Instructions: For full credit, be sure to show all your work. The final answer should be in scientific notation with three significant figures.

QUIZ 5

1. During a collision with a wall, the velocity of a 0.200 \( kg \) ball changes from 20.0 \( m/s \) toward the wall to 12.0 \( m/s \) away from the wall. If the time the ball was in contact with the wall was 60.0 \( ms \), what were the magnitude and the direction of the average force applied to the ball?

Let consider the positive x-axis as shown below:

\[
\begin{align*}
    m &= 0.200 \text{ kg} \\
    \Delta t &= 60.0 \text{ ms} = 60.0 \times 10^{-3} \text{ s} \\
    \vec{V}_i &= -20.0 \text{ m/s} \hat{i} \\
    \vec{V}_f &= +12.0 \text{ m/s} \hat{i} \\
    \vec{F}_{ave} &= \frac{\vec{P}_f - \vec{P}_i}{\Delta t} = \frac{m(\vec{V}_f - \vec{V}_i)}{\Delta t} = \frac{0.200 \text{ kg} \left[12.0 \text{ m/s} - (-20.0 \text{ m/s})\right] \hat{i}}{60.0 \times 10^{-3} \text{ s}} = 106.7 \text{ N} \hat{i}
\end{align*}
\]

So, the average force is 106.7 \( N \) in the positive x direction.