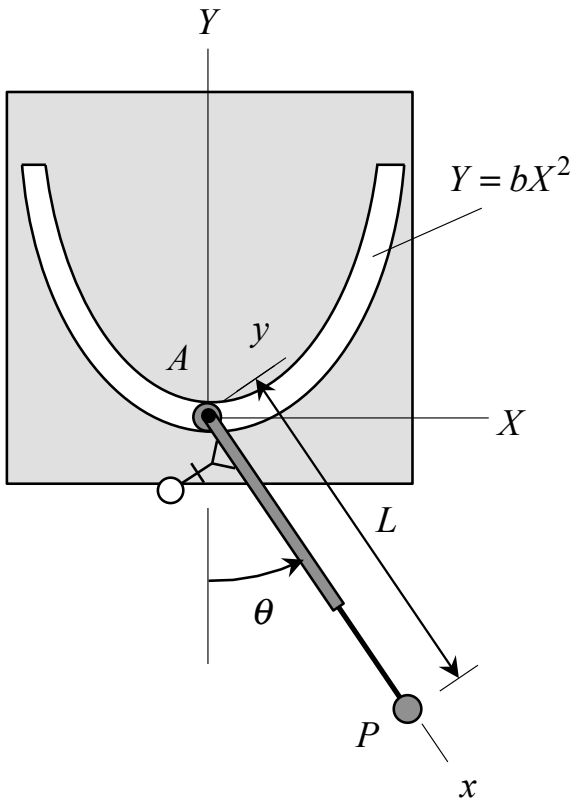
Homework H.3.B

Given: End A of the telescoping rod AP is constrained to move within a curved slot that defines a path of $Y = bX^2$ for A, where X and Y are given in feet. A is known to move through the slot with a constant x-component of velocity of $\dot{X}$. In addition, AP rotates with a constant rate of $\dot{\theta}$, and AP extends at a constant rate $\dot{L}$. At the instant shown, A is located at $X = 0$. A set of xyz-coordinate axes are attached to AP, as shown.

Find: At the instant shown, determine the velocity and acceleration of P. Write your answers in terms of their x- and y-components.

HINT: Consider using an observer attached to the non-extending section of arm AP, as shown in the figure.



Use the following parameters in your analysis: $b = 2/\text{ft}$, $\dot{X} = 6$ ft/s, $\theta = 30°$, $\dot{\theta} = 5$ rad/s, $L = 2$ ft and $\dot{L} = 10$ ft/s.

