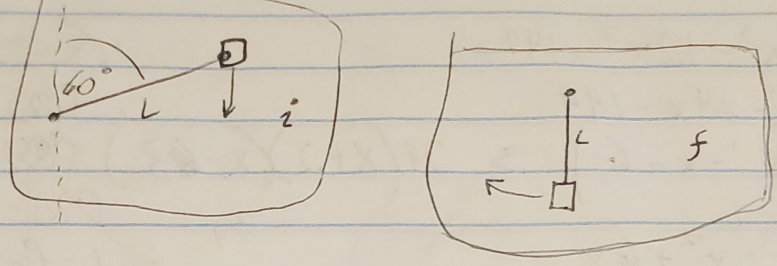
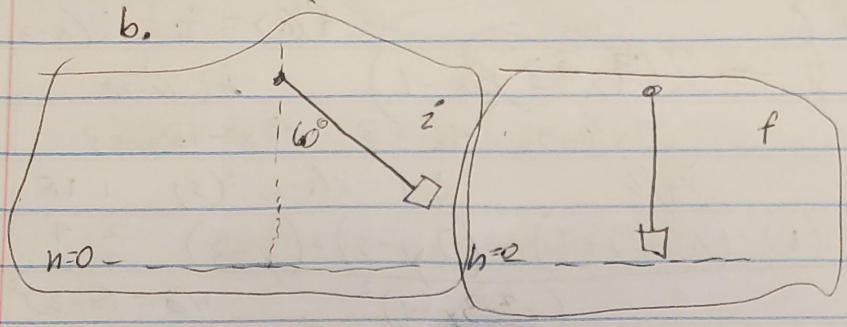
1. a.



b.

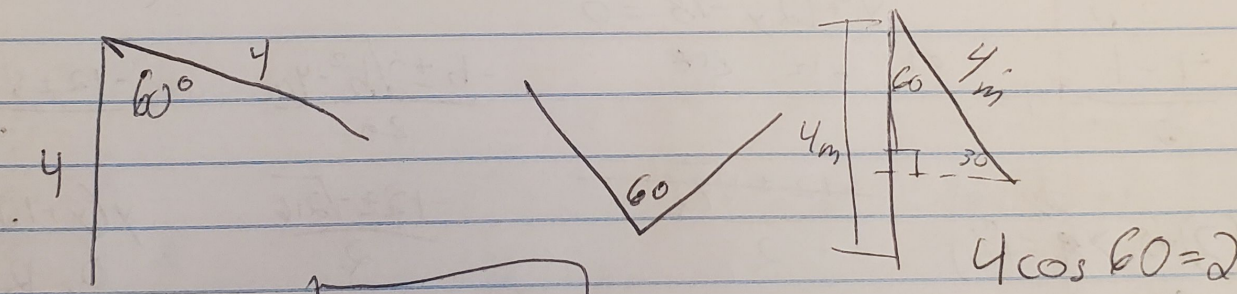


c. $W_{NC} + mgh_i + \frac{1}{2}mv_i^2 = \frac{1}{2}mv_f^2 + mgh_f$ (0, 0, 0)

d. Tension on the chain

e. ~~Yes~~ no Tension is perpendicular to the motion

f.



