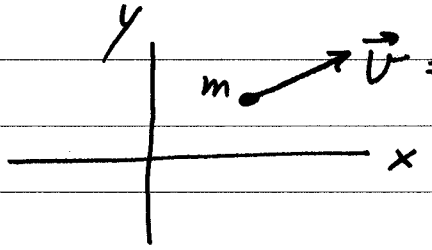
Physics of Momentum

① Definition $\vec{p} = m\vec{v}$ (a vector)



$\vec{v} = v_x \hat{i} + v_y \hat{j}$

$p_x = m v_x$

$p_y = m v_y$

② In collisions, the total momentum is conserved.

$$\underbrace{m_1 \vec{v}_1 + m_2 \vec{v}_2}_{\text{initial}} = \underbrace{m_1 \vec{v}_1' + m_2 \vec{v}_2'}_{\text{final}}$$

③ $\Delta \vec{p} = \vec{F}\,\Delta t$ ← Newton's 2nd law

$\Delta \vec{p}$ = change of momentum

Δt = time duration of force

$\vec{F}$ = mean force

$$\begin{cases} \Delta p_x = F_x\,\Delta t \\ \Delta p_y = F_y\,\Delta t \end{cases}$$