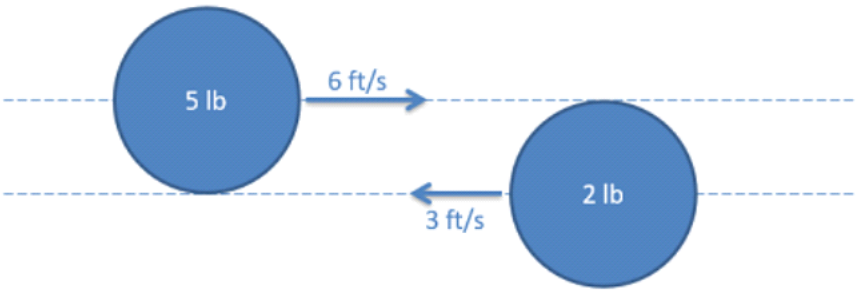
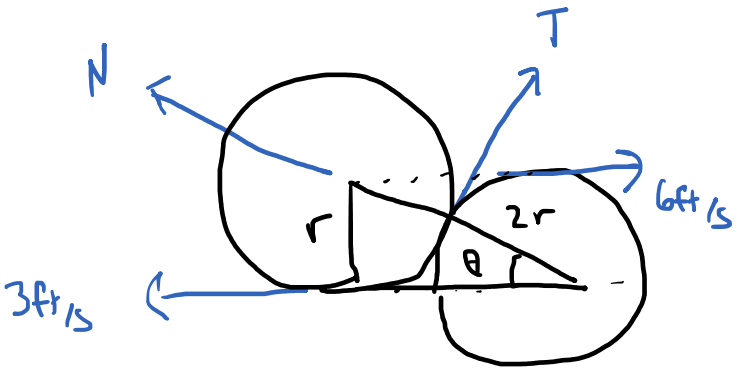
Problem 2

Two pucks as shown below collide obliquely while sliding on a smooth surface as shown below. Assume the coefficient of restitution is .7 and time of impact is .001s.

- What is the final speed of each puck?
- What is the average force exerted on each puck during the impact?





$$\theta = \sin^{-1}\left(\frac{r}{2r}\right)$$

$$\theta = 30^\circ$$

$$\sum m V_{Nf} = \sum m V_{Ni}$$

$$\left(\frac{5}{32.2}\right)(V_{ANF}) + \left(\frac{2}{32.2}\right)(V_{BNF}) = \left(\frac{5}{32.2}\right)(-6\cos(30)) + \left(\frac{2}{32.2}\right)(3\cos(30))$$

$$5V_{ANF} + 2V_{BNF} = -20.78$$

$$V_{ATF} = V_{ATi} = 6\sin(30) = 3$$

$$V_{BTF} = V_{BTi} = -3\sin(30) = -1.5$$

$$.7 = -\frac{V_{ANF} - V_{BNF}}{V_{ANi} - V_{BNi}} = -\frac{V_{ANF} - V_{BNF}}{-6\cos(30) - 3\cos(30)}$$

$$V_{ANF} = V_{BNF} + 5.46$$

$$5(V_{BNF} + 5.46) + 2V_{BNF} = -20.78$$

$$7V_{BNF} = -48.06$$

$$V_{BNF} = -6.86 \text{ m/s}$$

$$V_{ANF} = \frac{-20.78 - 2V_{BNF}}{5} = -1.41 \text{ m/s}$$

$$V_{AF} = \sqrt{3^2 + 1.41^2} = \boxed{3.31 \text{ m/s}}$$

$$V_{BF} = \sqrt{1.5^2 + 6.86^2} = \boxed{7.02 \text{ m/s}}$$

only normal

$$(F)(t) = \frac{5}{32.2}(-1.41) - \frac{5}{32.2}(-6\cos(30))$$

t: .001 s

$$\boxed{F = 587.9 \text{ lbs}}$$