

## OPEN QUESTIONS IN ASTRONOMY, 1642

1. Insofar as Copernican and Tychonic systems are both fully consistent with all accessible astronomical observations and several leading astronomers adhere to the latter, can any decisive evidence be adduced to settle the question whether the Earth is in orbit about the Sun or vice versa?
2. Granted that Kepler's claims about planetary orbital motion hold at least to high approximation, should they be taken to hold (1) for bodies beyond those now known to be orbiting the Sun and (2) for the bodies now known, indefinitely far into the past and future; and should they be taken to hold exactly, or only essentially exactly, or merely approximately; and if they do not hold exactly, should they be regarded as idealizations of some sort, and do they at least hold in the mean?
3. Granted that questions about relative distances of the planets, Sun, and Earth from one another have largely been resolved in units of the mean distance of the Earth from the Sun, what do these distances amount to in earthly units – e.g. in units of the radius of the Earth?
4. Is orbital astronomy *perfectible* at all – i.e. can the motions be mathematically characterized in a way that assures that conclusions drawn about the remote past and the remote future will hold at least to the same level of precision as conclusions about the present era?
5. Can the apparent motion of the Moon be mathematically characterized to the same level of precision as has been achieved for the planets?
6. What are comets, what trajectories do they describe in their observed motions, and are they governed by the same physical processes, whatever those may be, that govern the motions of the planets?

## **“Mechanics”**

### **Classical:**

**Archimedes (ca. 287 B.C. – ca. 212 B.C.)**

### **Medieval:**

**Mertonians (at Oxford, 1320 – 1350)**

**Buridan, Oresme (at Paris, 1340 – 1380)**

### **Italian Renaissance: (16<sup>th</sup> Century)**

**Leonardo da Vinci (1452 – 1519)**

**Tartaglia (1499/1500 – 1557)**

**Benedetti (1530 – 1590)**

**Guido Ubaldo (1545 – 1607)**

### **Dutch:**

**Stevin (1548/49-1620)**

**Beeckman (1588-1637)**

### **The “Science of Machines”**

**(Balance)**

**Lever**

**Screw**

**Pulley**

**Wedge**

**Inclined plane**