The beginnings of mathematics in Greece,
by Jenia Tevelev
How was Greek mathematics different from the previous tradition?

- Emphasis on arguments and logic: emergence of “mathematical proof”. Some contributing factors:
  - public debates, democracy
  - trials by jury, orators (future lawyers)
  - philosophy (love of wisdom) advanced critical thinking (questioning everything). The greek root mathema means knowledge.

- Broad education with full mathematics curriculum. Mathematical textbooks.

- Mathematicians are no longer anonymous
Thales (c. 624-547 BCE)

• All sorts of stories recorded much later, or example how he cornered the market on olive oil presses in a year with a bumper crop of olives and made a lot of money.
• Computed the height of a pyramid - how?
• Measuring the distance to a ship
Pythagoras (c. 572-497 BCE)
Math attributed to Pythagoras

• Mathematics of pebbles
Pythagorean theorem

\[ a^2 + b^2 = c^2 \]
Commensurability

Commensurable segments
Incommensurability of the side and the diagonal of the square
School of Athens by Rafael, 1510, Apostolic Palace, Vatican
- Plato founded the Academy in Athens around 387 BCE.
- Flourished until 529 CE when the Emperor Justinian shut it down claiming it was a pagan institution - the Dark Ages have begun - no significant new mathematical discoveries in Europe for almost a thousand years!
- The purpose of the Academy and other “academic venues” was education of the rulers, the elite (one famous example is of Aristotle, who was a mentor of Alexander the Great).
- Mathematics was viewed as “mental gymnastics” rather than a collection of practical skills.
Plato on Mathematics (from the Republic)

http://www-history.mcs.st-and.ac.uk/Extras/Plato_on_mathematics.html

Teaching Methods

The Socratic Method:

WHAT CAN WE SAY ABOUT THIS PHENOMENON?
WELL, WHAT ARE YOUR ASSUMPTIONS?
AND WHAT DO YOU BASE YOUR REASONING ON?

The Sarcastic Method:

OF COURSE IT WON'T BE ON THE TEST. I JUST LECTURED ABOUT IT FOR NO REASON!
I'D BE HAPPY TO RE-GRADE IT. I LOVE WASTING MY TIME!
YES, YOU CAN SUBMIT IT LATE. YOU'RE SPECIAL!

WWW.PHDCOMICS.COM
Is modern-day university education (in general and in math) closer to the Babylonian-style “professional education” or to the Plato’s dictum of “drawing the soul toward truth”? Or is it something else entirely?
Euclid, known as the *Writer of the Elements* and the *Geometer*

By Nino Pasano, 14th century
Located in Florence

by Juseppe Ribera, 1630
Getty Museum (Los Angeles)
• Little is known about the life of Euclid. A common speculation is that he was educated in Athens but taught and worked in Alexandria. There is little evidence to support that.

• The *Elements* went through more editions than any other book in the world except the Bible. Only 100 years ago, every high school student spent many years mastering it.

• So let’s read *The Book*!
Group Discussion

1. Book I of the Elements - what’s in it?
2. Proposition 4.11 (construction of a regular pentagon)
3. Proposition 3.26
4. Proposition 2.11 (golden ratio)
5. Proposition 4.10 (construction of a 36-72-36 triangle)
Jefferson once said in the letter to Adams: “I have given up newspapers in exchange for Tacitus and Thucydides, for Newton and Euclid; and I find myself much the happier.”

One can argue that the argument in the Declaration of Independence is in the style of Euclid. The axioms and common notions: “We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness. – That to secure these rights, Governments are instituted among Men, deriving their just powers from the consent of the governed, – That whenever any Form of Government becomes destructive of these ends, it is the Right of the People to alter or to abolish it, and to institute new Government”

A long laundry list of these destructive acts is submitted: He has refused his Assent to Laws. . . . He has obstructed the Administration of Justice, …

Therefore a new government must be instituted. Q.E.D.
Further Reading

- Plato on Mathematics (from the *Republic*)
  [http://www-history.mcs.st-and.ac.uk/Extras/Plato_on_mathematics.html](http://www-history.mcs.st-and.ac.uk/Extras/Plato_on_mathematics.html)
- *Elements*, by Euclid. On-line hyperlinked version at
  [http://aleph0.clarku.edu/~djoyce/java/elements/](http://aleph0.clarku.edu/~djoyce/java/elements/)