ECE 333 – GREEN ELECTRIC ENERGY

HOMEWORK – 2

SOLUTIONS

1. **Answer for 1st question is left to the students. In case of any doubt, discuss with TA.**

2. **Initial Energy must be equal to the Final Energy**

Let initial velocity = v and final velocity = v'

Einitial = E(kinetic)=1/2mv²

Efinal = E(kinetic)+E(potential) = 1/2mv'² + mgh

Einitial = 1/2.2kg.(10m/s) ² = 100 joule

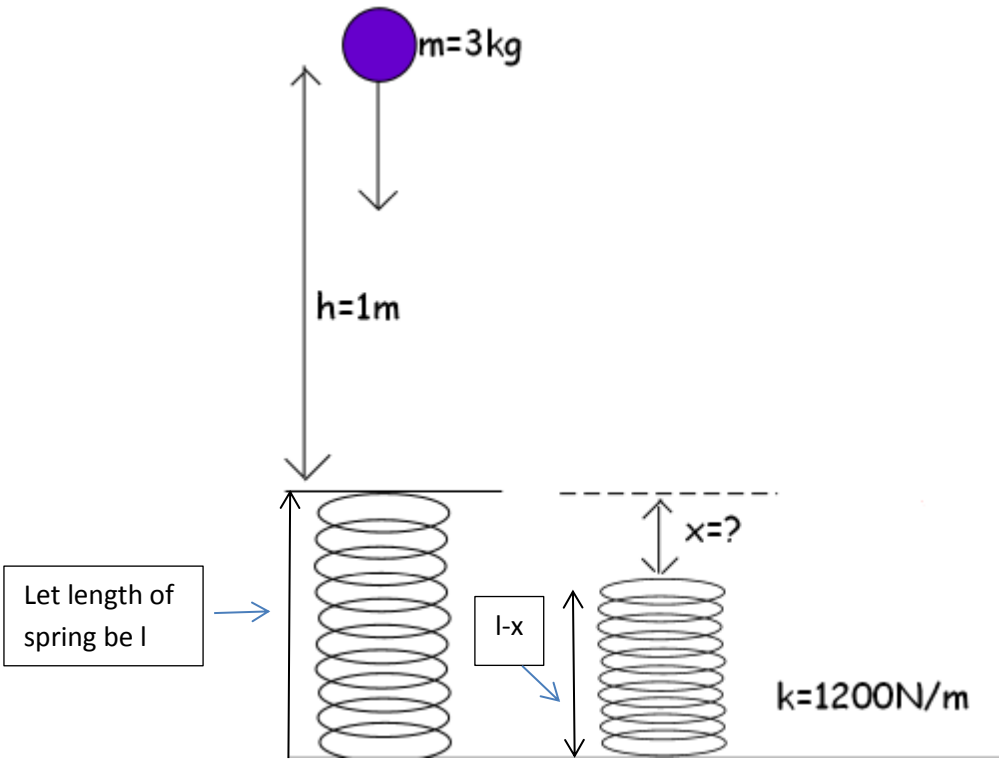
Efinal = 1/2.2kg.v'² + 2kg.10m/s².4m=80+v'²

Since Einitial = Efinal

100=80+v'²

v'=2√5m/s

3.



3.

$E_{initial} = E_{final}$

$E_{initial} = m \times g \times h_{total}$

$E_{initial} = 3 \times 10 \times (1 + l)$

$= 30 + 30l$ —— (1)

E_{final} = Ball potential Energy + Spring potential Energy

$= mg(l - x) + \frac{1}{2} k x^2$

$= 30l - 30x + \frac{1}{2} \times 1200 \times x^2$ (600)

$= 30l - 30x + 600x^2$ —— (2)

by law of energy conservation

$30 + 30l = 30l - 30x + 600x^2$

$600x^2 - 30x - 30 = 0$

$20x^2 - x - 1 = 0$

$20x^2 - 5x + 4x - 1 = 0$

$5x(4x - 1) + 1(4x - 1) = 0$

$x = \frac{1}{4} m$ or $x = -\frac{1}{5} m$ → not possible

so compression $= \frac{1}{4} m$.