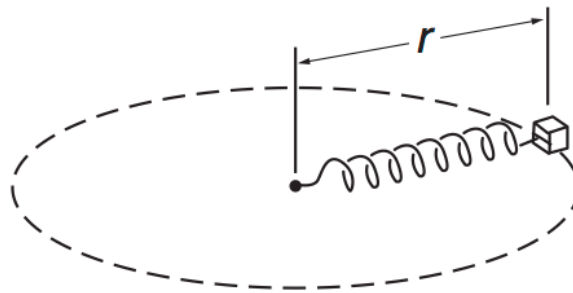


## Tutorial 7

**Problem 1.** (K. & K. 10.2.) A particle of mass 50 g moves under an attractive central force of magnitude  $4r^3$  dynes. The angular momentum is equal to  $1000 \text{ g cm}^2/\text{s}$ .

1. Find the effective potential energy.
2. Indicate on a sketch of the effective potential the total energy for circular motion.
3. The radius of the particles orbit varies between  $r_0$  and  $2r_0$ . Determine  $r_0$ .

**Problem 2.** (K. & K. 10.5.)



A 2 kg mass on a frictionless table is attached to one end of a massless spring. The other end of the spring is held fixed by a frictionless pivot. The spring constant is 3 N/m. The mass moves in a circle and has a total energy of 12 J.

1. Find the radius of the orbit and the velocity of the mass.
2. The mass is struck by a sudden sharp blow, given it an instantaneous velocity of 1 m/s radially outward. Show the state of the system before and after the blow on a sketch of the energy diagram.
3. For the new orbit, find the maximum and minimum values of  $r$ .