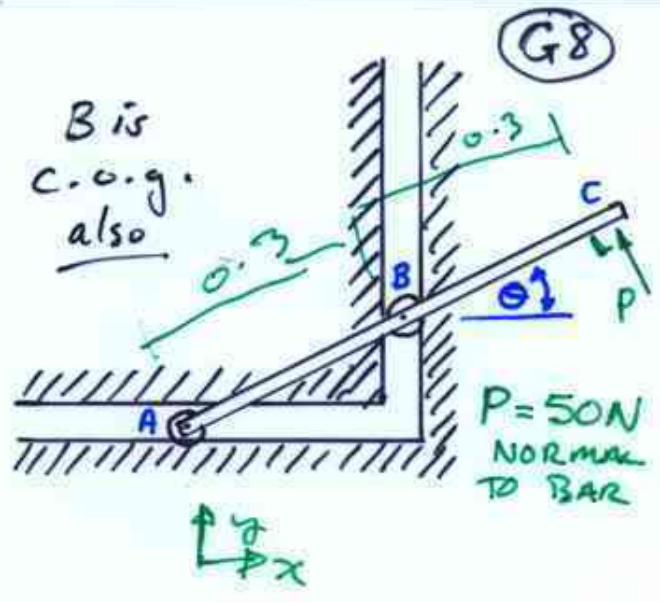


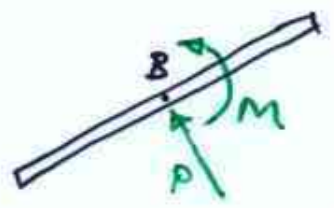
EXAMPLE Q. 6/150

CONSTRAINED MOTION
 BAR LENGTH = 600 mm
 MASS = 4 kg

starts @ $\theta = 0$
 find velocity v at which
 A will strike vertical support.
 at $\theta = 90^\circ$.



Replace force P by a force + couple @ B



$M = (50)(0.3) = 15\text{Nm}$

$U_{1-2} = \Delta T + \Delta V_g$ no Ve term

ΔV_g is easy ... $\Delta V_g = mg \Delta h = (4)(9.81)(0.3) = \underline{11.77\text{J}}$

ΔT NEEDS A LITTLE MORE THOUGHT.

when $\theta = 90^\circ$ center of mass is STATIC
 OBVIOUSLY $v_{Ax} = 0$... kinematics
 $v_{Ay} = 0$ because it is @ peak of curve

$\therefore \Delta T = \frac{1}{2} I_B \omega^2 = \frac{1}{2} \left(\frac{1}{12} (4) (0.6)^2 \right) \omega^2$

v_A is vel of A $\Rightarrow \omega = \frac{v_A}{0.3}$ SUBSTITUTE IN.

$\Delta T = 0.667 v_A^2$ $v = r\omega$

$U_{1 \rightarrow 2} = \int_1^2 \vec{F} \cdot d\vec{r} + \int M d\theta$

$= \int_0^{0.3} 50 \cos \theta dy + \int_0^{\frac{\pi}{2}} 15 d\theta$

$\int_0^{0.3}$
 $\int_0^{\frac{\pi}{2}}$

$50 \cos \theta$
 15

dy
 $d\theta$

M

