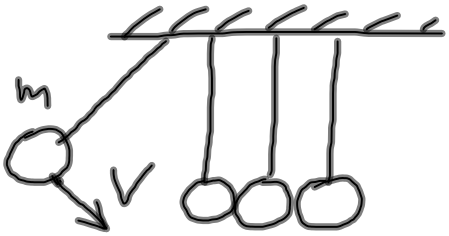
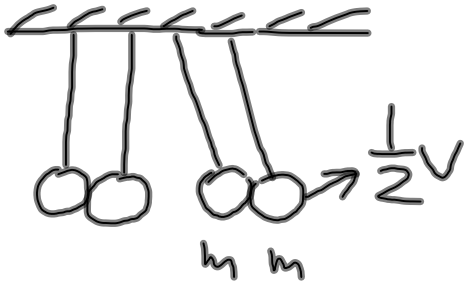
Newton's cradle problem.

Before



After



$P_o = mV$

$P_F = m\frac{1}{2}V + m\frac{1}{2}V$

$P_F = mV$

$P_o = P_F$ V OK

Feb 9-7:43 AM

$K_o = \frac{1}{2}mV^2$

$K_F = \frac{1}{2}m\left(\frac{1}{2}V\right)^2 + \frac{1}{2}m\left(\frac{1}{2}V\right)^2$

$K_F = 2\left(\frac{1}{2}m\frac{1}{4}V^2\right)$

$K_F = \frac{1}{4}mV^2$

$K_o \neq K_F \Rightarrow$ NOT POSSIBLE!

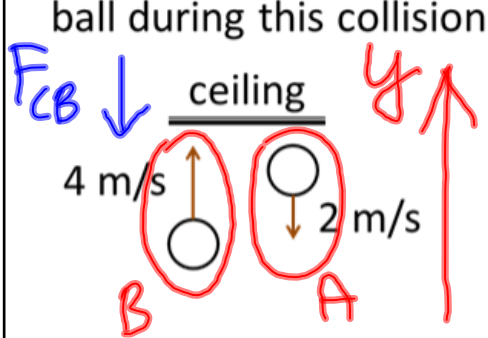
Feb 9-8:00 AM

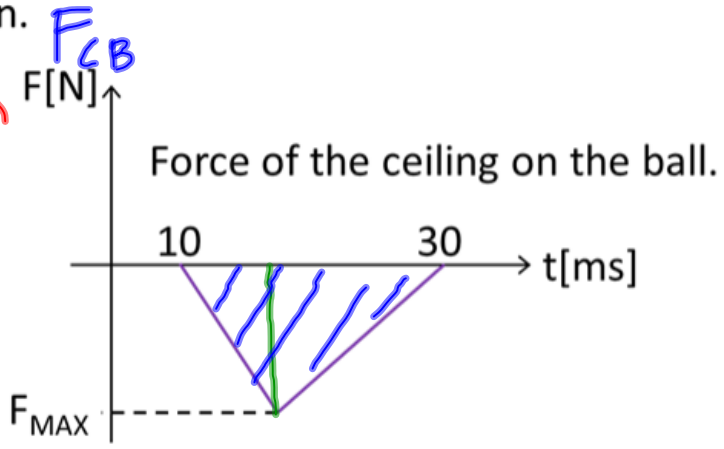
We consider billiard balls, steel balls (Newton's cradle) collisions to be elastic. However, in real life the elastic collisions are somewhere in-between, as shown below.

ELASTIC INELASTIC

Nov 28-10:31 AM

Find the maximum force exerted by the ceiling on the 1.0 kg ball during this collision.





