

8. We choose the positive direction in the direction of rebound so that  $\vec{v}_f > 0$  and  $\vec{v}_i < 0$ . Since they have the same speed  $v$ , we write this as  $\vec{v}_f = v$  and  $\vec{v}_i = -v$ . Therefore, the change in momentum for each bullet of mass  $m$  is  $\Delta\vec{p} = m\Delta v = 2mv$ . Consequently, the total change in momentum for the 100 bullets (each minute)  $\Delta\vec{P} = 100\Delta\vec{p} = 200mv$ . The average force is then

$$\vec{F}_{\text{avg}} = \frac{\Delta\vec{P}}{\Delta t} = \frac{(200)(3 \times 10^{-3} \text{ kg})(500 \text{ m/s})}{(1 \text{ min})(60 \text{ s/min})} \approx 5 \text{ N} .$$