Lesson video #2 - 3 types of collision:

perfectly elastic, perfectly inelastic, partially elastic; Percent elasticity

Lesson video: https://www.loom.com/share/f0b00c61cd354f35ad44a0f3c8f896e4 255m 77 1

Types of collisions:

1) Perfectly elastic collisions

- Momentum is conserved $(p_T = p_T')^*$
- Kinetic energy is conserved ($E_k = E_k'$) i.e. no kinetic energy is transformed into sound or heat • during the collision
- In real life, this only happens in cases where there's a collision in which the objects don't physically touch each other, such as proton-proton collision.

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Perfectly inelastic collisions

- Momentum is conserved ($p_T = p_T'$)
- After the collision the objects stick together and move as one mass
- In perfectly inelastic collisions, the maximum possible amount of kinetic energy is transformed into other forms, such as sound and heat, while still obeying the law of conservation of momentum. The law of conservation of momentum is always obeyed.

3) Partially elastic collisions alum

- Momentum is conserved ($p_T = p_T'$) •
- Kinetic energy is not conserved $(E_k > E_k')$ i.e. some kinetic energy is transformed into sound or heat during the collision
- The objects do not stick together after the collision the objects bounce off each other and travel away as individual objects.
- Most of the collisions we investigate in Physics 11 are partially elastic

Percent elasticity =
$$(E_k'/E_k) \times 100\%$$
 = $\left(\frac{1}{2}M_A V_B^2 + \frac{1}{2}M_B V_B^2\right) \times 100\%$
Calculate % elasticity of examples from Lesson 1. $\frac{1}{2}M_B V_A^2 + \frac{1}{2}M_B V_B^2\right) \times 100\%$

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Lesson #1 example 3 (b) is a "perfectly inelastic" collision (the objects stick together after the collision)

$$% = \frac{2}{8} e \log \frac{1}{100} = \frac{1}{100} =$$

Lesson #1 example 3 (d) is a "partially elastic" collision. (the objects do not stick together, but there is transformation of kinetic energy into other forms such as sound and heat)

% elasticity =?
$$\left(\frac{1}{2}m_{A}V_{A}^{\prime} + \frac{1}{2}m_{B}V_{B}^{\prime}}{\frac{1}{2}m_{A}V_{A}^{2} + \frac{1}{2}m_{B}V_{B}^{2}}\right) \times 100\%$$

$$= \left(\frac{(1500)(057)^{2} + (960)(2)^{2}}{(1500)(4)^{2} + (980)(5^{2})^{2}}\right) \times 100\%$$

$$= 1.75\%$$