Philosophy 167: Science Before Newton's PRINCIPIA

Assignment for November 25

Newton's Early Unpublished Work in Mechanics

Reading:

Newton, Isaac, "On Circular Motion," from Herivel, The Background to Newton's Principia, pp. 195-198.

-------, "On Motion in a Cycloid," ibid., pp. 203-207.

-------, "The Laws of Motion," ibid., pp. 208-218.

-------, Excerpts from the manuscript "De Gravitatione et aequipondio fluidorum," ibid., pp. 226-235.

Wilson, "From Kepler's Laws, So-Called, to Universal Gravitation: Empirical Factors," pp. 136-147.

Questions to Focus On:

1. **How does Newton's treatment of circular motion differ from Huygens's? To what extent do the differences reflect their being preoccupied with different problems?**

2. **What physical principles does Newton take to be axiomatic in his proof that motion along a cycloid is isochronous? What is it about the cycloid that makes it more readily amenable to a solution than the large arc pendulum?**

3. **Which "laws of motion" does Newton take to be fundamental -- i.e. axiomatic -- in his paper on impact? How do these differ from Descartes' laws?**

4. **How does Newton's theory of the motion of bodies under impact differ from Huygens's? What are the differences attributable to?**

5. **What was Newton getting at in the so-called Moon test of the late 1660's? In particular, how would he have then proceeded if the test had been successful -- i.e. if he had used the more accurate measure of the radius of the earth that Picard obtained during the 1670's?**

6. **Exactly what objections is Newton lodging against Descartes' "imaginings" in "De Gravitatione et aequipondio fluidorum" ("On the Gravity and Equilibrium of Fluids")? To what extent are these objections based on empirical considerations?**