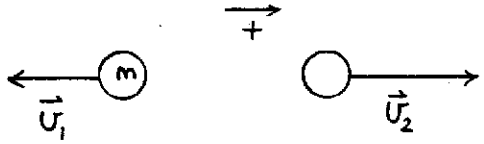
1996/7 TEST 2

B1.



Impulse - Momentum Theorem

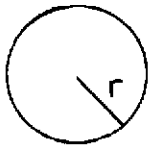
$$\vec{F}\Delta t = \Delta\vec{p}$$

Choose to right as +ve direction

$$\vec{F} = \frac{\Delta\vec{p}}{\Delta t} = \frac{\vec{p}_2 - \vec{p}_1}{\Delta t} = \frac{m\vec{v}_2 - m\vec{v}_1}{\Delta t} = \frac{m(\vec{v}_2 - \vec{v}_1)}{\Delta t}$$

$$\vec{F} = \frac{(0.0650\,kg)(26.0\,m/s - (-15.0\,m/s))}{0.0200\,s} = \boxed{133\,N}$$

B2.

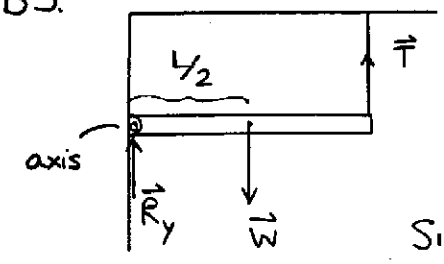


For no slipping, $v_{trans} = v_{tangential} = r\omega$

$$v_{trans} = r\omega = (0.700\,m)(6.30\,rad/s)$$

$$v_{trans} = \boxed{4.41\,m/s}$$

B3.



Equilibrium, so $\Sigma\vec{F} = 0$ and $\Sigma\tau = 0$

Calculate τ's about pivot point.

Let L = length of pole.

Since pole is uniform, CG at $L/2$.

$$\Sigma\tau = TL - W\left(\frac{L}{2}\right) = 0 \Rightarrow T = \frac{W}{2} = \frac{mg}{2}$$

$$T = \frac{(15.0\,kg)(9.80\,m/s^2)}{2} = \boxed{73.5\,N}$$