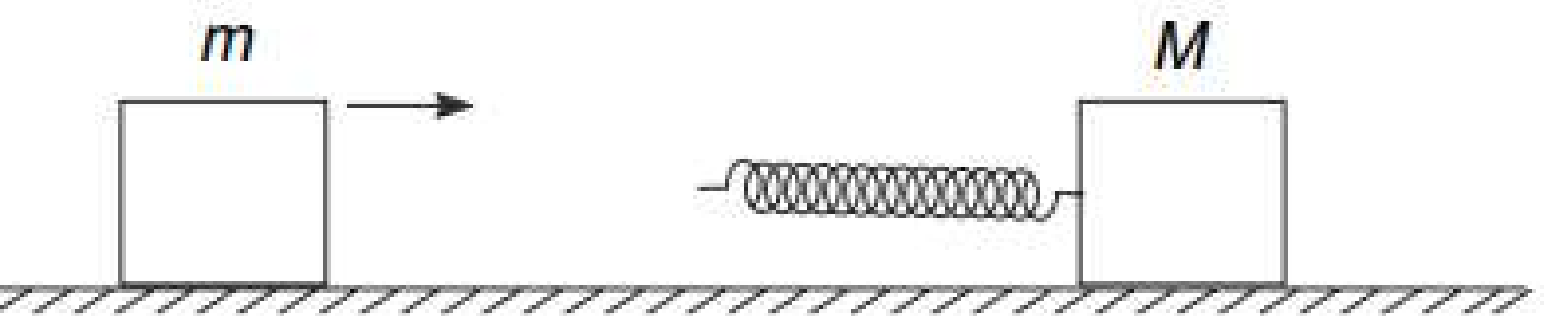


Two blocks of mass m and M are lying on a smooth table. A spring is attached with the block of mass M (see fig). Block of mass m is given a velocity towards the other block. Find the value of $\frac{M}{m}$ for which the kinetic energy of the system will never fall below one third of the initial kinetic energy imparted to the block of mass m .



KE of the system is minimum when compression in the spring is maximum. This happens when both the blocks have same velocity (Say V). If initial velocity of mass m is u then—

$$(M + m)V = mu \Rightarrow V = \frac{mu}{M + m}$$

According to the problem

$$\frac{1}{2}(M + m)\left(\frac{mu}{M + m}\right)^2 \geq \frac{1}{3} \cdot \frac{1}{2}mu^2$$

$$\Rightarrow \frac{m}{M + m} \geq \frac{1}{3} \Rightarrow \frac{M}{m} \leq 2$$