

xp#2: Conservation of linear Momentum

$\vec{P} = m\vec{v} \rightarrow \text{velocity}$
 $\downarrow$
 linear momentum mass

- if there was N objects in an isolated system:- No External resultant forces acts on it

$$\vec{P} = \sum_{i=1}^N m_i \vec{v}_i$$

$\vec{P}$ is conserved for an isolated system

* Collision:-

$\vec{P}_{\text{before collision}} = \vec{P}_{\text{after collision}}$
 $M_1 v_{1b} + M_2 v_{2b} = M_1 v_{1a} + M_2 v_{2a}$
 $= 0$

Theory.

$$\frac{P_a}{P_b} = \frac{M_1 v_{1a} + M_2 v_{2a}}{M_1 v_{1b}} = 1$$

$$y_{1b} = \frac{1}{2} g t^2$$

$$t = \sqrt{\frac{2y}{g}}$$

$$v_b = \frac{x_b}{t_b} \Rightarrow v = \frac{x}{\sqrt{2y}}$$

$P_b = \frac{M_1 x_{1b}}{\sqrt{\frac{2y}{g}}}$ • t is equal for the so 2 balls before and after

$$\frac{P_a}{P_b} = R = \frac{M_1 x_{1a} + M_2 x_{2a}}{M_1 x_{1b}} = \frac{A}{B}$$

$$\frac{\Delta R}{R} = \frac{\Delta A}{A} + \frac{\Delta B}{B} = \frac{M_1 \Delta x_{1a} + x_{1a} \Delta M_1 + M_2 \Delta x_{2a} + x_{2a} \Delta M_2}{M_1 x_{1a} + M_2 x_{2a}} + \frac{M_1 \Delta x_{1b} + x_{1b} \Delta M_1}{M_1 x_{1b}}$$

Also Itami: