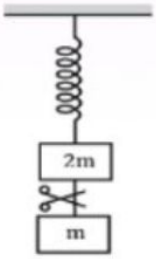
The system shown in the figure is in equilibrium at rest and the spring and string are massless. Now the string is cut. The acceleration of masses 2m and m just after the string is cut will be:



(A) $\frac{3g}{2}$ upwards, g downwards

(B) $\frac{g}{2}$ upwards, g downwards

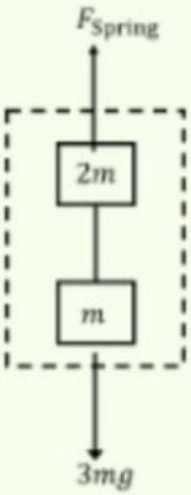
(C) g upwards, 2g downwards

(D) 2g upwards, g downwards

The correct option is **B** $\frac{g}{2}$ upwards, g downwards

Initially, when the system is in equilibrium:

FBD of system:

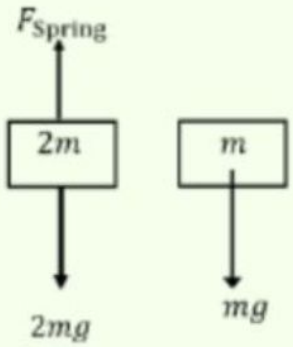


By applying equilibrium condition on system in vertical direction

$\Rightarrow F_{Spring} = 3mg$

Now, after the string is cut, T = 0 i.e tension in string becomes zero instantaneously, while spring force will act at its initial value F_{Spring}, due to inertia of spring.

FBD of individual blocks after string is cut, represented below:



Acceleration of block of mass m

$a_m = \frac{mg}{m}$

$\therefore a_m = g$ (Downwards)

Acceleration of block of mass 2m

$a_{2m} = \frac{F_{Spring} - 2mg}{2m} = \frac{mg}{2m}$

$\therefore a_{2m} = \frac{g}{2}$ (Upwards)