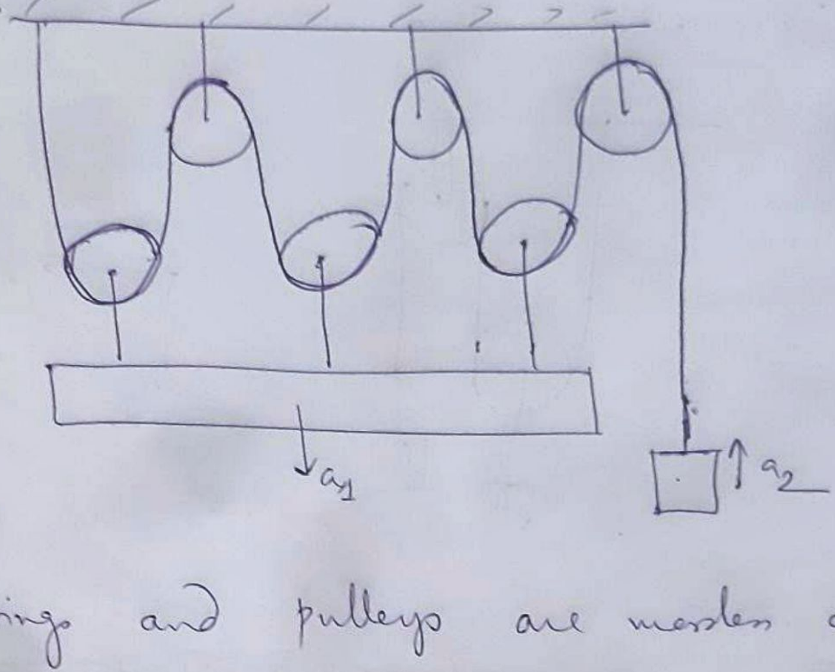
$$\sum_{i \in \{A,B\}} T_{sys_i} \cdot a_{sys_i} \cdot \cos\theta_i = 0$$ where A, B are systems.

$\Rightarrow (2T a_A \cos 180) + (T a_B \cos 0) = 0$

$\Rightarrow -2T a_A + T a_B = 0$

$\Rightarrow \boxed{2a_A = a_B} \longrightarrow$ Same as earlier.

Q (Easy)



Strings and pulleys are massless and frictionless. Relation between accelerations of the block (a_1 & a_2):

here A, B are systems.

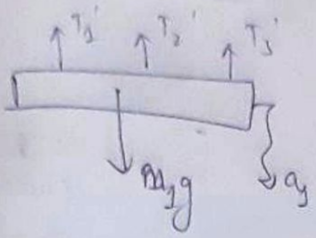
lier.

a_2

es and

acceleration

System – 1



Concepts Used

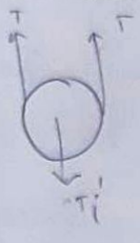
1. Constraint Relation
2. Equilibrium

Formulae Used

1. Trick Mentioned before.

$$m_1 g - \sum_{i=1}^{3} T_i' = m_1 a_1 \quad \text{---} (1)$$

For each ith pulley :-



Since pulley is massless

$\Rightarrow T_i' = 2T$

$\Rightarrow$ Eq (1) changes to $m_1 g - 6T = m_1 a_1$

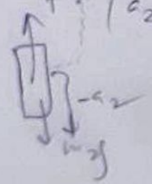
$\Rightarrow T_{sys_1} = 6T$

$a_{sys_1} = a_1$

$\theta = 180°$

System - 2

$(a_2) \rightarrow$ actual direction



$$T - m_2 g = m_2 a_2$$

$T_{sys_2} = T$

$a_{sys_2} = a_2$

$\theta = 0°$

~~Kasetsy~~ Applying the theorem :-

$$\sum_{i=1}^{2} T_{sys\,i} \cdot a_{sys\,i} \cos\theta_i = 0$$

$\Rightarrow \; -6T a_1 + T a_2 = 0$. [Since $\cos 180^\circ = -1$, $\cos 0^\circ = 1$]

$\Rightarrow \; \boxed{6a_1 = a_2}$

(Metum)

5 Three equal weights of mass 2kg each