Elastic Collisions

Recall: Law of Conservation of Momentum applies to ALL collisions that are an isolated system (no friction)

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

Some collisions may be classified as an ELASTIC COLLISION!

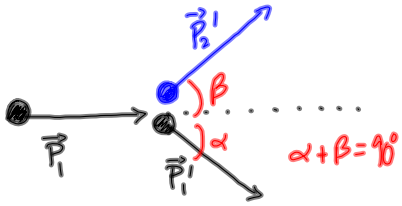
Elastic Collision - the kinetic energy is conserved during the collision.

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

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

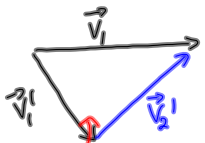
A Special case:

- Two identical masses
- one object is at rest
- elastic collision (2D)



Using a vector addition diagram:

$$\vec{P}_{total} = \vec{P}'_{total}$$
$$\vec{P}_1 = \vec{P}_1' + \vec{P}_2'$$
$$m\vec{v}_1 = m\vec{v}_1' + m\vec{v}_2'$$
$$\vec{v}_1 = \vec{v}_1' + \vec{v}_2'$$



We know it is an elastic collision:

$$E_{k_1} = E'_{k_1} + E'_{k_2}$$
$$\frac{1}{2}mv_1^2 = \frac{1}{2}mv_1'^2 + \frac{1}{2}mv_2'^2$$
$$v_1^2 = v_1'^2 + v_2'^2$$
$$c^2 = a^2 + b^2$$

tells us this angle is 90°

To DO
* Look over MP|514
* PP|515

Review: p529/26-30 and p627/38, 41, 45