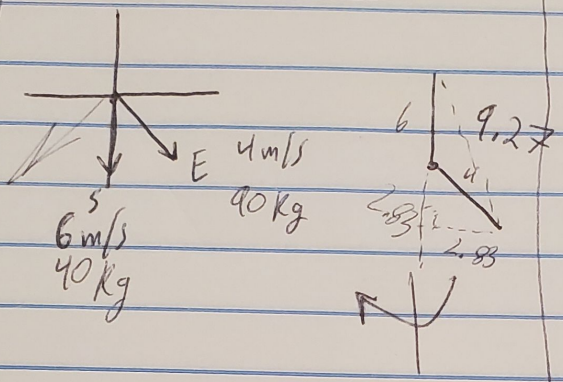
1. $\vec{p} = m\vec{v}$

yes, the system is eachother

2. $m_1 = m \quad m_2 = 2m$,

$3E^7$ m/s towards star 1.

4.



$t = \frac{V_i \sin 45}{4.9}$

$V = \sqrt{\frac{\frac{2}{3}4.1}{3\sin\theta\cos\theta}}\,L$

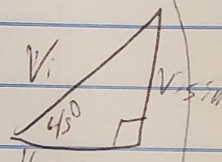
$\frac{2}{3}L = \frac{V_i^2 \sin\theta\cos\theta}{4.9}$

$V_i = \sqrt{6.53L}$

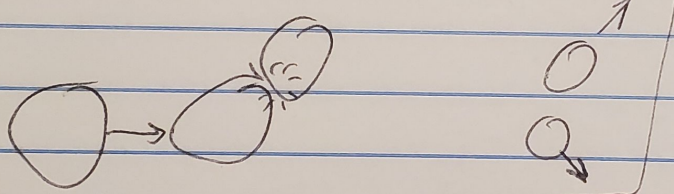
$\frac{2}{3}L = V_i \cos 45\left(\frac{V_i \sin 45}{4.9}\right)$

$0 = -4.9t^2 + V_i \sin 45\, t$

$\frac{2}{3}L = V_{ix}\, t$



5.



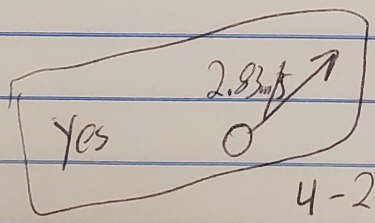
$\Delta x = \frac{1}{2}at^2 + V_{iy}t$

$\Delta x = V_{ix}t$

$L = \frac{1}{2}\Delta x_F + \Delta x_F = \frac{3}{2}\Delta x_F$

$\Delta x_F = \frac{2}{3}L$

6.



$4 - 2.83 = 1.17$ m/s

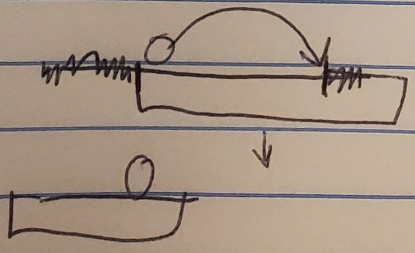
$V_{ff} = -2V_{fB}$

$V_{fB} = -\frac{m_f V_{ff}}{2m_B}$

$m_f V_{ff} = -2m_f V_{fB}$

$m_f V_{ff} = -m_B V_{fB}$

7.



$\Delta x_f = 2\Delta x_B$

$\theta = 45$

$\Delta x_B = \frac{1}{2}\Delta x_F$

$m_B = 2m_F$

$L = \Delta_T + \Delta_F$

$mv_1 = mv_2$

$p = mv$

$m_f V_{if} + m_B V_{iB} = m_f V_{ff} + m_B V_{fB}$

(0) (0)