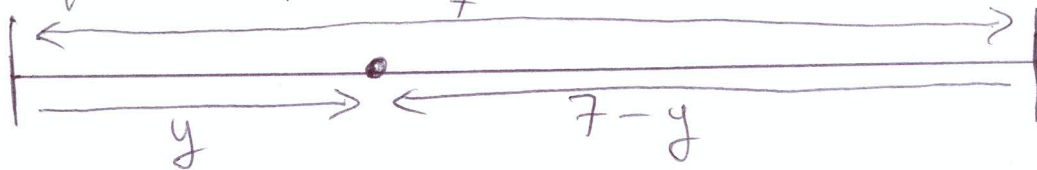


(i) To show SHM first find Equilibrium position.
Let equilibrium position be y m from the left wall



Forces



Hooke
 $F = k(\text{Ext})$

$$\left. \begin{aligned} |L| &= 12(y-1) \\ |R| &= 8(7-y)-1 \end{aligned} \right\} \begin{aligned} |R| &= 8(6-y) \end{aligned}$$

N II

$$\Sigma F = ma$$

At equilibrium

$$a = 0$$

$$-|L| + |R| = 0$$

$$-12(y-1) + 8(6-y) = 0$$

$$-12y + 12 + 48 - 8y = 0$$

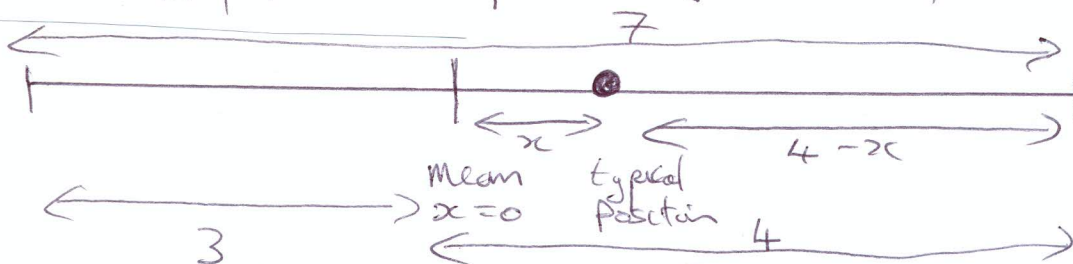
$$60 = 20y$$

$$3 = y$$

Equil position 3m from left wall.

Next Examine forces at a typical position:

x m from mean position (i.e. $3+x$ from left wall)



Forces:



Hooke

$$\left. \begin{aligned} |L'| &= 12(x+3)-1 \\ &= 12(x+2) \end{aligned} \right\} \begin{aligned} |R'| &= 8(4-x)-1 \\ &= 8(3-x) \end{aligned}$$

N II

$$\text{Nett } F = ma$$

$$\Rightarrow -|L'| + |R'| = 5a$$

$$\Rightarrow -12(x+2) + 8(3-x) = 5a$$

$$\Rightarrow -12x - 24 + 24 - 8x = 5a$$

$$\Rightarrow -20x = 5a$$

$$\Rightarrow$$

$$\boxed{a = -4x}$$

$\Rightarrow$ SHM $\omega = 2$ about point $3+x$ from left wall.