2 meters

$$W_{NC} + mgh = \frac{1}{2}mv^2$$

$$\frac{W_{NC} + mgh}{0.5\,m} = v^2$$

$$v = \sqrt{\frac{2(W_{NC} + mgh)}{0.5\,m}}$$

$$v = \sqrt{2gh} = \sqrt{2(9.8)(2)}$$

6.26 m/s

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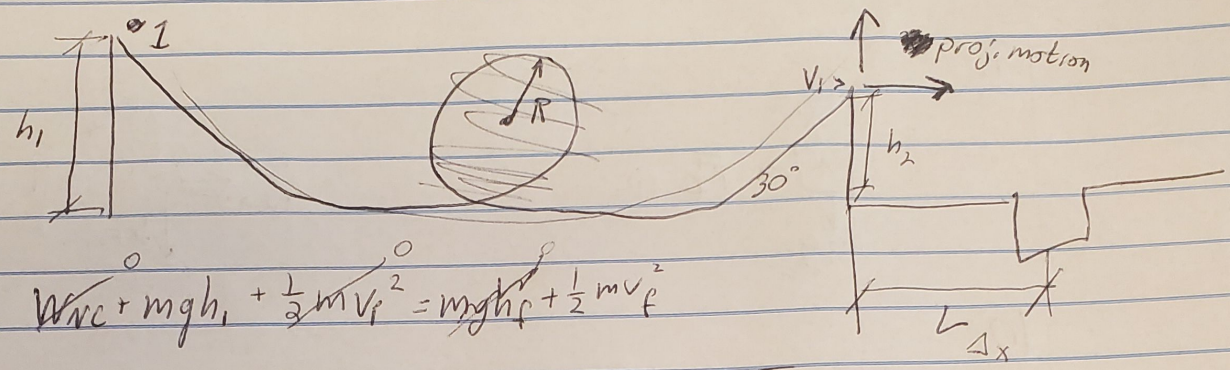
3. $m_{Ball} = 0.1kg$ $h_1 = 2m$ $r = 0.8m$ $h_2 = 0.2m$
$L = ?$ solve



$W_{NC} + mgh_1 + \frac{1}{2}mv_i^2 = mgh_f + \frac{1}{2}mv_f^2$

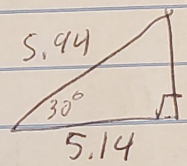
$mgh_1 = \frac{1}{2}mv_f^2 + mgh_f$

$\frac{2(mgh_1 - mgh_2)}{m} = v^2$ $2(gh_1 - gh_2) \Rightarrow 2g(h_1 - h_2)$

$v = \sqrt{2g\Delta h}$ $\sqrt{2(9.8)(1.8)}$ 5.94 m/s

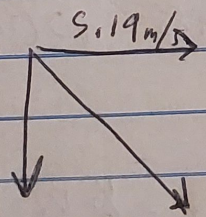
$y^f = -4.9t^2 + 2.97t + 0.2$

$t = 0.67$ seconds



$x_f = V_i \cos\theta\, t + x_i$ $(5.14)(0.67) = 3.44m$

4.



$a^2 + b^2 = c^2$

$5.14^2 + 3.63^2 = 36.6$ $c = 6.29$ m/s

2. $v = \sqrt{2g\Delta h}$

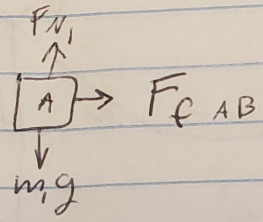
6. no

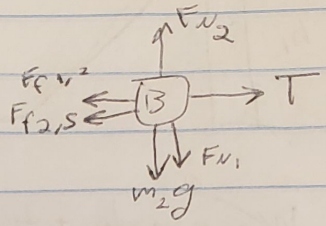
7. negative only

8.

positive

9.





10.

$\Sigma F_{y\,A} = F_{N_1} - m_1 g = 0$

$\Sigma F_{x\,A} = \mu_s F_{N_1} = ma$

$\Sigma F_{y\,B} = F_{N_2} - m_2 g - F_{N_1} = 0$

$\Sigma F_{x\,B} = T - \mu_s F_{N_1} - \mu_k F_{N_2} = m_2 a$

$v = \sqrt{2ax}$

$m_1 = 2\,kg \quad m_2 = 5\,kg \quad T = 40\,N$

$m_1 a = \mu_s m_1 g \quad a = \mu g$

$\mu_s = 0.4 \quad \mu_k = 0.2$

$x = 10\,m$

$3.92 = (0.4)(9.8)$

$\boxed{v = 8.85\,m/s}$

11.

$W_{NC} + mgh_i + \frac{1}{2}mv_i^2 = mgh_f + \frac{1}{2}mv_f^2$

$W_{NC} = Fx \quad F = ma$

$W_{NC} = \frac{1}{2}mv_f^2$

$max = \frac{1}{2}mv_f^2$

$2ax = v_f^2 \quad v_f = \sqrt{2ax}$

$8.85 = \sqrt{2(3.92)(10)}$

$\boxed{v = 8.85\,m/s}$

12.

$a = \frac{\Delta v}{t}$

$\frac{v_f - v_i}{t} x = \frac{1}{2} v_f^2$

$x = \frac{1}{2} v_f^2 \,/\, v_f - v_i$