1. If F_{avg} is the magnitude of the average force, then the magnitude of the impulse is $J = F_{\text{avg}}\Delta t$, where Δt is the time interval over which the force is exerted (see Eq. 10-8). This equals the magnitude of the change in the momentum of the ball. Since the ball is initially at rest, J is equal to the magnitude of the final momentum mv. When $F_{\text{avg}}\Delta t = mv$ is solved for the speed, the result is

$$v = \frac{F_{\text{avg}}\Delta t}{m} = \frac{(50\,\text{N})\left(10 \times 10^{-3}\,\text{s}\right)}{0.20\,\text{kg}} = 2.5\ \text{m/s}\ .$$