

12.48. Model: The bar is a rotating rigid body. Assume that the bar is thin.

Visualize: Please refer to Figure EX12.48.

Solve: The angular velocity $\omega = 120 \text{ rpm} = (120)(2\pi)/60 \text{ rad/s} = 4\pi \text{ rad/s}$. From Table 12.2, the moment of inertial of a rod about its center is $I = \frac{1}{12}ML^2$. The angular momentum is

$$L = I\omega = \left(\frac{1}{12}\right)(0.50 \text{ kg})(2.0 \text{ m})^2(4\pi \text{ rad/s}) = 2.1 \text{ kg m}^2/\text{s}$$

If we wrap our fingers in the direction of the rod's rotation, our thumb will point in the z direction or out of the page. Consequently,

$$\vec{L} = (2.1 \text{ kg m}^2/\text{s}, \text{ out of the page})$$