BO1 History of Mathematics
Lecture I
Introduction
Part 3: Ancient Greek mathematics

MT 2020 Week 1

Ancient Greek mathematics

Earliest origins of Greek mathematics in 6th century BC

But what do we mean by 'Greek'?

500 BC – 300 BC	Collection of city-states in Greece
300 BC – AD 500	Greek-speaking peoples around the Mediterranean, especially in Alexandria

Some major figures of 'Greek' mathematics

Pythagoras	Samos (Greece)?	c. 600 BC
Euclid	Alexandria (Egypt)?	c. 300 (or 250?) BC
Archimedes	Syracuse (Sicily)	c. 250 BC
Apollonius	Perga (Turkey)	c. 180 BC
Diophantus	Alexandria (Egypt)	c. AD 200

Euclid's *Elements*

The 'elements of geometry' in 13 books, compiled around 300 (250?) BC from existing geometrical knowledge

Books I–VI	plane geometry	points, lines, angles, circles, ...
Books VII–X	properties of numbers	odd, even, square, triangular, prime, perfect, ...
Books XI–XIII	solid geometry	cube, tetrahedron, icosahedron, ...

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David Joyce's Java version of Euclid's *Elements*

Oliver Byrne's colour version of the first six books

Euclid's *Elements*, book I

23 definitions: point, line, surface, angle, circle, ...

5 postulates: what one can do

e.g. a straight line may be drawn between any two points;
a circle may be drawn with given centre and radius

5 'common notions': how one may reason

e.g. if equals are added to equals, then the wholes are equal

48 propositions: each built only on what has gone before

The influence of Euclid's *Elements*

HUGE influence on Western mathematics:

- hundreds of editions and translations from renaissance onwards
- basis of mathematics teaching in schools until c. 1960
- style: definitions—axioms—theorems—proofs
- status of 'Parallel Postulate' led to much investigation and, ultimately, non-Euclidean geometries
- problems of 'ruler and compass' construction inspired much investigation and many new discoveries
- wider cultural importance: http://readingeuclid.org/

Other Greek authors

Archimedes	d. 212 BC:	method of exhaustion and much else
Apollonius	c. 180 BC:	conic sections
Diophantus	c. AD 250:	*Arithmetica* in 13 books (number problems)

Also had HUGE influence on Western mathematics