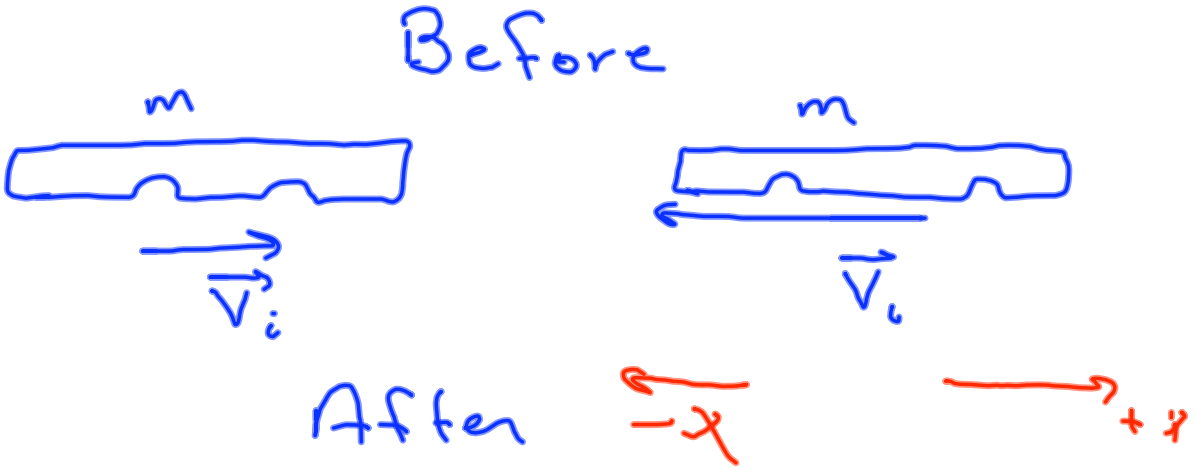
Reminders 10-17-07:

- Next Homework Due 10/21!!!
- Momentum Worksheet due Today.
- Quiz Today, Energy & Momentum.
- EXAM 2 10/22
- Chapter 4, 5, & 6 Practice Assignment.
- You need a 50% average in lab to pass this course.

Objectives:

