91. The center of mass is initially at height $h = \frac{L}{2}\sin 40^\circ$ when the system is released (where $L = 2.0$ m). The corresponding potential energy Mgh (where $M = 1.5$ kg) becomes rotational kinetic energy $\frac{1}{2}I\omega^2$ as it passes the horizontal position (where I is the rotational inertia about the pin). Using Table 11-2(e) and the parallel axis theorem, we find $I = \frac{1}{12}ML^2 + M(L/2)^2 = \frac{1}{3}ML^2$. Therefore,

$$Mg\frac{L}{2}\sin 40^\circ = \frac{1}{2}\left(\frac{1}{3}ML^2\right)\omega^2 \quad \Longrightarrow \quad \omega = \sqrt{\frac{3g\sin 40^\circ}{L}}$$

which yields $\omega = 3.1$ rad/s.