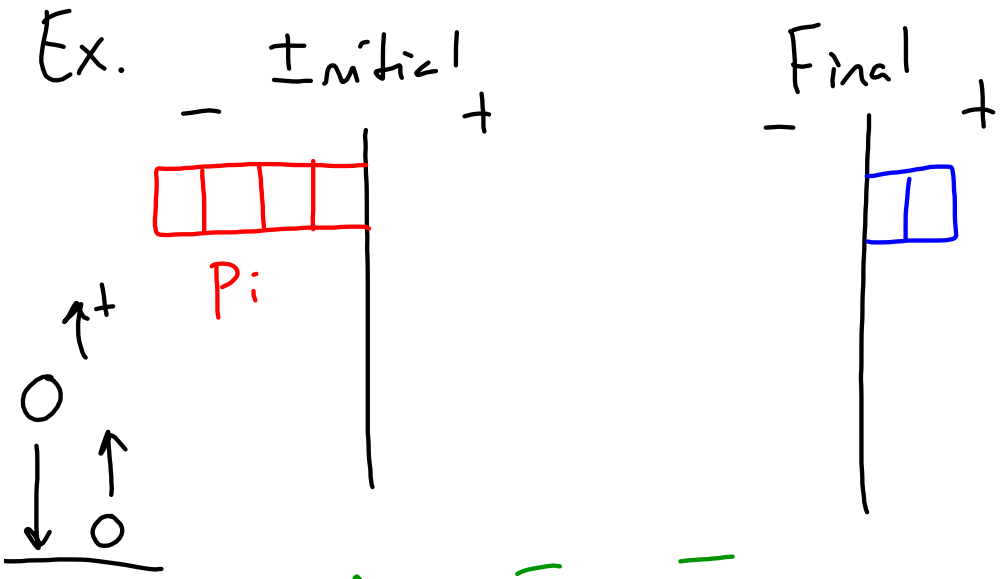
$$\bar{F}\,\Delta t = m\,\Delta \bar{v} = \Delta \bar{p}$$

Impulse-Momentum theorem

Momentum and Impulse PS

Ex.



$$\Delta \bar{p} = \bar{p}_f - \bar{p}_i$$

$$= m\bar{v}_f - m\bar{v}_i$$

$$= (2\,kg)(0.8\,m/s) - (2\,kg)(-3\,m/s)$$

$$= 7.6\,kg\cdot m/s$$

$$\bar{F}\,\Delta t = \Delta \bar{p}$$

$$F = \frac{\Delta p}{\Delta t}$$

$$= \frac{7.6\,kg\cdot m/s}{0.05\,s}$$

$$= 152\,N$$

$$\text{Impulse} = \bar{F}\,\Delta t$$

$$\Delta \bar{p} = \bar{p}_f - \bar{p}_i = m\bar{v}_f - m\bar{v}_i$$

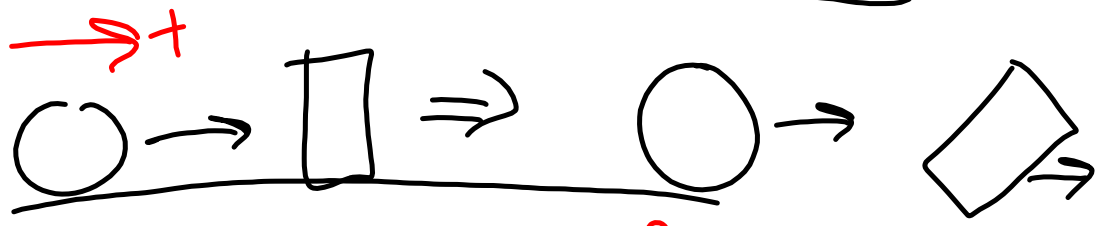
$$\text{Impulse} = \Delta \bar{p}$$

Impulse = change in momentum

$$\bar{F}\,\Delta t = \Delta \bar{p}$$

Conservation of Momentum

6)



1 → bowling ball

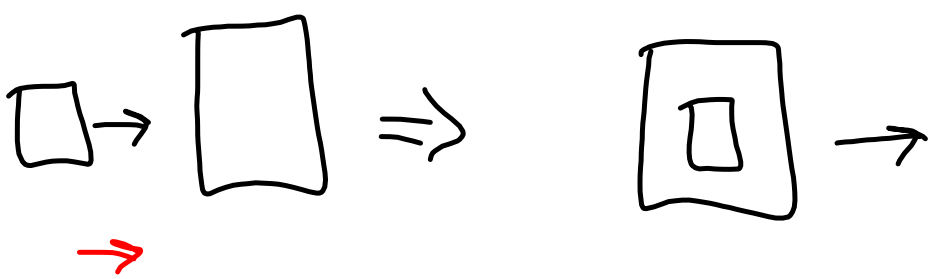
2 → pin

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

($v_{2i} = 0$)

$$v_{1i} = \frac{1}{m_1}\left[m_1 v_{1f} + m_2 v_{2f}\right]$$

$$= 2.66 \text{ m/s}$$

8) 

1 → little fish

2 → big fish

$$m_1 v_{1i} + m_2 \cancel{v_{2i}}^{\,0} = (m_1 + m_2) v_f$$

$$v_f = \frac{m_1 v_{1i}}{m_1 + m_2}$$

$$= 0.6 \text{ m/s}$$