CONSERVATION OF MOMENTUM
COLLISION, COM

- Conservation of Linear Momentum

$\vec{P}_{system}$ = constant

$$(\vec{P}_i)_{sys} = (\vec{P}_f)_{sys}$$

↑ Before ↑ After

- Gun Bullet System

$$V_{recoil} = -\frac{mv}{M}$$

- mass - bullet system

$$V_{comb} = \frac{mv}{(m+M)}$$

- Momentum conservation hamesha ground frame me use karna h.

COLLISION

1) Elastic collision [e = 1]

$$KE_i = KE_f$$

2) Inelastic collision [e < 1]

$$KE_i \neq KE_f$$

3) Perfectly inelastic [e = 0]

$$KE_i \neq KE_f$$

★ Coefficient of Restitution

$$e = \frac{|\vec{v}_2 - \vec{v}_1|}{|\vec{u}_1 - \vec{u}_2|}$$

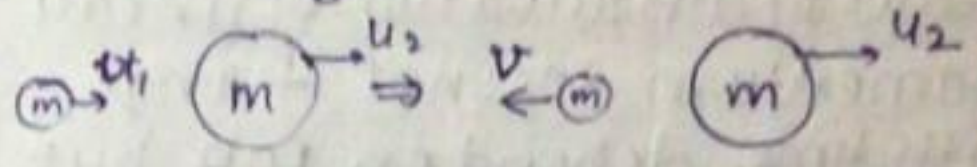
↓ always applied along the line of impulse.

$$e = \frac{v_2 - v_1}{u_1 - u_2}$$

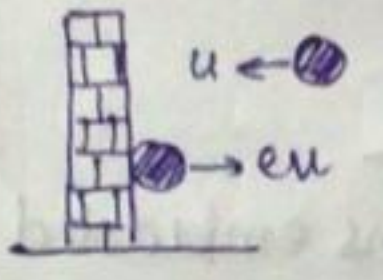
↑ velocity ke sign rakhege.

① • Mass = same
• Elastic collision ⇒ velocity exchanged
• 1-D linear collision

② Bhari object ki velocity me takkar ke baad koi significant change nhi ayega, velocity. vohi rhegi



CONCEPT



velocity after 1 collision = eu

$$V_n = e^n u$$

$$V_n = e^n\sqrt{2gh}$$

$$H_n = e^{2n} h_0$$

$$S_n = h_0\left(\frac{1+e^2}{1-e^2}\right)$$

$$t_n = e^n\sqrt{\frac{2h}{g}}$$

$$t_n = e^n t$$

Total time elapsed before the ball stops (Total time taken in bouncing)

$$T = \sqrt{\frac{2h}{g}}\left(\frac{1+e}{1-e}\right)$$

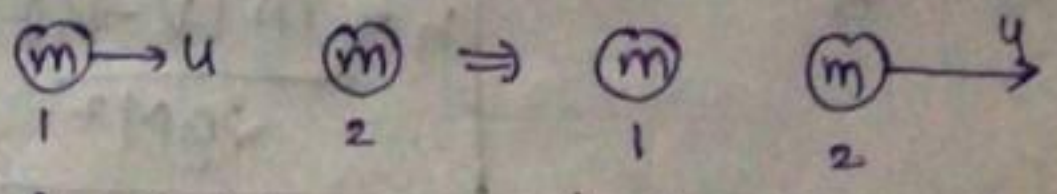
Average speed

$$|\vec{V}|_{avg} = \sqrt{\frac{gh}{2}}\left(\frac{1+e^2}{(1+e)^2}\right)$$

Average velocity

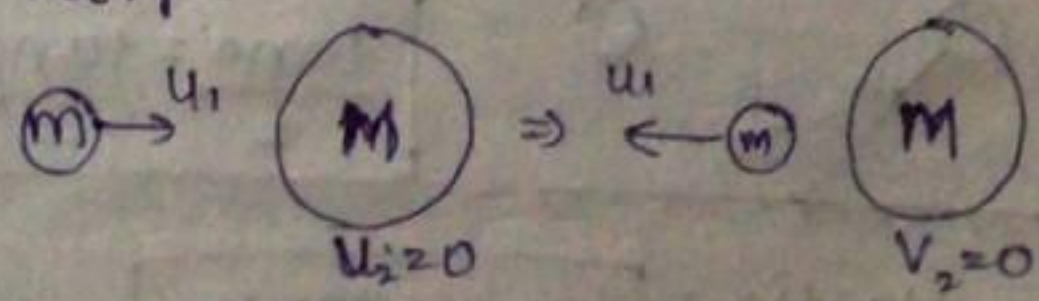
$$V_{avg} = \sqrt{\frac{gh}{2}}\left(\frac{1-e}{1+e}\right)$$

③ If Mass = equal, 2nd body at rest
. energy transfer = 100%.



1 ki velocity 2 ko mil jayegi and 1 rest pe.

④



→ Linear momentum and total energy remains conserved in all type of collisions.

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