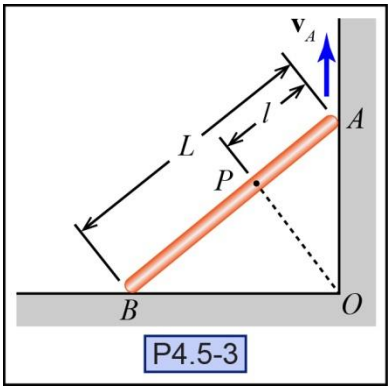
P4.5-3) Rod AB contacts a wall and floor as shown in the figure. If these contacts are not broken and the velocity of end A is constant upward, prove that the acceleration of point P is always perpendicular to the line drawn from O to A.



P4.5-3

Given:

Find:

Solution:

Draw, on the figure, the directions of the angular velocities and angular accelerations. Include a coordinate system.

Velocity

Solve for the angular velocity of the bar by relating the velocity of A to the velocity of B.

Hint: remember to apply the geometric constraints.

ω = _____

Acceleration

Solve for the angular acceleration of the bar by relating the acceleration of A to the acceleration of B.

α = _____

Calculate the acceleration of point P.

$\mathbf{a}_P$ = _____

Is $\mathbf{a}_P$ perpendicular to the line drawn from O to A?

Yes No