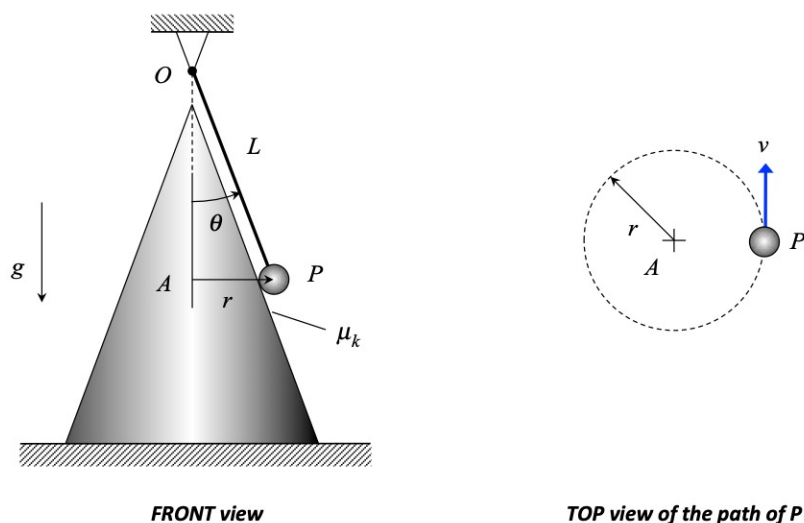


## Homework H.4.B

**Given:** Particle P (of mass  $m$ ) is attached to an inextensible cable, with the opposite end of the cable being attached to a fixed pin O. P is also constrained to move along the rough surface of a right circular cone, with P following a circular path of radius  $r$ . The coefficient of kinetic friction between P and the cone is known to be  $\mu_k$ . The angle of cable OP with respect to the vertical is known to be  $\theta$ . At a particular instant in time, P is moving with a speed of  $v$ .

**Find:** For this instant in time,

- Determine the normal component of force of the cone acting on particle P.
- Determine the rate of change of speed of particle P.



Use the following parameters in your analysis:  $\mu_k = 0.3$ ,  $m = 10$  kg,  $\theta = 36.87^\circ$ ,  $r = 0.5$  m and  $v = 1.5$  m/s.