

A Philosophical Point: Orbits Exist

In the process of explaining orbits a philosophy resonates in the background. The struggle between empirical and *a priori* knowledge yields an insight into the nature of force and space. Consider the fundamental chapter concerning the *a priori* demonstration that equal areas are swept in equal times. An assumption was made, although it was not stated. It was assumed that for a body that was sweeping past a central attracting body, the force of attraction was not strong enough to pull the sweeping body all the way to the central body in an instant. This was clearly an assumption; if we had no experience to guide us, we could have proposed that attractive forces were so strong that a central body would always cause a sweeping body to "land". If true, all the geometry presented in the proof of equal areas swept in equal times would become invalid since the triangles of area swept would vanish. But one may validly state that this can not always be the case regardless of what experience might tell us; no matter how strong the centrally attractive force may be, the distance of the sweeping body can be made great enough

so that it will orbit and not land on its central body. This is the crux of the *a priori* nature of orbits; all that is necessary is a proper "match" between relatively large distances and relatively small forces. To prove that this is valid, consider the converse proposition regarding the strength of attractive force; if attractive force were so great that even at infinite distances the sweeping body would land on the central body, then there would be no possibility for orbits. There would be no possibility for things to be separate. The universe would be an infinitely small point in space where all matter would reside. There would be no need for explanations since we would all be one and the same entity. Apparently, since explaining exists, attractive forces must not always be infinitely strong. Orbits exist.