- Finish Chapter 6
- Chapter 6 Demos
- Exam 2 Review



$V_f = ?$

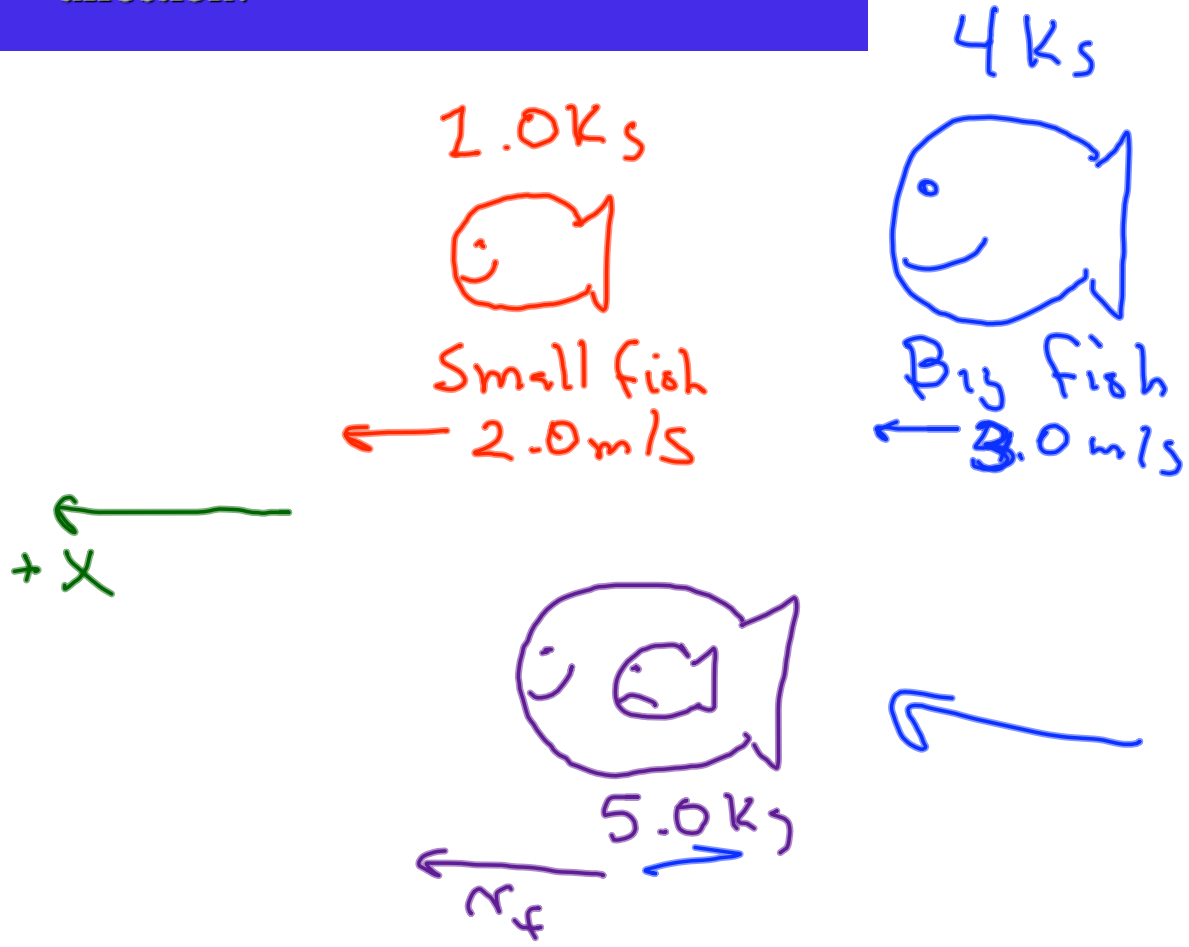
$$\Sigma p_i = \Sigma p_f$$

$$-mv_i + mv_i = 0 = mv_f + mv_f = 2mv_f$$

Elastic

$$0 = mv_{1f} + mv_{2f}$$

- A big 4.0kg fish moving to the left at 3.0 m/s swallows a small 1.0 kg fish moving to the left at 2.0 m/s. What is the final speed of the big fish? What if the fish were moving in the opposite direction?



$$\sum p_i = \sum p_f$$

$$(4.0\,kg)(3.0\,m/s) + (1.0\,kg)(2.0\,m/s) = 5v_f$$

$$14\,kg\,m/s = 5v_f$$

$$v_f = \frac{14}{5}\,m/s = 2.8\,\frac{m}{s}$$

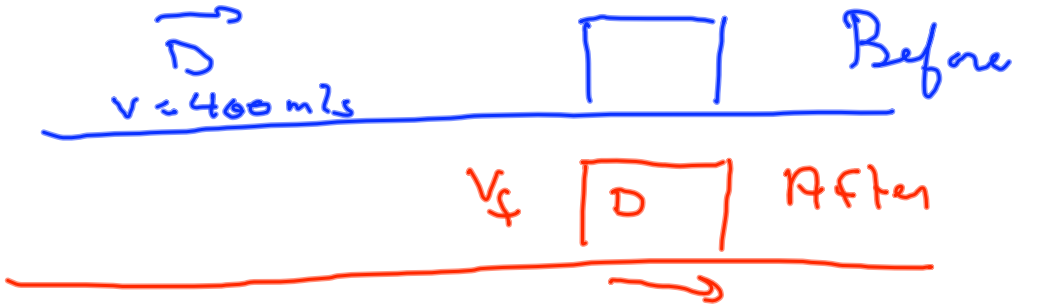
$$(4)(3) + (1)(-2) = 5v_f$$

$$10\ kg\ m/s = 5v_f$$

$$v_f = 2.0\ m/s$$

A gun with a muzzle velocity of 4.0×10^2 m/s horizontally fires a 12 g bullet into a 2.0kg block resting on a frictionless surface. The bullet comes to rest after traveling 15 cm.

- What are the impulse and change in momentum of each object just after the collision?
- What is the work done on the bullet by the block in bringing it to a complete stop?
- What is the force and average power required to stop the bullet?
- What is the average acceleration of the bullet?
- What is the work done on the block in this time.



