Retrograde Motion

from West to East. Relative to the stars, the Moon and Sun always move prograde,

reverse, retrograde motion. But, the planets usually move prograde, but have periods of

Ptolemy's geocentric (Earth-centered) system explained retrograde motion with epicycles – complex, nested circular orbits.

motion with elliptical orbits. Kepler's heliocentric (Sun-centered) system explained retrograde

Kepler's Laws (1600)

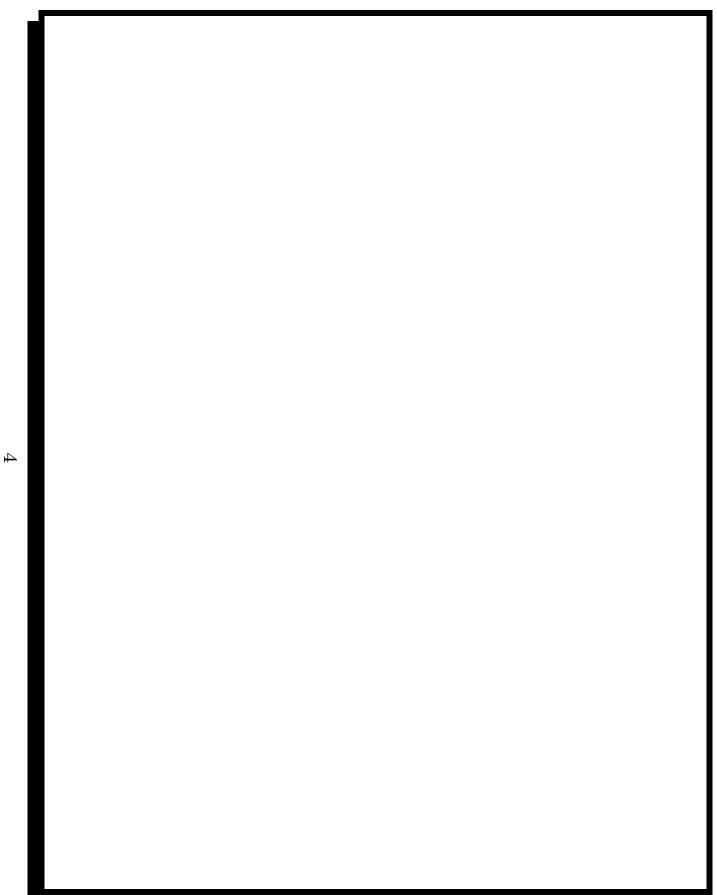
explain why. Three laws that describe the planets' motions, even if they don't

- 1. Each planet moves in an ellipse, with sun at one focus
- 2. Line between sun and planet sweeps out equal area in equal
- 3. $A^3 = P^2$, where A = distance (AU), P = orbital period (years)

Newton's Laws (1700)

formed the basis of the science of Physics. Three laws that explained why the planets move like they do, and

- constant speed in a straight line unless a force acts upon it. 1. A body at rest stays at rest, and a body in motion moves at a
- body. direction of the force and inversely proportional to the mass of the 2. A force acting on a body causes it to accelerate in the
- force acting on another body 3. For every force on a body, there is an equal and opposite



Galileo's Alleged Use for the Telescope

ships and to judge their strength and be ready to chase them, to fight of discovering the ships of the enemy two hours before they can be seen secret and show it only to Your Highness. The telescope was made for to distinguish every movement and preparation." them, or to flee from them; or, in the open country to see all details and with the natural vision and to distinguish the number and quality of the and land enterprises. I assure you I shall keep this new invention a great in the study of Padua, but to write of having decided to present to Your willingness, not only to satisfy what concerns the reading of mathematics before Your Highness, watching carefully, and with all spirit of "Most Serene Prince. Galileo Galilei most humbly prostrates himself the most accurate study of distances. This telescope has the advantage Highness a telescope ("Occhiale") that will be a great help in maritime

Galileo to Prince of Venice Mar 1610

Is the Earth Really Round?

can use the stars, the Sun, mountains, logic, boats – anything you like, but can't leave the Earth's surface to actually look at it. You whether the Earth is round or flat. You can use any technology you In groups of 3-4, come up with an experiment that could determine

been thinking. Can you do better than them? Think about what Columbus, Aristarchus, Galileo, etc. might have