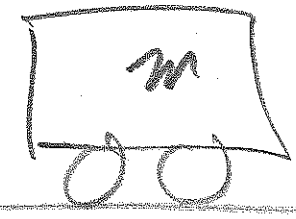
10-9-13

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

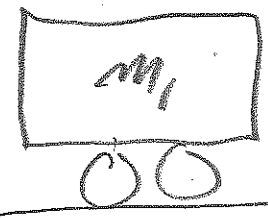
CAR → $\vec{v}$



i = initial

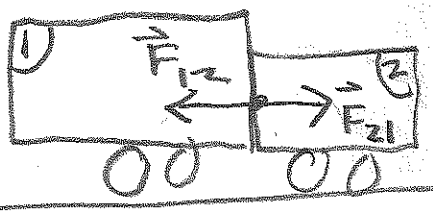
Before collision

v_{1i} → v_{2i}



cases of a collision course

during collision → Δt = time of contact



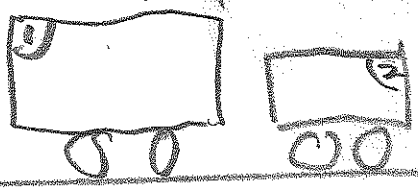
$|\vec{F}_{12}| = |\vec{F}_{21}|$

same magnitudes

$\vec{F}_{12}$ = force on 1 due to 2

$\vec{F}_{21}$ = force on 2 due to 1

After collision



f = final

$|\vec{F}_{12}| = |\vec{F}_{21}|$ Newton's 3rd Law

$|m_1 \cdot \vec{a}_1| = |m_2 \cdot \vec{a}_2|$

$m_1 \cdot |\vec{a}_1| = m_2 \cdot |\vec{a}_2|$

$|\vec{a}_1| = \frac{v_{1i} - v_{1f}}{\Delta t} \iff |\vec{a}| = \left|\frac{\Delta \vec{v}}{\Delta t}\right|$

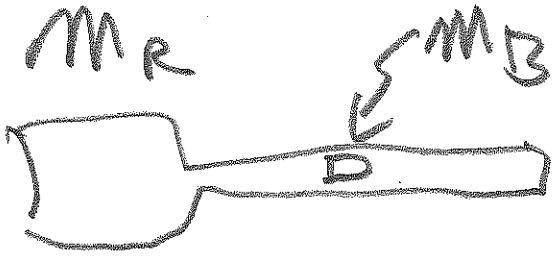
$|\vec{a}_2| = \frac{v_{2f} - v_{2i}}{\Delta t} \iff |\vec{a}| = \left|\frac{\Delta \vec{v}}{\Delta t}\right|$

$\Rightarrow m_1 \cdot \left(\frac{v_{1i} - v_{1f}}{\Delta t}\right) = m_2 \cdot \left(\frac{v_{2f} - v_{2i}}{\Delta t}\right)$

$m_1 v_{1i} - m_1 v_{1f} = m_2 \cdot v_{2f} - m_2 \cdot v_{2i}$

$$\boxed{m_1 v_{1i} + m_2 v_{2i} = m_1 v_{1f} + m_2 v_{2f}}$$

Example 8.3



SUM (ALL) $\sum P_x = \sum P_x$

before after

$$m_R \cdot 0 + m_B \cdot 0 = m_R \cdot v_R + m_B \cdot v_B$$

$$v_B = +300 \frac{m}{s} \rightarrow$$

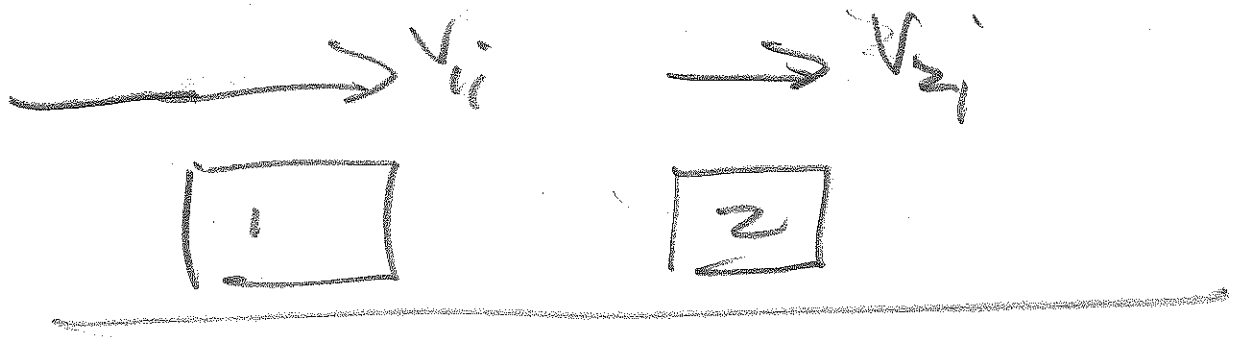
$$0 = (3.00\,kg) \cdot v_R + (0.005\,kg) \cdot \left(300 \frac{m}{s}\right)$$

