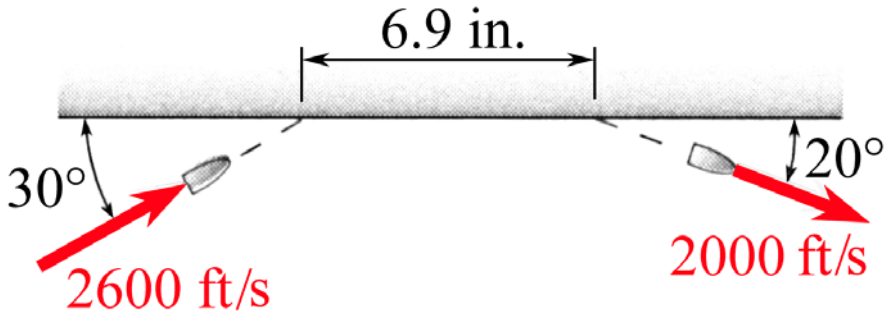
MEEG 2013 Quiz #4.m12.072

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.



$$\frac{6.9}{12} = 2300(\Delta t) \qquad \Delta t = 250\times10^{-6}\ \text{s} \quad ②$$

Diagram of $MD_1 + ID_{1\to2} = MD_2$ for the bullet ③

$F_x = 2890.379$ lb ② $\qquad F_y = 15404.04$ lb ②

$$\mathbf{F} = -2.89\,\mathbf{i} - 15.40\,\mathbf{j}\ \text{kips} \quad ①$$

Or

$F = 15.67$ kips $\qquad \theta_F = 259°$