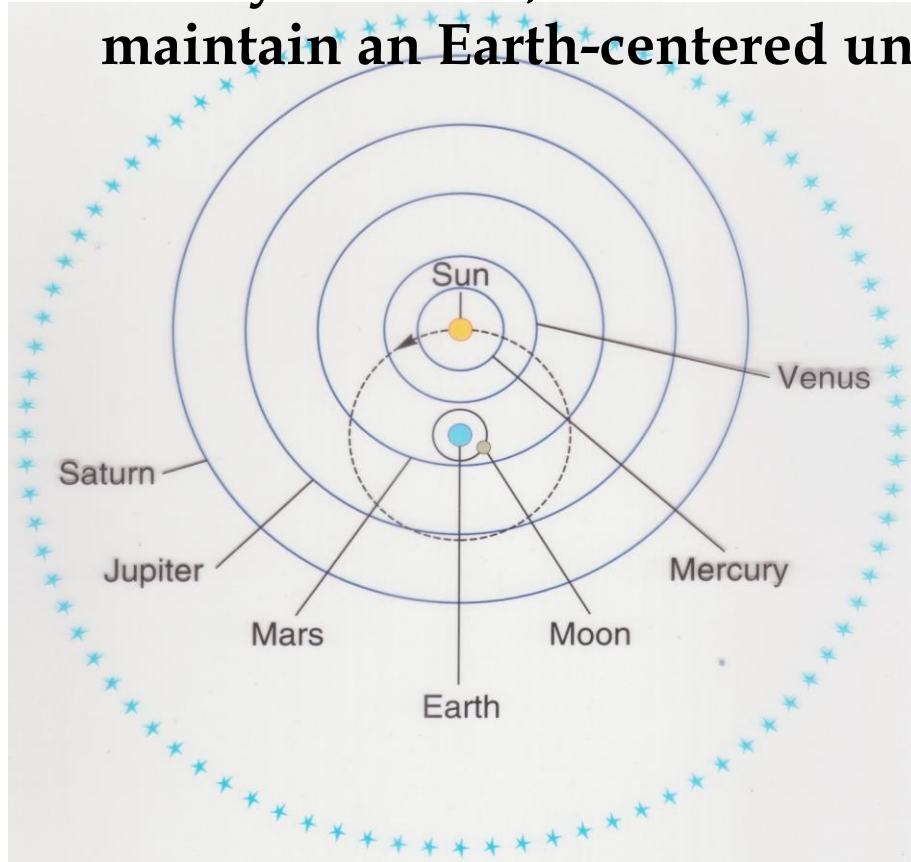
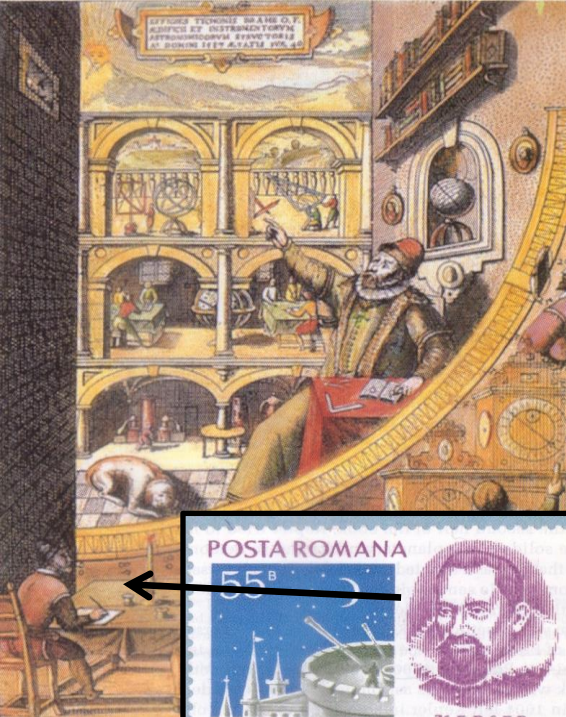


Notes: Kepler's Laws

The model of Tycho Brahe (1570s to 1601)

A Danish nobleman, known for his arrogance and “lordly manners,” that was determined to maintain an Earth-centered universe



Kepler's 1st Law

- The orbits of the planets are ellipses with the sun at one focus.
 - What is an [ellipse](#)?
- What happens to the ellipse if it has “F” and “G” (the foci) in the same location?

Kepler's 1st Law

- As “P” is moved around the orbit, how does the sum of FP and PG change?
- Choose the correct statement, then explain your choice:

All circles are ellipses.

All ellipses are circles.

Kepler's 2nd Law

- A line connecting the planet to the sun will sweep out equal area in equal time
 - Planets move faster when closer to the sun

[Orbital Speed Calculator](#)

- Measure the distance at 10 different locations around the orbit and determine the speed at each location.

Kepler's 3rd Law

- The square of a planet's orbital period is proportional to the cube of its semimajor axis

$$\text{time to orbit}^2 = \text{semi major axis}^3$$

Drawing Orbits in Scale Model

Table 1. Drawing Orbits in Scale Model

Orbit	Loop Circumference (knot to knot)	# pins	Pin 2 from Sun	
			Distance	Angle
Mercury	18 cm	2	3.1 cm	270°
Venus	27 cm	1	--	--
Earth	39 cm	1	--	--
Mars	64 cm	2	5.6 cm	45°
Asteroid Belt: Inner Edge	84 cm	1	--	--
Asteroid Belt: Outer Edge	122 cm	1	--	--
Asteroid Ceres	114 cm	2	8.4 cm	78°
Asteroid 1983RD	118 cm	2	39 cm	173°
Asteroid Icarus	85 cm	2	38 cm	330°