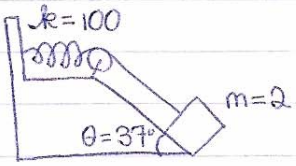
Class Notes – Lecture 24 (REVIEW 2) : Biswas 12 October 2009

No rocket problems **OR** Kepler's Laws (7.6)
Homework due November 18

1. (76)



$N = mg\cos\theta$

$f_k = \mu_k mg\cos\theta$

$W_{nc} = \Delta KE + \Delta PE_g + \Delta PE_s$

$h = d\sin\theta$

$= [-mg(d\sin\theta)] + [\frac{1}{2}kx^2 - 0]$

$= -\mu_k mg\cos\theta(d)$

C.

2. $m_1 = 20$ $v_1 = 0$
$m_2 = 10$ $v_2 = 3$

$m_1v_{1i} + m_2v_{2i} = m_1v_{1f} + m_2v_{2f}$ | $v_{1i} + v_{1f} = v_{2i} + v_{2f}$

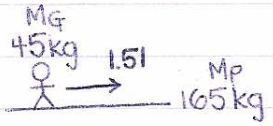
$0 + 10(3) = 20v_{1f} + 10v_{2f}$ $v_{1f} - v_{2f} = 3$

$30 = 20v_{1f} + 10v_{2f}$ → $2v_{1f} + v_{2f} = 3$

$3v_{1f} = 6$

D. 2 m/s

3.



$m_1v_{1i} + m_2v_{2i} = m_1v_{1f} + m_2v_{2f}$ | $v_{rel} = v_G - v_P$

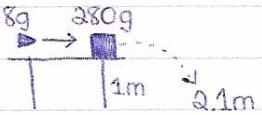
$0 = 45v_G + 165v_P$ $(1.51 = v_G - v_P)\,165$

$0 = 45v_G + 165v_P$

$v_G =$

B. 1.19 m/s

4.



a) $0.008v_b + 0.28(0) = (.008 + .28)v_f$

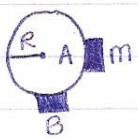
$v_f = 0.028v_b$

b) find t; $v_f(t) = 2.1\text{m}$ → $\Delta y = v_yt + \frac{1}{2}at^2$

solve for v_b

D. 166 m/s

5.

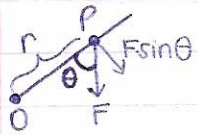


acceleration of m at A?

C. ω^2R

6. acceleration at B? on the axis of rotation at the pole

A. 0

7. 

$\tau = r F \sin\theta$

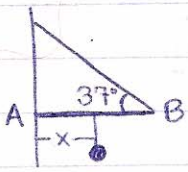
negative (CW)

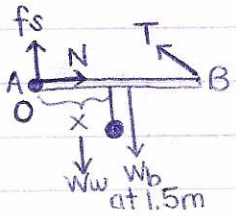
8. 

$f_s = 0.4$

don't need L

D. 51°

9. 



$\Sigma F_x = N - T\cos 37^\circ = 0$

$N = T\cos 37^\circ$

$\Sigma F_y = \mu_s N + T\sin 37^\circ - 2w = 0$

$\Sigma \tau = -w(x) - w(1.5) + \frac{3}{L} T\sin 37^\circ = 0$

$T = \frac{2w}{\mu_s \cos\theta + \sin\theta}$

$-w(x) - 1.5w + \frac{6w \sin 37}{\mu_s \cos\theta + \sin\theta} = 0$

Solve for x