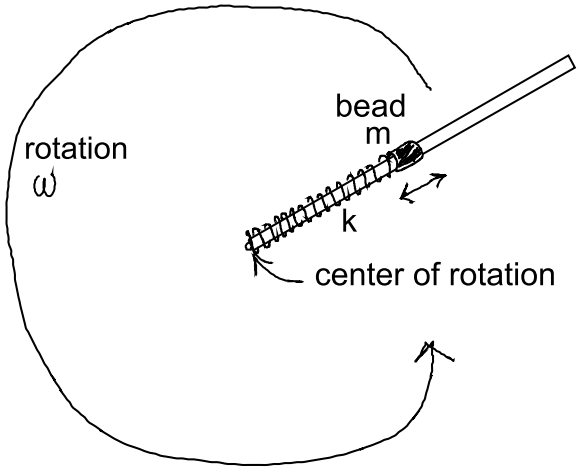
Please provide your solutions on a separate sheet of paper provided.
Write your name down first, on that sheet!
You can keep this sheet.

15 minutes.

A bead is constrained to move, without friction, along a solid wire. The bead is connected to a spring with the spring constant k and the equilibrium length l (when the spring is at rest). The spring wraps tightly around the wire, without any friction between the spring and the wire. The wire is rotating at a constant angular velocity ω due to some outside mechanism.



(a) Find the Lagrangian, the Hamiltonian and the effective potential.

(b) Give precise (read, quantitative) physical explanation of each term in the effective potential (there are two terms), by assuming that you are a resident in the reference frame of the rotating wire.