Chapter 10- Reminder

1- The definition of the impulse is: $\vec{J} = \int_{t=t_i}^{t_f} \vec{F}(t)\, dt$

2- The impulse-linear momentum theorem: $\Delta \vec{P} = \vec{P}_f - \vec{P}_i = \vec{J}$

3- For **all kinds of collisions**: $\Delta \vec{P} = 0$, or $\vec{P}_i = \vec{P}_f$ (because the system is isolated, and closed)

4- Only for the elastic collision the **kinetic energy of the system is conserved**: $\Delta k = 0$, or $K_i = K_f$

5- Kinds of collisions in one dimension:

a- Elastic collision:

The momentum of the system **is conserved**: $\Delta \vec{P} = 0 \Rightarrow \vec{P}_i = \vec{P}_f \Rightarrow m_1 v_{1i} + m_2 v_{2i} = m_1 v_{1f} + m_2 v_{2f}$

The kinetic energy of the system **is conserved**: $\Delta K = 0 \Rightarrow K_i = K_f \Rightarrow \frac{1}{2} m_1 v_{1i}^2 + \frac{1}{2} m_2 v_{2i}^2 = \frac{1}{2} m_1 v_{1f}^2 + \frac{1}{2} m_2 v_{2f}^2$

b- Inelastic collision (**Fission collision**):

The momentum of the system **is conserved**: $\Delta \vec{P} = 0 \Rightarrow \vec{P}_i = \vec{P}_f \Rightarrow (m_1 + m_2) v_i = m_1 v_{1f} + m_2 v_{2f}$

The kinetic energy of the system **is not conserved**: $\Delta K \neq 0 \Rightarrow K_i = K_f +$ **Loss in the kinetic energy**

c- Completely inelastic collision (**Fusion**):

The momentum of the system **is conserved**: $\Delta \vec{P} = 0 \Rightarrow \vec{P}_i = \vec{P}_f \Rightarrow m_1 v_{1i} + m_2 v_{2i} = (m_1 + m_2)\, v_f$

The kinetic energy of the system **is not conserved**: $\Delta K \neq 0 \Rightarrow K_i = K_f +$ **Loss in the kinetic energy**