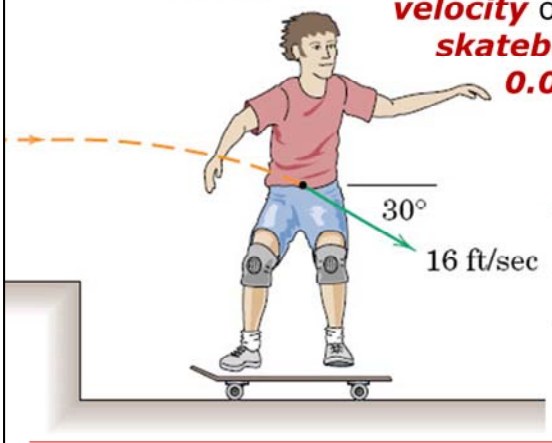
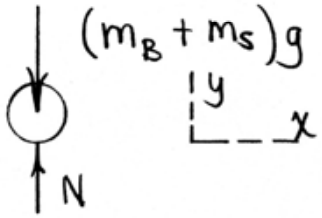
Linear Impulse and Momentum: Exercise 2

The ***80-lb boy*** takes a running jump with a ***velocity*** of ***16 ft/s*** onto ***10-lb skateboard*** and ***impact*** lasts ***0.05 s***.



Determine the ***final speed*** v along the horizontal surface and the total ***normal force*** N exerted by the surface on the skateboard during impact.

3/223 System :



$$m_B v_{Bx} + m_S \overset{0}{v_{Sx}} = (m_B + m_S)v$$

$$v = \frac{m_B v_{Bx}}{(m_B + m_S)} = \frac{80/32.2}{90\,(32.2)}\,(16 \cos 30°)$$

$$= \underline{12.32 \text{ ft/sec}}$$

$$m_B v_{By} + m_S \overset{0}{v_{Sy}} + \int_0^{\Delta t} [N - (m_B + m_S)g]\,dt = 0$$

$$-\frac{80}{32.2}(16 \sin 30°) + N(0.05) - 90\,(0.05) = 0$$

$$\underline{N = 488 \text{ lb}}$$