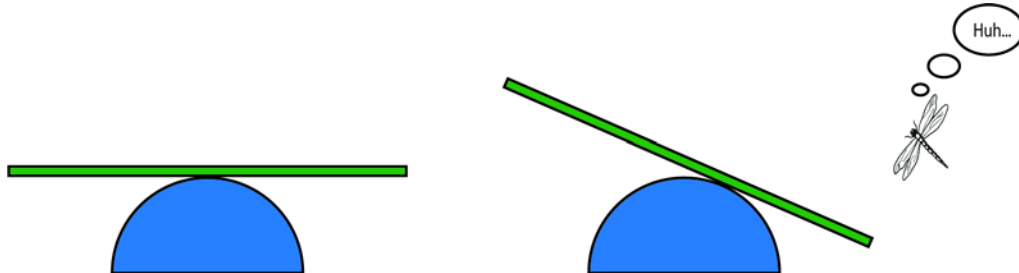# 2019 Physics Prize Problem
Teeter-totter

A teeter-totter consists of a thin uniform beam of length $4R$ balanced atop a hemisphere of radius R that is fixed in position, in a uniform gravitational field g. Show that the oscillations of the beam about its equilibrium position are approximately simple harmonic for small oscillations, and find the period (in units of $\sqrt{R/g}$). Then find the period of oscillations having an amplitude of $30°$, measured between the beam and the horizontal, as accurately as possible. Assume that the hemisphere is sufficiently rough that the beam rolls on it without slipping.