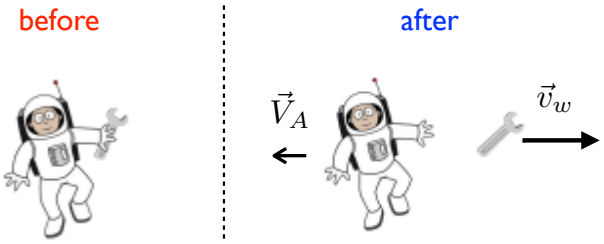
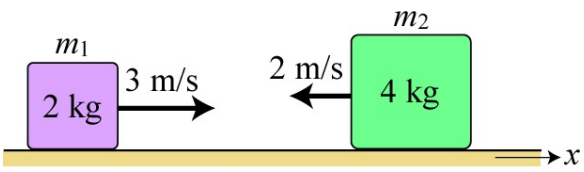
Momentum

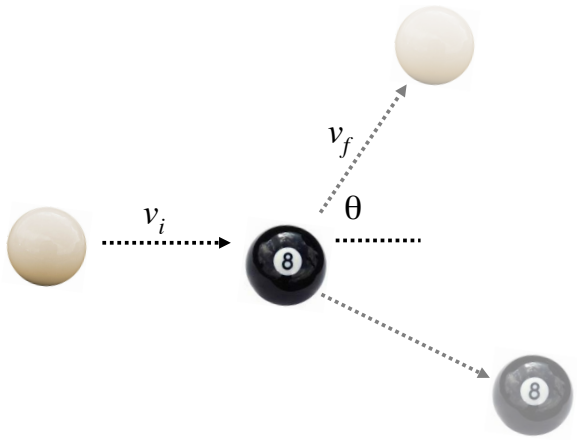
1. **Recoil of an astronaut:** An astronaut of mass m_A = 95 kg, is initially at rest and holds a wrench of mass m_w = 1800 g. He throws the wrench with a velocity v_w = 7 m/s.
   What is the recoil velocity V_A of the astronaut?



2. **Perfectly inelastic collision:** Two masses sliding on a frictionless surface have a completely inelastic head-on collision. Following impact, the velocity of the 4 kg mass is:



3. **Billiards:** A cue ball of mass m_c strikes a stationary eight ball of mass m_8 with speed v_i. It continues at angle θ with speed v_f. What is the velocity of the eight ball?



4. On a frictionless horizontal air table, puck A (with mass 0.251 kg) is moving toward puck B (with mass 0.375 kg), which is initially at rest. After the collision, puck A has velocity 0.120 m/ s to the left, and puck B has velocity 0.650 m/s to the right.

   What was the speed v_{Ai} of puck A before the collision?
   Calculate ΔK , the change in the total kinetic energy of the system that occurs during the collision.