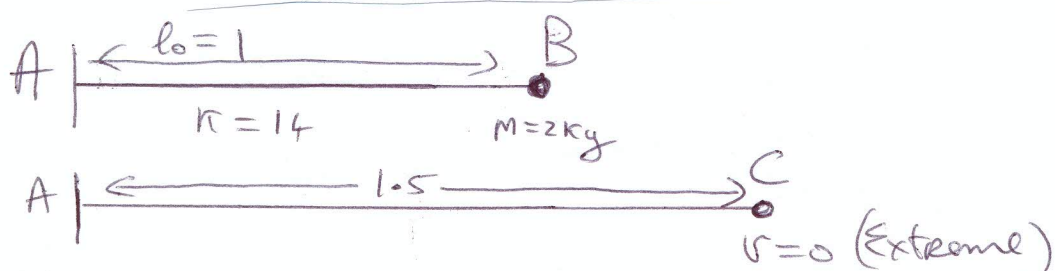


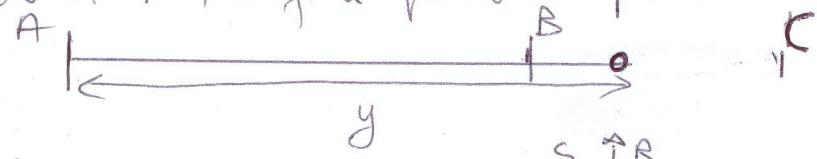
Ex 2: (1992)

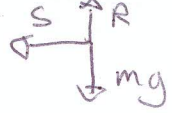
(b) A particle of mass 2 kg is attached to one end of a light elastic string of natural length 1 m and elastic constant 14 N/m. The other end of the string is fixed to a point A on a smooth horizontal table. The particle is pulled across the table and released from rest at a point C which is a distance 1.5 m from A. If B is a point on AC such that $|AB| = 1\text{m}$,

- (i) prove that the particle performs simple harmonic motion when travelling from C to B.
- (ii) calculate the time taken to travel from C to B.
- (iii) prove that the particle then travels for $\frac{4}{\sqrt{7}}$ s with constant speed.



(i) Show SHM first find equilibrium position, y metres from A.



Forces 

Hooke $\Rightarrow |S| = 14(y - 1)$

At equil $a = 0$

$\Sigma F = 0$

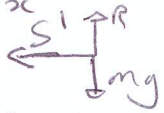
$\Rightarrow -14(y - 1) = 0$

$\Rightarrow \boxed{y = 1}$

Equil position 1m from A.

Examine typical position, $1+x$ metres from A.



Forces 

Hooke $\Rightarrow |S| = 14(1+x - 1) \Rightarrow |S| = 14x$

N II $\Rightarrow \Sigma F = ma$

$\Rightarrow -14x = 2a$

$\Rightarrow -7x = a$

which is SHM about B with $\omega = \sqrt{7}$

Also as $v = 0$ at C where $x = 0.5$

$\therefore \boxed{A = 0.5}$