A 1-oz bullet strikes a hard surface with a velocity of 2600 ft/s and incurs a 6.9-in. scratch on the surface before ricocheting with a velocity of 2000 ft/s as shown. Assuming an average speed of 2300 ft/s during contact, determine the average impulsive force exerted by the hard surface on the bullet.

\[ \frac{6.9}{12} = 2300(\Delta t) \quad \Delta t = 250 \times 10^{-6} \text{ s} \quad (2) \]

Diagram of \( MD_1 + ID_1 \rightarrow_2 = MD_2 \) for the bullet \( (3) \)

\( F_x = 2890.379 \text{ lb} \quad (2) \quad F_y = 15404.04 \text{ lb} \quad (2) \)

\[ \mathbf{F} = -2.89\mathbf{i} - 15.40\mathbf{j} \text{ kips} \quad (1) \]

Or

\[ F = 15.67 \text{ kips} \quad \theta_F = 259^\circ \]