University Physics 1A

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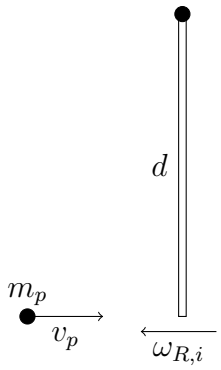
Angular Momentum

Angular Momentum:

$$L = I\omega = \vec{r} \times m\vec{v}$$

Example

A thin rod of mass M_R and length d is pivoted at one end and can rotate without friction along a horizontal surface. The diagram is a top view. Initially it is rotating clockwise at $\omega_{R,i}$. A piece of putty of mass m_p slides without friction toward the end of the rod as shown with a speed of v_p. The putty collides and sticks to the rod at the very end. What is the final angular velocity of the rod and putty?



$$
\begin{aligned}
I_{rod}\omega_{R,i} - (dm_p v_p) &= I_{rod\ and\ putty}\omega_f \\
\frac{1}{3}M_R d^2 - dm_p v_p &= (\frac{1}{3}M_R d^2 + m_p d^2)\omega_f \\
\omega_f &= \frac{\frac{1}{3}M_R d^2 - dm_p v_p}{\frac{1}{3}M_R d^2 + m_p d^2}
\end{aligned}
$$

You can find all my notes at `http://omgimanerd.tech/notes`. If you have any questions, comments, or concerns, please contact me at alvin@omgimanerd.tech