Ex 2B

(1) $EPE = \frac{10(0.4)^2}{2\times 0.8} = 1\ J$

(2) $EPE = \frac{150(0.1)^2}{2\times 0.5} = 1.5\ J$

(3)(a) $EPE = WD = \frac{8(0.3)^2}{2\times 0.5} = 0.72\ J$

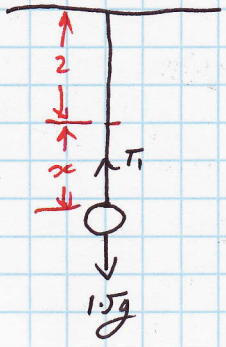
(b) $WD = EPE = \frac{8}{2\times 0.5}(0.8^2 - 0.25^2) = 4.62\ J$

(4) (a) $WD = \Delta EPE = \frac{200(0.1)^2}{2\times 0.8} = 1.25\ J$

(b) $WD = \Delta EPE = \frac{200}{2\times 0.8}(0.15^2 - 0.05^2) = 2.5\ J$

They are different because more work is required to move from one state of compression to another than its natural length into a state of compression.

(5)



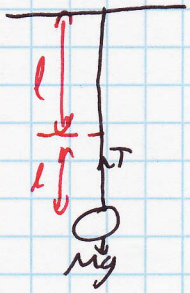
$T_1 = 1.5g$

$1.5g = \frac{16.x}{2}$

$x = 1.8375$

$\Delta EPE = \frac{16}{2\times 2}(2^2 - 1.8375^2) = 2.49\ J.$

(6)



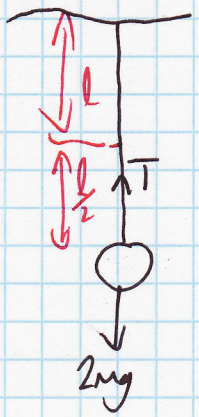
$EPE = T = Mg$

$Mg = \frac{\lambda l}{l}$

$\lambda = Mg$

Now $EPE = \frac{Mg\,l^2}{2l} = \frac{Mgl}{2}\ J.$

(7)



$T = 2mg$

$2mg = \frac{\lambda\, 0.5l}{l}$

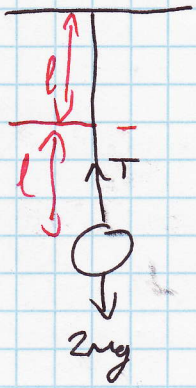
$\lambda = 4mg$

Now $w.d = \frac{4mg}{2l}\left(l^2 - \frac{l^2}{4}\right)$

$= \frac{2mg}{l}\left(\frac{3l^2}{4}\right)$

$= \frac{3mgl}{2}$ J

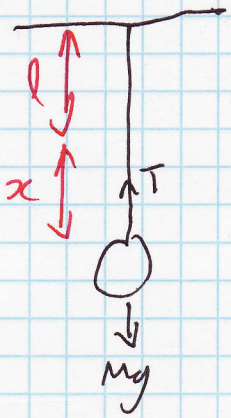
(8)



$T = 2mg$

$2mg = \frac{\lambda l}{l}$

$\lambda = 2mg$



$T = Mg$

$Mg = \frac{2mgx}{l}$

$x = \frac{l}{2}$

$EPE = \frac{2mg}{2l}\left(\frac{l}{2}\right)^2 = \frac{Mgl}{4}$ J.