

## Euclid's Proof of the Pythagorean Theorem

- ▼ 1. Greece flourished in the 150 years between Hippocrates & Euclid.
  - ▼ a. Plato (427 BC) and his student Eudoxus (408 BC) led the way
    - i. Many sophists (clever know-it-alls who taught for money) wandered the land - some brilliant, some quacks
    - ii. **Socrates'** disciple was **Plato**, and his student was **Aristotle**
  - ▼ b. Plato traveled until age 40, then founded the Academy in Athens. The intellectual center of the world, headquarters of Greek wisdom.
    - i. Learned from the Pythagoreans in Italy, visited Egypt, etc. Sold as a slave, but then ransomed by his friends.
    - ii. His school is the spiritual ancestor of our institution of higher learning, the land had belonged to the hero Akademos.
    - iii. As was custom, to establish legitimacy the Academy was a "religious brotherhood" worshiping the Muses
    - iv. For 900 years it stood as intellectual center of Greece until 529 AD, was closed b/c it was "pagan" and of "perverse learning"
  - ▼ c. Math was king, Geometry was required for entrance.
    - i. Plato disliked "applied mathematics" and geometric instruments, embracing only the straightedge and compass
  - ▼ d. **Eudoxus** was poor, commuted in to Athens, and had two main pieces of mathematics, was 2nd only to Archimedes
    - ▼ i. Theory of proportion
      - 1. Many proofs of "similar triangles have equal ratios of corresponding sides" required the (false) commensurability of numbers.
      - 2. Eudoxus' devised a proof that did not appeal to commensurability.
      - 3. His proof is found in Book V of the Elements (Euclid didn't prove everything there.)
    - ▼ ii. Method of Exhaustion
      - 1. Main idea of limits/calculus.
      - 2. Archimedes used/credited Eudoxus' idea to find the area of a circle.
  - ▼ e. Alexander the Great & Alexandria
    - i. 332 BC Alex (20 y/o from Macedonia) conquered Egypt, established a new city Alexandria
    - ii. Alexandria grew while Alex "conquered the world" and became the intellectual center
    - iii. 500 K people and 600K (really?) Papyrus rods, Alexandrian Library & Museum > Academy,
    - iv. The Museum (the oldest university) was heaven on earth for thinkers, food, space community.
    - v. Alex conquered Greece, Egypt, most of Asia Minor, and died trying to capture India.
    - vi. Alexandria remained central & powerful for 300 years - the Hellenistic (Greek-like) age, until the Roman Empire.
    - vii. 300 - 100 BC is the 2nd most mathematically productive era ever. #1 = Kepler - Gauss (1600 -1850)
    - viii. Archimedes, Eratosthenes, Apollonius Pappus, Claudius Ptolemy, Diophantus & Euclid all worked here at some time.