

Week 87 (5/10/04)

Leaving the hemisphere

A point particle of mass m sits at rest on top of a frictionless hemisphere of mass M , which rests on a frictionless table, as shown. The particle is given a tiny kick and slides down the hemisphere. At what angle θ (measured from the top of the hemisphere) does the particle lose contact with the hemisphere?

In answering this question for $m \neq M$, it is sufficient for you to produce an equation that θ must satisfy (it will be a cubic). However, for the special case of $m = M$, this equation can be solved without too much difficulty; find the angle in this case.