$J = F \cdot \Delta t$

$J = \Delta p$

$F_{MAX} = -600\ N$

Dec 3-1:52 PM

$$\boxed{J} = \text{AREA UNDER} = \frac{1}{2} F_{MAX.} (0.020\ s)$$

$$\Delta p = p_F - p_0$$

$$\Delta p = (1)(-2) - (1)(4)$$

$$\Delta p = -6\ kg \cdot \frac{m}{s} = \boxed{J}$$

$$\boxed{J} = \boxed{J}$$

$$\frac{1}{2} F_{MAX.} (0.020) = -6$$

Feb 9-8:17 AM

$$\boxed{F_{MAX.} = 600\ N}$$

Feb 9-8:20 AM

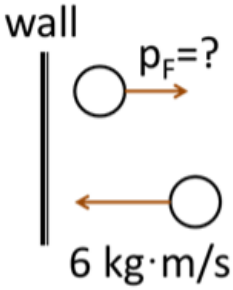
$J = F_{AVG} \cdot \Delta t$

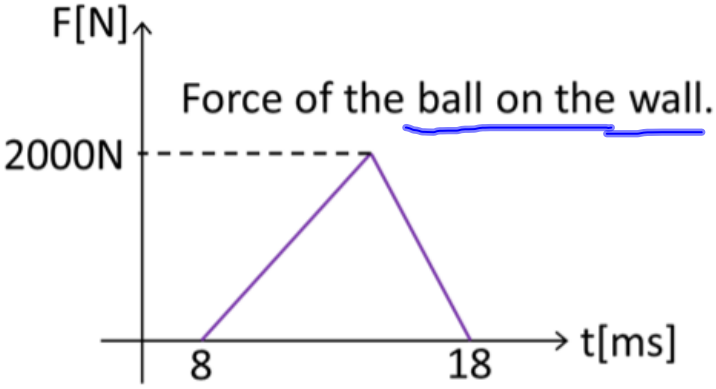
The black area and the red area are equal. But in our problem we used the peak force info.

Dec 3-1:58 PM

HW problems.

