mechanism (made in 200-100 BC), found on the bottom of the sea by a sponge diver in 1900.



If this had not been found, we would never have known that such things (planetariums) existed in Greek antiquity.

Another probable example: medieval portolan charts which are impossibly accurate (the data were probably ancient Roman or Greek)

