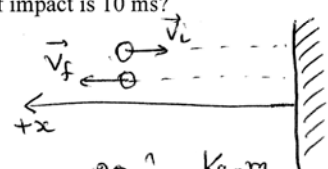


Physics 101Rec
Quiz#7-8-Sect 05
Chapter 9-10

Name: Key Id: _____

1. A 0.5 kg ball moving along the positive x direction strikes a vertical wall with a speed of 20 m/s and bounces off with the same speed. What is magnitude and direction of the average force of the wall on the ball during impact if the time of impact is 10 ms?

$$\begin{aligned} \Delta \vec{p} &= \vec{p}_f - \vec{p}_i \\ &= m (\vec{v}_f - \vec{v}_i) \end{aligned}$$


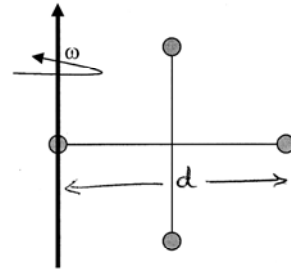
$$= 0.5 (20 \hat{i} + 20 \hat{i}) = 20 \hat{i} \text{ Kg}\cdot\frac{\text{m}}{\text{s}}$$

$$\vec{F}_{\text{avg}} = \frac{\Delta \vec{p}}{\Delta t} = + \frac{20}{0.01} \hat{i} = \boxed{2000 \hat{i}} \text{ (N)}$$

magnitude = 2000N
direction to the left!

2. Find the rotational kinetic energy of the system of particles shown in the figure if it is rotating at 5 rad/s. Each rod is massless and has a length 4 m and each ball has a mass of 0.5 kg.

$$\begin{aligned} I &= \sum_{i=1}^4 m_i r_i^2 = m(0)^2 + 2m\left(\frac{d}{2}\right)^2 \\ &\quad + m d^2 \\ &= 2 \times 0.5 \times (2)^2 + 0.5 \times (4)^2 \\ &= 4 + 8 = 12 \text{ Kg}\cdot\text{m}^2 \end{aligned}$$



$$\begin{aligned} K_{\text{rot}} &= \frac{1}{2} I \omega^2 = \frac{1}{2} \times 12 \times (5)^2 = 6 \times 25 \\ &= \boxed{150 \text{ J}} \end{aligned}$$