1. Find the momentum and the velocity of the 0.5 kg ball after the collision.





F_{BW}

Dec 3-1:59 PM

$J_{BW} = \frac{1}{2}(2000)(0.010)$

$J_{BW} = 10\ N \cdot s$ | $J_{WB} = -10\ N \cdot s$

$J_{WB} = \Delta p$

$-10 = p_F - 6$

$p_F = -4\ kg \cdot \frac{m}{s}$

Feb 9-8:34 AM

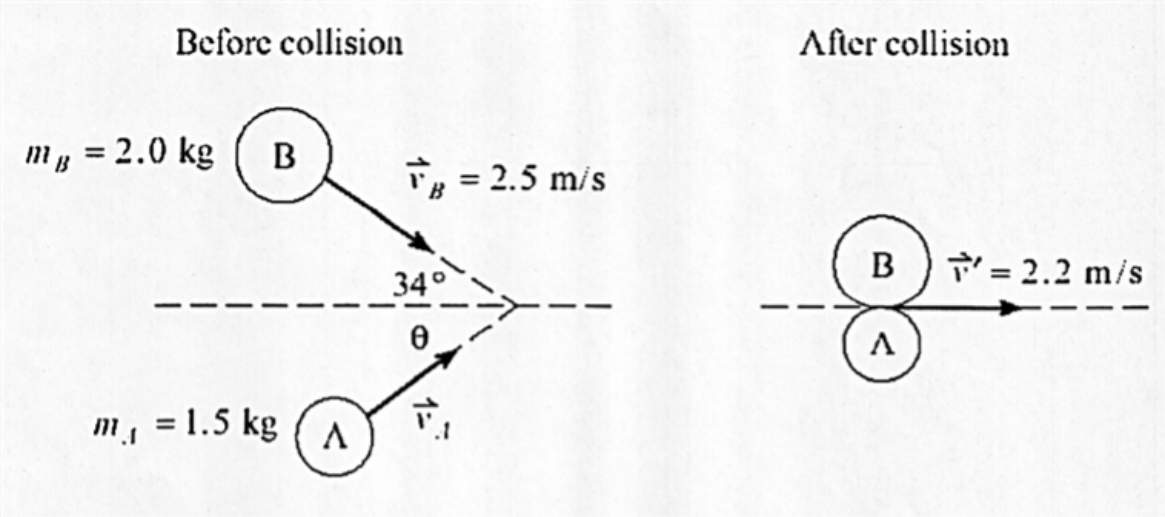
$p_F = m \cdot v_F$

$-4 = (0.5)v_F$

$v_F = -8\ \frac{m}{s}$

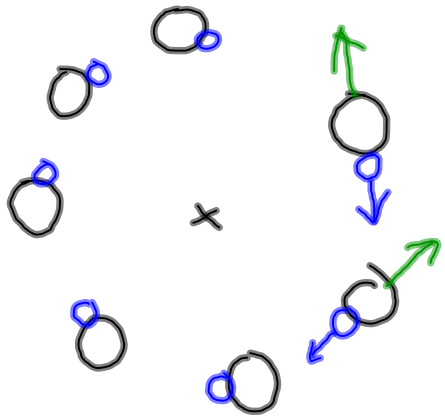
Feb 9-8:37 AM

2. Two air pucks approach each other, stick together and then travel due east as shown below. Find the initial velocity of puck A.



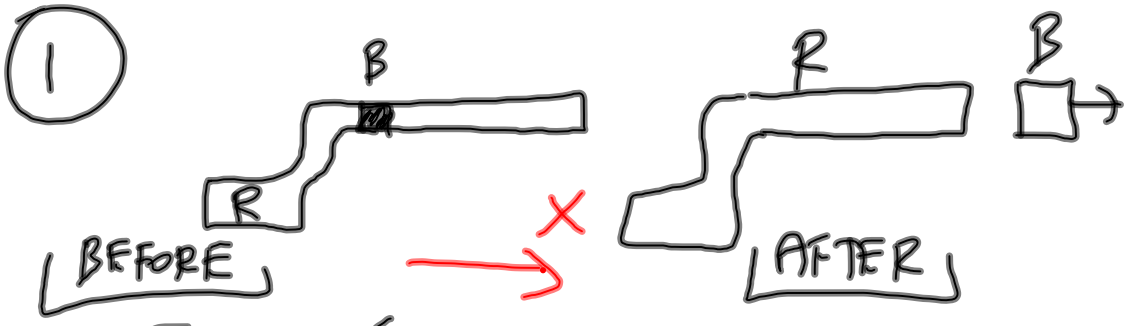
Dec 3-2:01 PM

A group of astronauts go for a space walk (EVA) and form a circle outside of the space craft.
Simultaneously the astronauts begin to toss a bunch of balls to one another but always to the person on their left. What happens to the circular formation?



Feb 9-8:45 AM

1



$m_B = 5\,g$

$m_R = 3\,kg$

$V_{BF} = 300\,\frac{m}{s}$

$V_{RF} = ?$

(RECOIL VELOCITY)

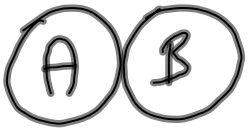
SYSTEM: R+B

$P_0 = P_F$

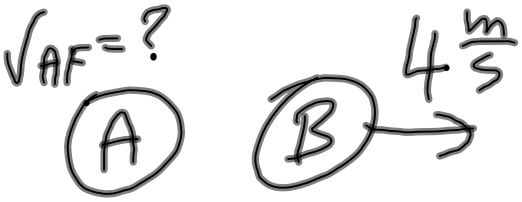
$V_{RF} = -0.5\,\frac{m}{s}$

Feb 9-9:01 AM

2



AT REST



$m_A = 100\,kg$

$m_B = 40\,kg$

A) $V_{AF} = ?$

B) $W_{AB} = ?$

C) $W_{BA} = ?$

D) $\Delta K = ?$

E) TYPE OF COLLISION?

Feb 9-9:07 AM