

► **Example 7.11** What is the moment of inertia of a rod of mass  $M$ , length  $l$  about an axis perpendicular to it through one end?

**Answer** For the rod of mass  $M$  and length  $l$ ,  $I = Ml^2/12$ . Using the parallel axes theorem,  $I' = I + Ma^2$  with  $a = l/2$  we get,

$$I' = M \frac{l^2}{12} + M \left( \frac{l}{2} \right)^2 = \frac{Ml^2}{3}$$

We can check this independently since  $I$  is half the moment of inertia of a rod of mass  $2M$  and length  $2l$  about its midpoint,

$$I' = 2M \cdot \frac{4l^2}{12} \times \frac{1}{2} = \frac{Ml^2}{3}$$