28. (a) With $\vec{p} = m\vec{v} = -16\,\hat{\mathrm{j}}$ kg · m/s, we take the vector cross product (using either Eq. 3-30 or, more simply, Eq. 12-20 and the right-hand rule):

$$\vec{\ell} = \vec{r} \times \vec{p} = -32\,\hat{\mathrm{k}}\ \mathrm{kg{\cdot}m^2/s}\ .$$

(b) Now the axis passes through the point $\vec{R} = 4.0\,\hat{\mathrm{j}}$ m, parallel with the z axis. With $\vec{r}\,' = \vec{r} - \vec{R} = 2.0\,\hat{\mathrm{i}}$ m, we again take the cross product and arrive at the same result as before:

$$\vec{\ell}\,' = \vec{r}\,' \times \vec{p} = -32\,\hat{\mathrm{k}}\ \mathrm{kg{\cdot}m^2/s}\ .$$

(c) Torque is defined in Eq. 12-14: $\vec{\tau} = \vec{r} \times \vec{F} = 12\,\hat{\mathrm{k}}$ N·m.

(d) Using the notation from part (b),

$$\vec{\tau}\,' = \vec{r}\,' \times \vec{F} = 0\quad .$$