HOT Questions

① Given: $m_1 = 8\,kg$

$m_2 = 2\,kg$

$F = 15\,N$.

Total mass = $m_1 + m_2 = 8 + 2 = 10\,kg$.

$$\boxed{F = ma}$$

$$\therefore a = \frac{F}{m} = \frac{15}{10} = 1.5\,ms^{-2}$$

F on 2 kg.

$$F = m_2 a$$

$$= 2 \times 1.5 = 3N$$

Force exerted on 2kg is 3N

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② Given: $K.E_T = K.E_B$

$m_1 : m_2 = 4 : 1$

$$\frac{1}{2} m_1 v_1^2 = \frac{1}{2} m_2 v_2^2$$

$$4 v_1^2 = 1 v_2^2$$

$$\left(\frac{v_1}{v_2}\right)^2 = \frac{1}{4}$$

$$\frac{v_1}{v_2} = \sqrt{\frac{1}{4}} = \frac{1}{2} \quad (i.e.)\ v_1 : v_2 = 1 : 2$$

Momenta:

$$m_1 v_1 : m_2 v_2$$

$$4 \times 1 : 1 \times 2$$

$$4 : 2$$

$$2 : 1$$

Ratio of momenta is 2 : 1

③ * The person gets hurt due to Newton's III law of motion

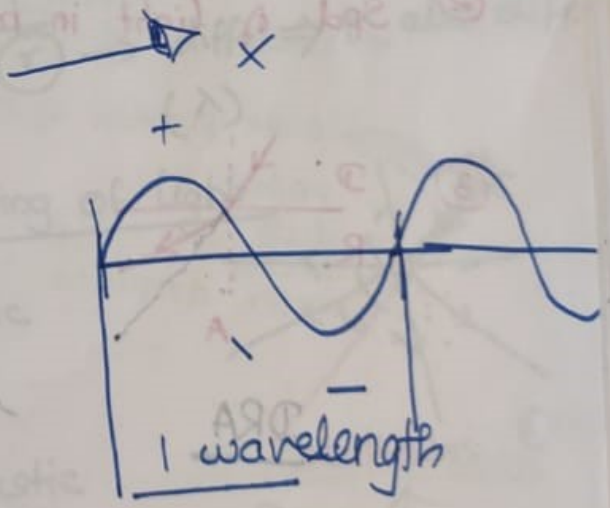
* By wearing a helmet by Newton's II law force is reduced by increasing the timeperiod

$$f \propto \frac{1}{t}$$

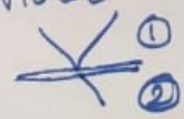
* Similarly, sudden brake makes the person to fall forward due to Newtons I law
* Wearing a seat belt can hold him to the seat

OPTICS

* Energy - waves - path → ray of light.
* Group of rays - Beam.
* Source of Light - luminous obj. (sun stars).
* dark room



Properties of Light.

1) Energy
2) St. line.
3) No medium
4) $c = 3 \times 10^8 \, ms^{-1}$
5) waves $\Rightarrow c = \nu\lambda$ (ν - frequency, λ - wavelength)
6) Diff. colour → Diff. λ
7) Violet - $\lambda \downarrow$ Red - $\lambda \uparrow$
8) 

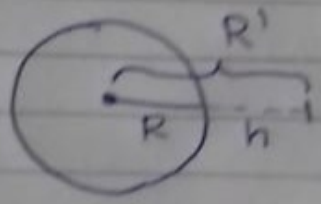
partly reflected & partly refracted.

Solved problem 3:

Given:

$$g' = \frac{1}{4}g \quad ; \quad R' = R+h$$

$$\boxed{g = \frac{GM}{R^2}}$$



G & M are same.

$$\therefore \frac{g}{g'} = \frac{1/R^2}{1/R'^2}$$

$$\frac{g}{g'} = \frac{1}{R^2} \times \frac{R'^2}{1} = \frac{R'^2}{R^2}$$

$$\frac{g}{\frac{1}{4}g} = \frac{(R+h)^2}{R^2}$$

$$4 = \left(\frac{R+h}{R}\right)^2$$

$$\left(\frac{R+h}{R}\right)^2 = 4$$

$$\frac{R+h}{R} = \sqrt{4} = 2$$

$$\frac{R+h}{R} = 2$$

$$R+h = 2R$$

$$h = 2R - R = R$$

$$h = R$$

$$\therefore R' = R+h \text{ (i.e.) } R$$

$$\boxed{R' = 2R}$$