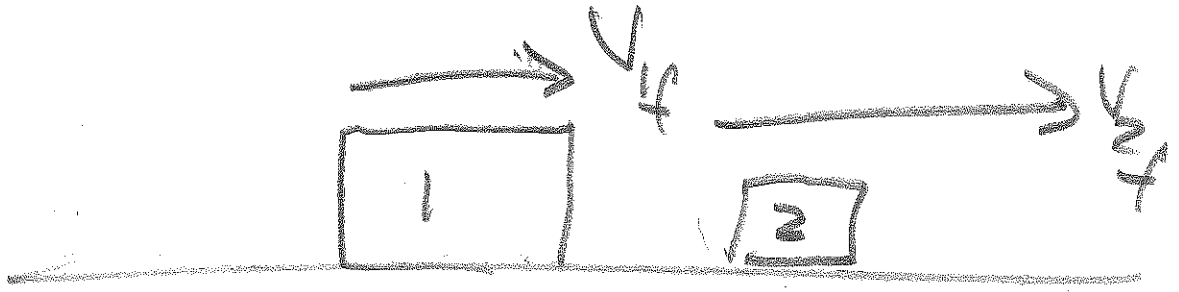
$$v_R = -\frac{(0.005\,kg)}{3.00\,kg} \cdot \left(300 \frac{m}{s}\right)$$

$$v_R = -0.5 \frac{m}{s}$$

moves left ←

In Physics 1D motion → positive direction





Inelastic:

$$\frac{1}{2}m_1v_{1i}^2 + \frac{1}{2}m_2v_{2i}^2 \neq \frac{1}{2}m_1v_{1f}^2 + \frac{1}{2}m_2v_{2f}^2$$

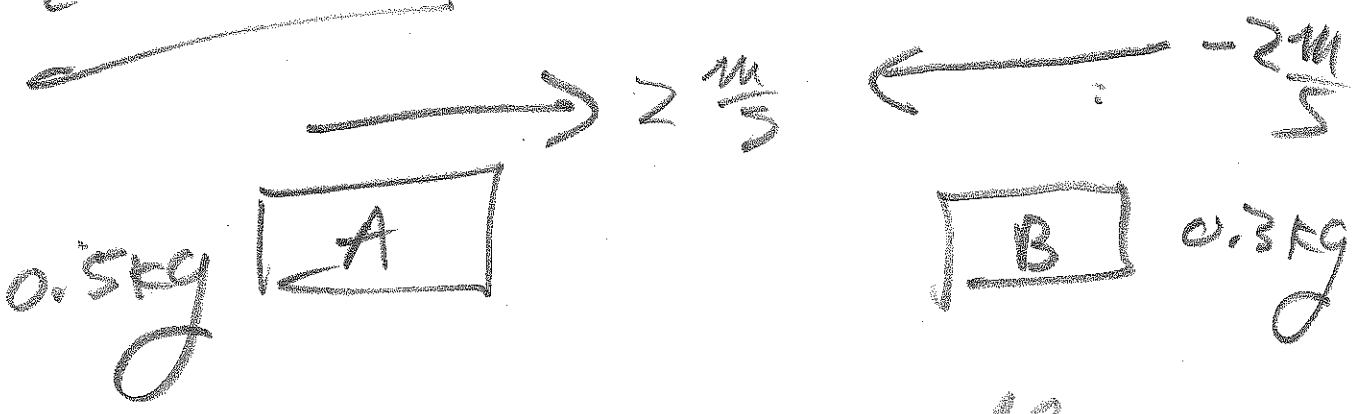
Elastic:

$$\frac{1}{2}m_1v_{1i}^2 + \frac{1}{2}m_2v_{2i}^2 = \frac{1}{2}m_1v_{1f}^2 + \frac{1}{2}m_2v_{2f}^2$$

Both cases $m_1v_{1i} + m_2v_{2i} = m_1v_{1f} + m_2v_{2f}$

Example of an elastic inelastic collision

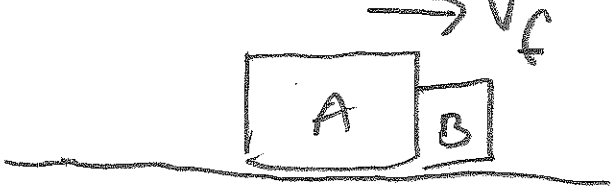
Example of 1D motion: → x (pos)



Before = after

$\Sigma P_x = \Sigma P_x$

$(0.5kg)\left(2\frac{m}{s}\right) + (0.3kg)\left(-2\frac{m}{s}\right) = 0.5kg \cdot v_f + 0.3kg \cdot v_f$



after

before $\qquad$ after

$0.4\,kg\cdot\frac{m}{s} = (0.5kg + 0.3kg)\cdot v_f$

$0.4\,kg\cdot\frac{m}{s} = (0.8kg)\,v_f$

$v_f = 0.5\frac{m}{s} \longrightarrow$

system moves right

To check inelasticity

(KE is not conserved),

Read example 6.

$KE_{before} = 1.6J$

$KE_{after} = 0.1J$

) KE is lost (1.5J) to heat, sound, etc

Test 2. Oct 30, 2013

projectile motion
circular motion *
relative motion
} CH5

* $a_c = \frac{v^2}{R}$

CH4
CH5
} Newton's Laws

CH 6 = circular motion (EC?)
(circular dynamics)

$F_c = \frac{mv^2}{R}$

study

* sample test 1
(projectile, circular motion)

* sample test 2

LOCATIONS

Sample T1:
"Free Fall/2D Motion"
LINK.

Sample T2:
"2D Motion/newton's Laws"
LINK