

QUADRIVIUM

Assignment 11a: GEOMETRY-II - Geometry in Motion

-Annandale- Tuesday, April 16th
or
-Fishkill- Wednesday, April 24th



Read the following:

-Euclid. *Elements*. Translated by T. L. Heath. 1908. (In Vol. II)

Read these sections from Book I: Carefully read Proposition 15 and follow the logic. Props 27-29 all relate to the deductions from Prop. 15 but they are difficult to follow in their entirety. Props 46-48 are all related to the Pythagorean Theorem, upon which all of trigonometry is formed. These are rather involved proofs, but worth reading over and getting the general idea. Prop. 11 constructs the Golden Ratio, though Euclid doesn't mention it. In a later book he explicitly constructs the Golden Ratio, but Prop. 11 from Book II is the first place he works on it. The "Construction of a Pentagon" homework assignment covers some of the same ground as Prop. 11.

- Prop. 15 (pp. 277-278) Intersecting lines
- Prop. 27 (pp. 307-308) Parallel lines
- Prop. 28 (pp. 309-310) Parallel lines
- Prop. 29 (pp. 311-312) Parallel lines
- Prop. 46 (pp. 347-348) Constructing a square
- Prop. 47 (pp. 349-350) Pythagorean Theorem
- Prop. 48 (pp. 368-369) Pythagorean Thm. extension

Book II

- Prop. 11 (pp. 402-403) Extreme and Mean ratio (Golden Ratio)

-Grant Medieval Sourcebook- Volume II extractions

Read pp. 442-445 from Sacrobosco's (d. ca. 144-1256): *Sphere*. It's in the section titled, "Astronomy, Astrology, and Cosmology." An image sheet precedes this chapter. Several of these images will help with the reading.

-Homework: Do the "Construction of a Pentagon" handout. Turn in the handout with the table filled in, the analysis completed, and the pentagram that you constructed.

Extras: Feel free to draw a human being into your completed pentagram. Also feel free to apply the Golden Spiral or Golden Rectangle or a Pentagon onto any image of your choosing like the ones found at the end of the handout. It makes any image mathematically mystical.

In class exercises:

- 1) Work with the straight-edge-compass (Sort of a beam compass) (pencil and paperclip included)
-label it and practice with it.
- 2) How to make a perpendicular line to a given straight line. (Prop. 11)
Also how to bisect a finite line segment. (Prop. 10)
- 3) How to make an equilateral triangle on a given line segment.
- 4) How to bisect the angle of an equilateral triangle.
- 5) Prop. 12. Figure it out yourselves.