$\sum p_i = \sum p_f$ → +x

$(.012\,kg)(400) = (m_b + m_B)v_f$

$v_f = \dfrac{(.012)(400)}{2.0 + .012} = 2.39\ \frac{m}{s}$

$F\,\Delta t = m_B \Delta v = (2.0\,kg)(2.39 - 0)$

Impulse delivered to block by bullet $= 4.8\ kg\ m/s$

Impulse delivered to bullet by block $= (.012kg)(2.39 - 400) = -4.8\ \frac{kg\,m}{s}$

$$W_{net} = \Delta KE$$

$$= \frac{1}{2}(.012)\left[(2.39)^2 - (400)^2\right]$$

$$-Fd = -960\,J$$

$$F = \frac{960\,J}{0.15m} = 6400N$$

$$P_{avg} = \frac{W}{t} = F v_{avg} = (6400N)\left[\frac{2.39+400}{2}\right]$$

$$= 1.3 \times 10^6 W$$

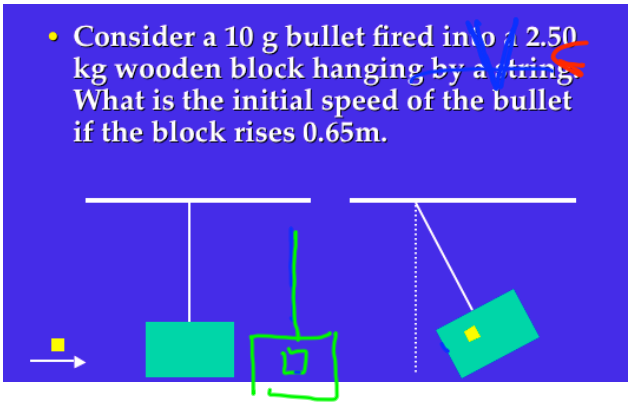
$$F = ma \qquad a = \frac{F}{m}$$

$$a = \frac{6400\,N}{.012\,kg} = 5.3 \times 10^5 \frac{m}{s^2}$$

$$W_{block} = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$$

$$= \frac{1}{2}(2.012)(2.39)^2$$

$$= 5.7\,J$$



$$m_b v_b = (m_b + M_B) V$$

$$\Delta KE + \Delta PE = 0$$

$$\frac{1}{2}(m_b + M_B) V_f^2 - \frac{1}{2}(m_b + M_B) V^2 + (m_b + M_B) g \Delta y = 0$$

$$-\frac{1}{2}(m_b + M_B) V^2 + (m_b + M_B) g \Delta y = 0$$

$$-\frac{1}{2} V^2 + g \Delta y = 0$$

$$V^2 = 2 g \Delta y$$

$$V = \sqrt{2 g \Delta y}$$

$$m_b v_b = (m_b + M_B) V$$

$$m_b v_b = (m_b + M_B) \sqrt{2 g \Delta y}$$

$$v_b = \frac{(m_b + M_B)\sqrt{2 g \Delta y}}{m_b}$$

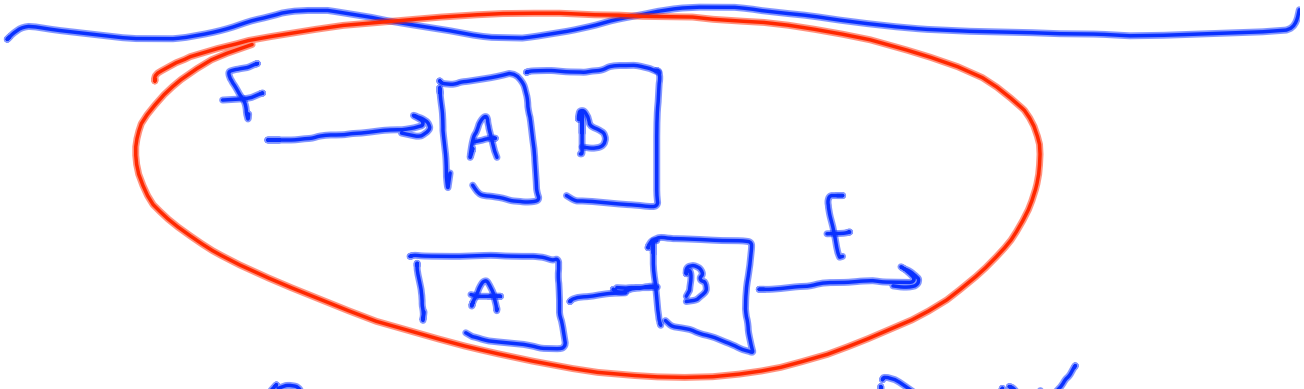
$$=$$

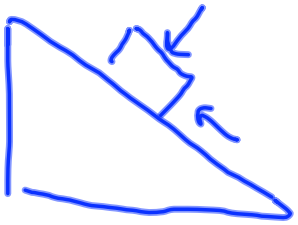
$W = |\vec{F}||\Delta x|\cos\theta$ $\quad W_{non-c} = -\Delta PE$

