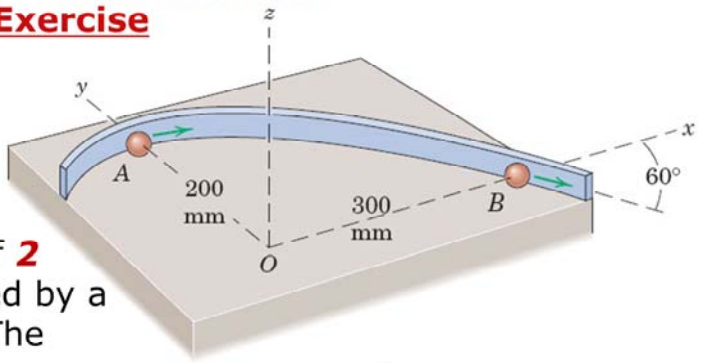
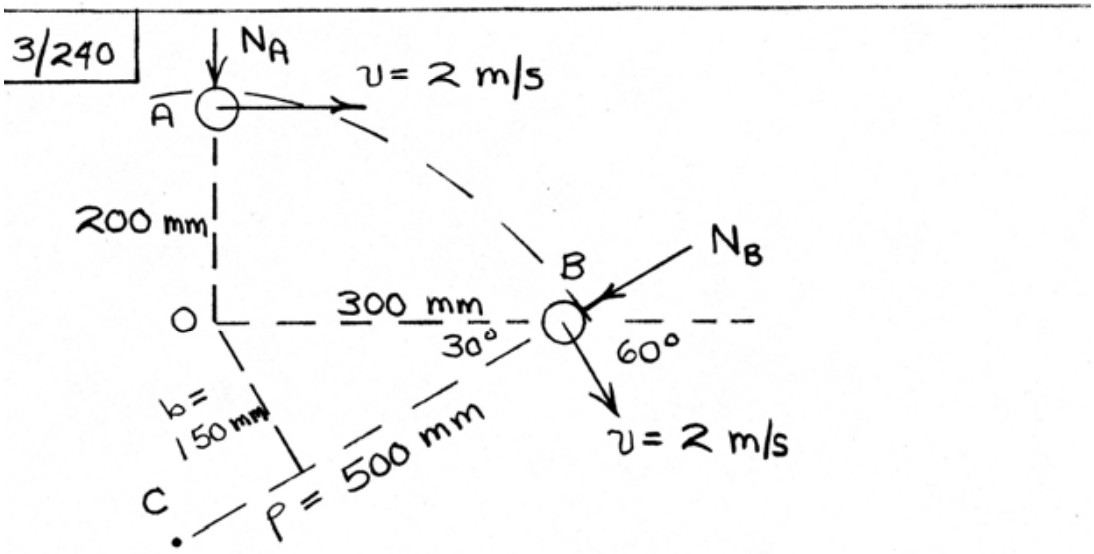
Angular Impulse-Momentum: Yet Another Exercise



A ***0.1-kg*** particle with a ***velocity*** of ***2 m/s*** is guided by a curved rail. The ***radius of curvature*** of the rail at ***B*** is ***500 mm***.

Determine the ***time rate of change*** of the ***angular momentum*** H_O about the ***z-axis*** through ***O*** at both ***A*** and ***B***.



$\Sigma M_{O_z} = \dot{H}_{O_z}$:

At A, $\Sigma M_{O_z} = 0$, so $\dot{H}_{O_z} = 0$

At B, $\Sigma M_{O_z} = -N_B b$, where $N_B = m\frac{v^2}{\rho} = 0.1\,\frac{2^2}{0.5}$

$= 0.8$ N

So $\dot{H}_{O_z} = -N_B b = -0.8(0.150) = -0.120$ N·m

(or -0.120 kg·m²/s²)