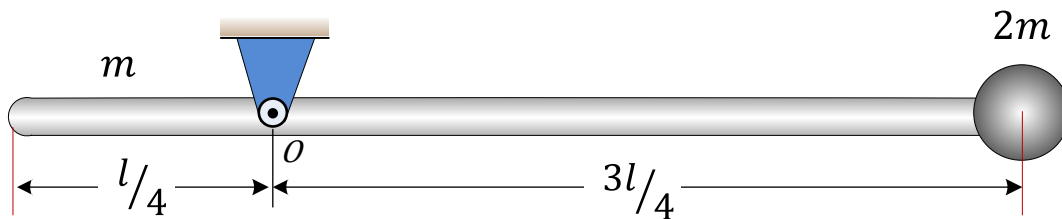


**MMAN2300 Engineering Mechanics 2**  
**Part B: Rigid Body Dynamics**  
**Problem solving session – 6**  
**WEEK 12\_S2\_2018**

**Question 1:**

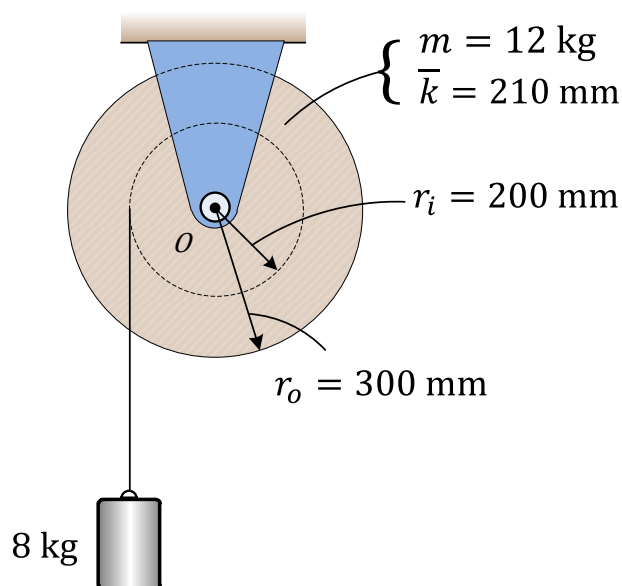
The slender rod of mass  $m$  and length  $l$  has a particle (negligible radius, mass  $2m$ ) attached to its end. If the body is released from rest when in the position shown, determine its angular velocity as it passes the vertical position.



$$[\omega = 1.66 \sqrt{\frac{g}{l}} \text{ CW}]$$

**Question 2:**

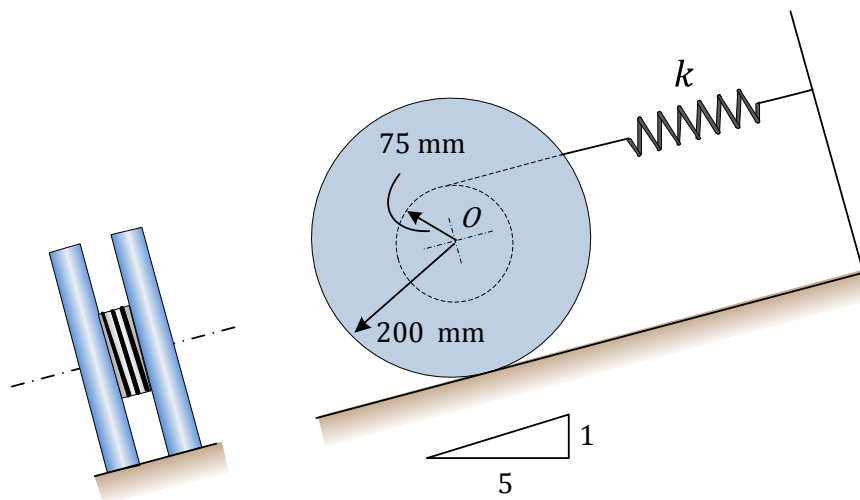
The velocity of the 8 kg cylinder is 0.3 m/s at a certain instant. Find its speed  $v$  after dropping an additional 1.5 m. The mass of the grooved drum is 12 kg, its centroidal radius of gyration is  $k = 210$  mm, and the radius of the groove is  $r_i = 200$  mm. The frictional moment at  $O$  is a constant 3 N.m.



$$[v_2 = 3.01 \text{ m/s}]$$

### Question 3:

The 10 kg double wheel with radius of gyration of 125 mm about  $O$  is connected to the spring of stiffness  $k = 600 \text{ N/m}$  by a cord which is wrapped securely around the inner hub. If the wheel is released from rest on the incline with the spring stretched 225 mm, calculate the maximum velocity  $v$  of its centre  $O$  during the ensuing motion. The wheel rolls without slipping.



$$[v_{max} = 1.325 \text{ m/s}]$$