

37. The particles are treated “point-like” in the sense that Eq. 11-26 yields their rotational inertia, and the rotational inertia for the rods is figured using Table 11-2(e) and the parallel-axis theorem (Eq. 11-29).

(a) With subscript 1 standing for the rod nearest the axis and 4 for the particle farthest from it, we have

$$\begin{aligned} I &= I_1 + I_2 + I_3 + I_4 \\ &= \left(\frac{1}{12} M d^2 + M \left(\frac{1}{2} d \right)^2 \right) + m d^2 + \left(\frac{1}{12} M d^2 + M \left(\frac{3}{2} d \right)^2 \right) + m (2d)^2 \\ &= \frac{8}{3} M d^2 + 5 m d^2 . \end{aligned}$$

(b) Using Eq. 11-27, we have

$$K = \frac{1}{2} I \omega^2 = \left(\frac{4}{3} M d^2 + \frac{5}{2} m d^2 \right) \omega^2 .$$