

Philosophy 167: Science Before Newton's PRINCIPIA

Assignment for October 14

Galileo's Two New Sciences: Projectile Motion

Reading:

Galileo, Two New Sciences, "The Third Day," p. [216] to end (i.e. pp. 175-216 in the Drake edition), reading Propositions III-VIII fully and then reading the Propositions, Corollaries, Scholia, and discussions, but skimming over or even ignoring all of the proofs.

---- "The Fourth Day," completely (i.e. pp. 217-260 in the Drake edition).

Questions to Focus On:

1. The Academician's Treatise from which Salviati is reading in "The Third Day" proceeds to develop and prove some 38 Propositions on uniformly accelerated motion. Of what interest or value are these Propositions to anyone other than theoretical mathematicians?
2. Which, if any, of the mathematical results of Galileo's theory of uniformly accelerated motions provide a basis for empirically testing the theory, given the technology available at the time?
3. What assumptions concerning motion are needed in Galileo's proof that the trajectory followed by a projectile in the absence of air resistance is a parabola?
4. In order to identify which parabola a given projectile follows, Galileo needs some way of specifying the relevant conditions at the start of its motion. How does he solve this problem?
5. At the end of the theory of projectile motion, Galileo provides three tables relating different features of the trajectory. How might one test these tables? How might the tables serve as a basis for testing the overall theory?
6. The theory of local motion presented in the last half of Two New Sciences includes two of the cornerstone "laws" of modern kinematics, the laws of free-fall and projectile motion. How compelling is the evidence that is presented in the book for these two laws?