Collisions

EVERY COLLISION → momentum is conserved (neglecting friction)

$$\vec{p}_{total} = \vec{p}'_{total}$$

$$\left(\Delta\vec{p}_A = -\Delta\vec{p}_B \right)$$

↑ really from Newton's 3rd Law

SOME COLLISIONS ~> KE is conserved and the collision is called an elastic collision.

$$E_{k\,total} = E'_{k\,total}$$

If $E_{k\,total} \neq E'_{k\,total}$ the collision is inelastic.

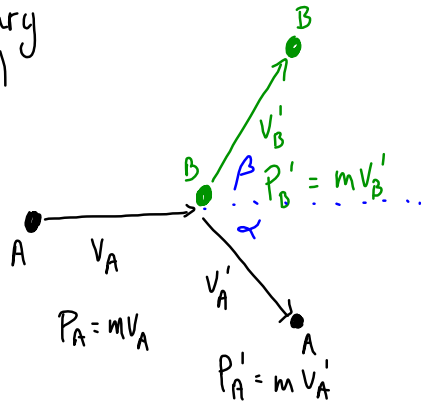
Recall: $E_K = \frac{1}{2}mv^2$

TODO: Look over MP/514

Do PP/515

A Special Case:

- one object is stationary
- identical masses (m)
- elastic collision

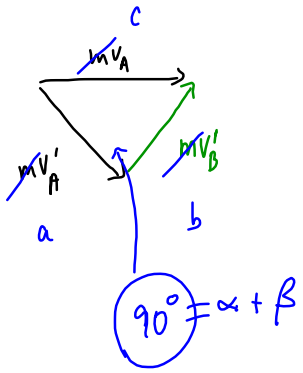


Vector Addition diagram:

$$\vec{P}_{total} = \vec{P}'_{total}$$

$$\vec{P}_A = \vec{P}'_A + \vec{P}'_B$$

$$m\vec{V}_A = m\vec{V}'_A + m\vec{V}'_B$$



Since the collision is elastic:

$$E_{k_{total}} = E'_{k_{total}}$$

$$E_{k_A} = E'_{k_A} + E'_{k_B}$$

$$\frac{1}{2}mV_A^2 = \frac{1}{2}m(V_A')^2 + \frac{1}{2}m(V_B')^2$$

$$V_A^2 = (V_A')^2 + (V_B')^2$$

$$(c^2 = a^2 + b^2)$$

If there is an elastic 2D collision between two identical masses and one of the objects is stationary, then the objects will travel at paths that are perpendicular to one another