Answer on Question #56956-Physics-Mechanics-Relativity

Two particles with masses 2.3 kg and 6.6 kg are connected by a light rod of length 3.5 m. Find the moment of inertia of the system about an axis perpendicular to the rod and passing through:

a) the midpoint of the rod;

(I already found the answer for this one: 27.26 kg∗m^2)

but I don't know how to find the answer for b)

b) the center of mass of the system of particle

Solution

According to the theorem of parallel axis

$$I_{mp} = I_{cm} + Ma^2 \to I_{cm} = I_{mp} - Ma^2,$$

where $M = 2.3 + 6.6 = 8.9\ kg$ and a is the distance between the midpoint of the rod and the center of mass of the system of particle.

$$a = \frac{2.3 \cdot \left(-\frac{3.5}{2}\right) + 6.6 \cdot \left(\frac{3.5}{2}\right)}{8.9} = 0.8455\ m.$$

$$I_{cm} = 27.26 - 8.9(0.8455)^2 = 20.89\ kgm^2.$$