$x = a\sin\omega t \Rightarrow \frac{dx}{dt} = a\omega\cos\omega t \Rightarrow \frac{d^2x}{dt^2} = -a\omega^2\sin\omega t.$

$\Rightarrow \text{accel} = -\omega^2(a\sin\omega t)$

$\Rightarrow \text{accel} = -\omega^2 x.$ qed.

a = amplitude (care!)

Typical position: $\longleftarrow 2.35+x \longrightarrow$ $m = 5kg$

Forces:

Accel: a

Hookes Law: $L = +140(2.35+x-2)$

$= +140(.35+x)$

$= 49+140x$

Friction Law: $F = \mu R$

$\Rightarrow F = R. \quad (\mu = 1)$

N II: $\Sigma \vec{F} = m\vec{a}$

$\vec{i}$ dirn

$-L+F = 5a$

$-49-140x+R = 5a$

$-49-140x+49 = 5a$

$\Rightarrow -140x = 5a$

$\boxed{-28x = a}$

$\vec{j}$ dirn

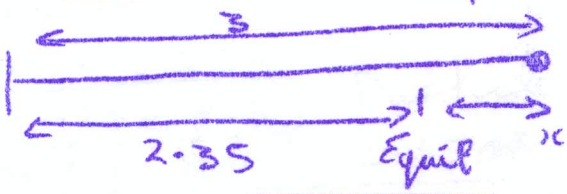
$R-W = 0.$

$R-5(9.8) = 0$

$R = 49$

Particle is performing SHM with $\omega = \sqrt{28}$ about a point 2.35 from wall.

Find Amplitude: Told $v = 0$ where particle is 3m from wall.

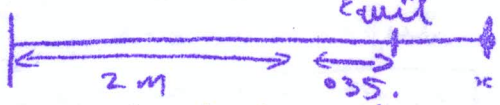


$x = 3-2.35$

$= .65.$

$v = 0$, where $x = .65 \Rightarrow \boxed{A = 0.65}$

Find time to go from a (Extreme) to point 2m from wall



Want time for particle to go from the + Extreme position to a position where $x = -.35$

$x = A\cos\omega t$ (as starts at extreme)

At required position $x = -.35$

$-.35 = .65\cos\sqrt{28}t.$

$\Rightarrow -\frac{35}{65} = \cos\sqrt{28}t.$

$\Rightarrow -.5385 = \cos\sqrt{28}t \Rightarrow 2.139 = \sqrt{28}t$

$\Rightarrow 0.404_{\text{secs}} = t.$

[To USE HINT GIVEN MUST DO THE COWARDS WAY!] [See Board]