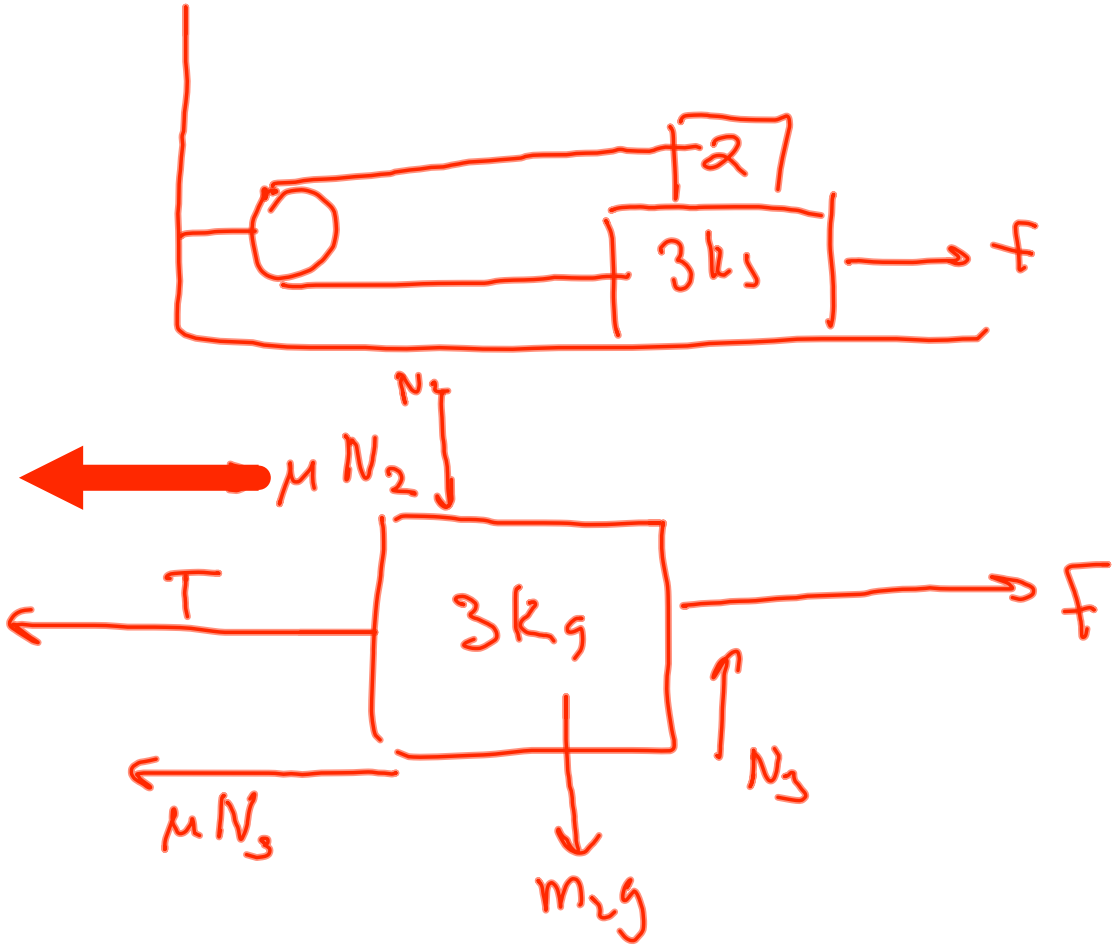
$W_{net} = \Delta KE$

$\Delta PE + \Delta KE = 0$

$W_{nc} = \Delta PE + \Delta KE = E_f - E_i$






2
3kg
f
N2
μ N2
T
3kg
f
N3
μ N3
m2g