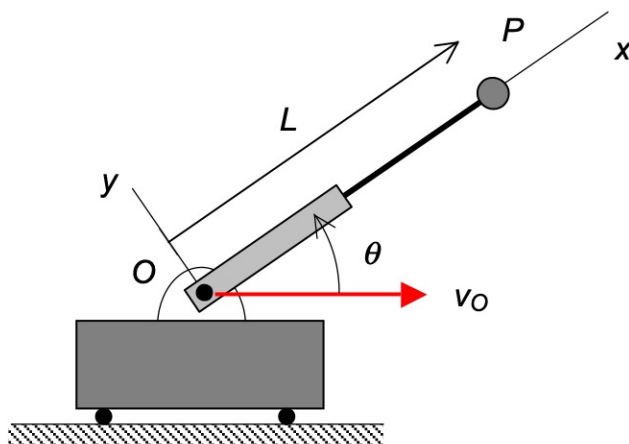


newpage **Homework H.3.A**

**Given:** A telescoping arm  $OP$  is pinned to a cart at end  $O$ . The cart moves along a horizontal surface with a constant speed of  $v_O$ . The angle of the arm,  $\theta$ , is increasing at a constant rate of  $\dot{\theta}$  and is extending at a rate of  $\dot{L}$ . The  $xyz$  coordinate system is attached to the telescoping arm with its origin at end  $O$  of the arm.

**Find:** For this problem:

- Determine the velocity and acceleration of particle  $P$ . Express your answers as vectors in terms of their  $x$ - $y$  components.
- Make a sketch of the velocity and acceleration vectors found above.



Use the following parameters in your analysis:  $\theta = 90^\circ$ ,  $v_O = 6$  m/s,  $\dot{\theta} = 5$  rad/s,  $L = 2$  m,  $\dot{L} = 0$  m/s, and  $\ddot{L} = 3$  m/s<sup>2</sup>.