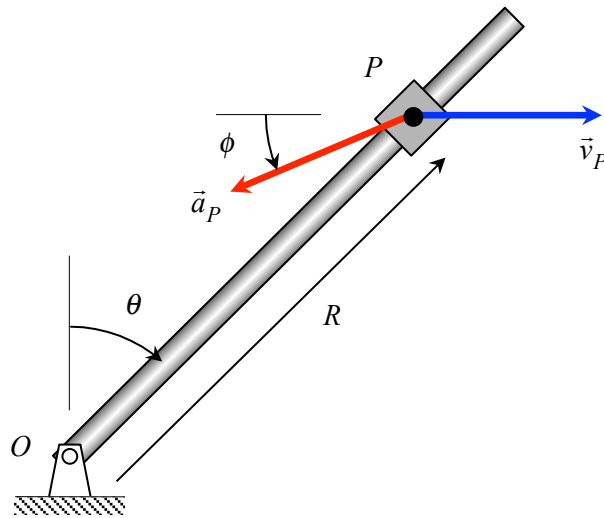


Homework H1.F

Given: Particle P is able to slide along an arm that is rotating about end O. At the instant shown, the arm is at an angle of θ measured clockwise from the vertical, the velocity of P is known to be horizontal, and the acceleration of P is in a direction defined by the angle ϕ from the horizontal, all as shown in the figure.

Find: For position of $\theta = 30^\circ$:

- show the position of P and the polar unit vectors \hat{e}_R and \hat{e}_θ , along with \vec{v}_P and \vec{a}_P , in a sketch.
- determine numerical values for \dot{R} , \ddot{R} , $\dot{\theta}$ and $\ddot{\theta}$.



Use the following parameters in your work: $\phi = 20^\circ$, $R = 2\text{m}$, $|\vec{v}_P| = 8\text{ m/s}$ and $|\vec{a}_P| = 20\text{ m/s}^2$.