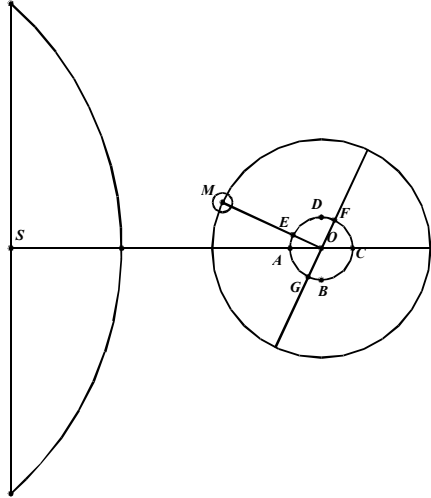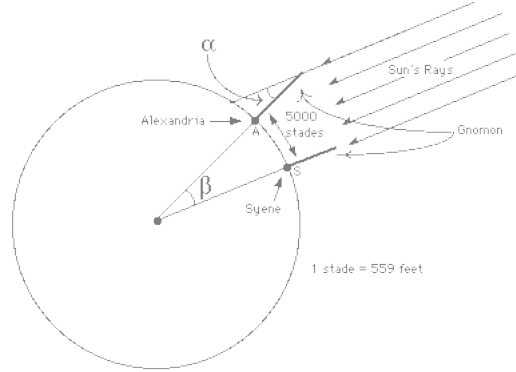Gary Rubinstein garyrubinstein@yahoo.com
Lesson handouts and presentation sketches available at www.garyrubinstein.com/nctm2013
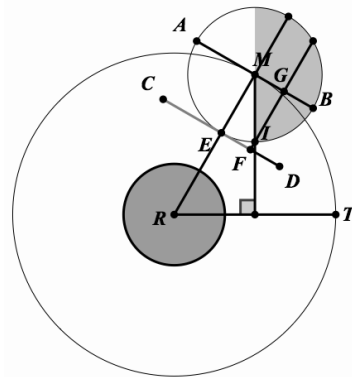A video of this presentation is available at www.garyrubinstein.com/nctm2013
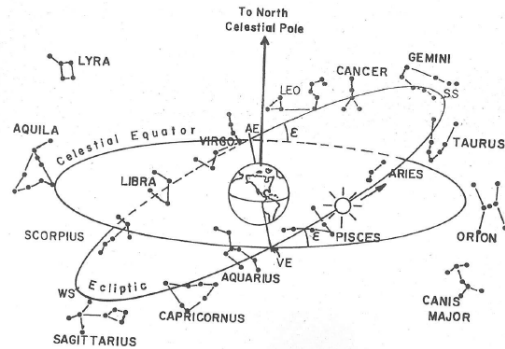
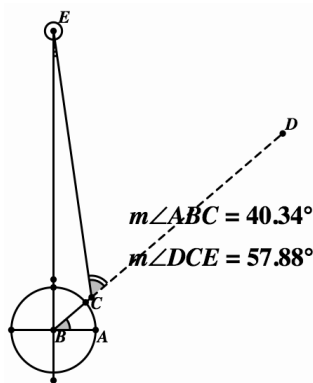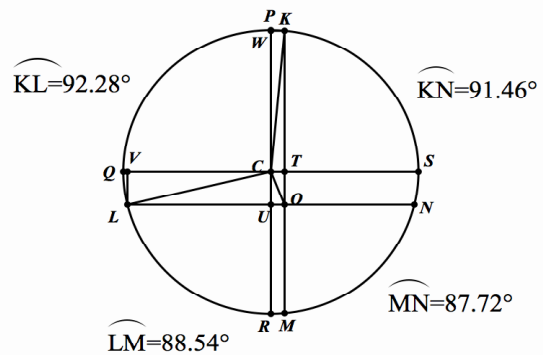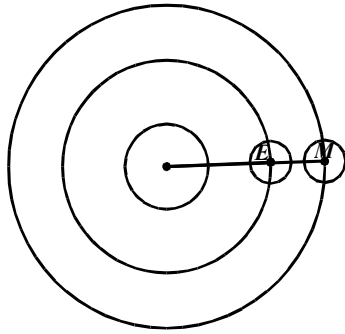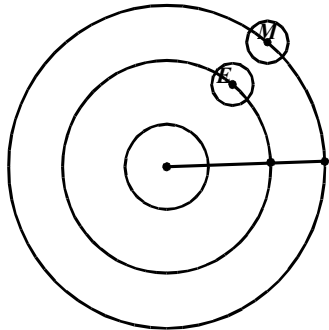| When can the Moon be seen?	Eratosthenes estimates the circumference of The Earth
Calculating the phase of of The Moon	The Celestial Sphere and the Ecliptic circle
Determining latitude at night based on The North Star	Using trigonometry to determine the solar eccentricity

Calculating the period of Mars' Orbit
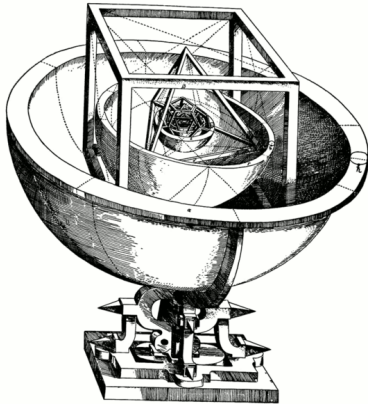
Days = 0.00

Days = 779.62

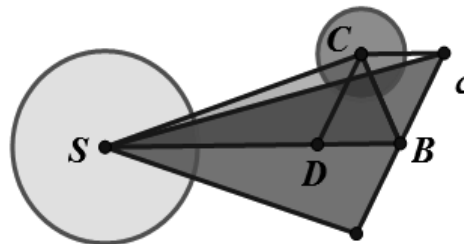Calculating size of the orbit of Mars
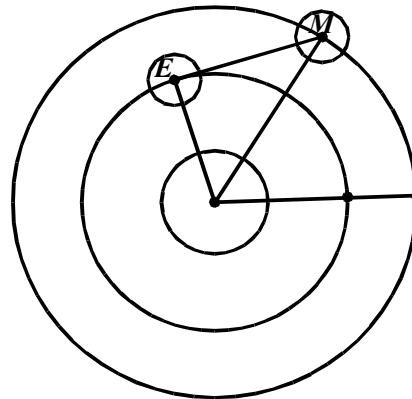
Days = 106.78

Kepler's nested Platonic solids

Newton's explanation of the equal area law

Resources:
Evans, James, The HIstrory and Practice of Ancient Astronomy
Van Brummelen, Glen, The Mathematics of the Heavens and the Earth: The Early History of Trigonometry
Van Brummelen, Glen, Heavenly Mathematics: The Forgotten Art of Spherical Trigonometry
Ryden, Robert, Astronomical Math, Mathematics Teacher, December 1999
Rosenkrantz, Kurt, Copernican Mathematics: Calculating Periods and Distances of the Planets, Mathematics Teacher, September 2004
Mathews, Susann, Where is the Moon Tonight?, Mathematics teaching in the Middle School, May 2006
Astronomy Education at the University of Nebraska-Lincoln www.astro.unl.edu
Sketches were made in Geometer's Sketchpad 5 and Cabri 3D
Astronomy software used was Starry Night. Stellarium is a good free sky simulator