

24. (a) Since the force of impact on the ball is in the y direction, p_x is conserved: $p_{x\,i} = mv_i \sin 30^\circ = p_{x\,f} = mv_i \sin \theta$. Thus $\theta = 30^\circ$.
- (b) The momentum change is

$$\begin{aligned}\Delta \vec{p} &= mv_i \cos \theta (-\hat{j}) - mv_i \cos \theta (+\hat{j}) \\ &= -2(0.165 \text{ kg})(2.00 \text{ m/s})(\cos 30^\circ)\hat{j} \\ &= -0.572\hat{j} \text{ kg}\cdot\text{m/s} .\end{aligned}$$