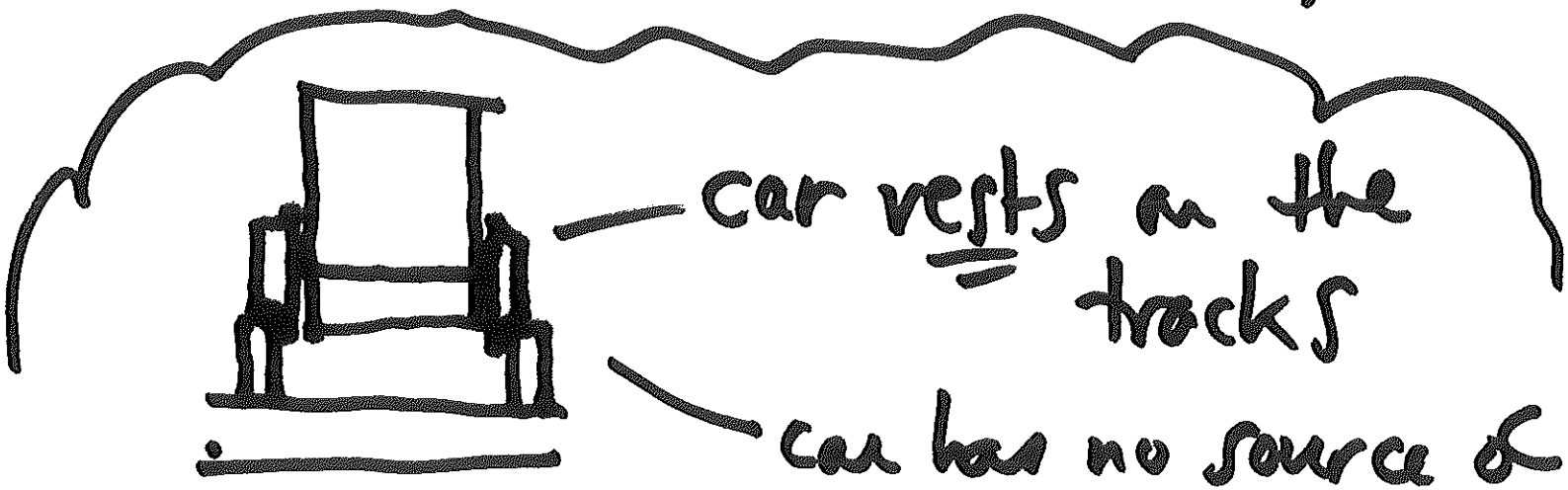
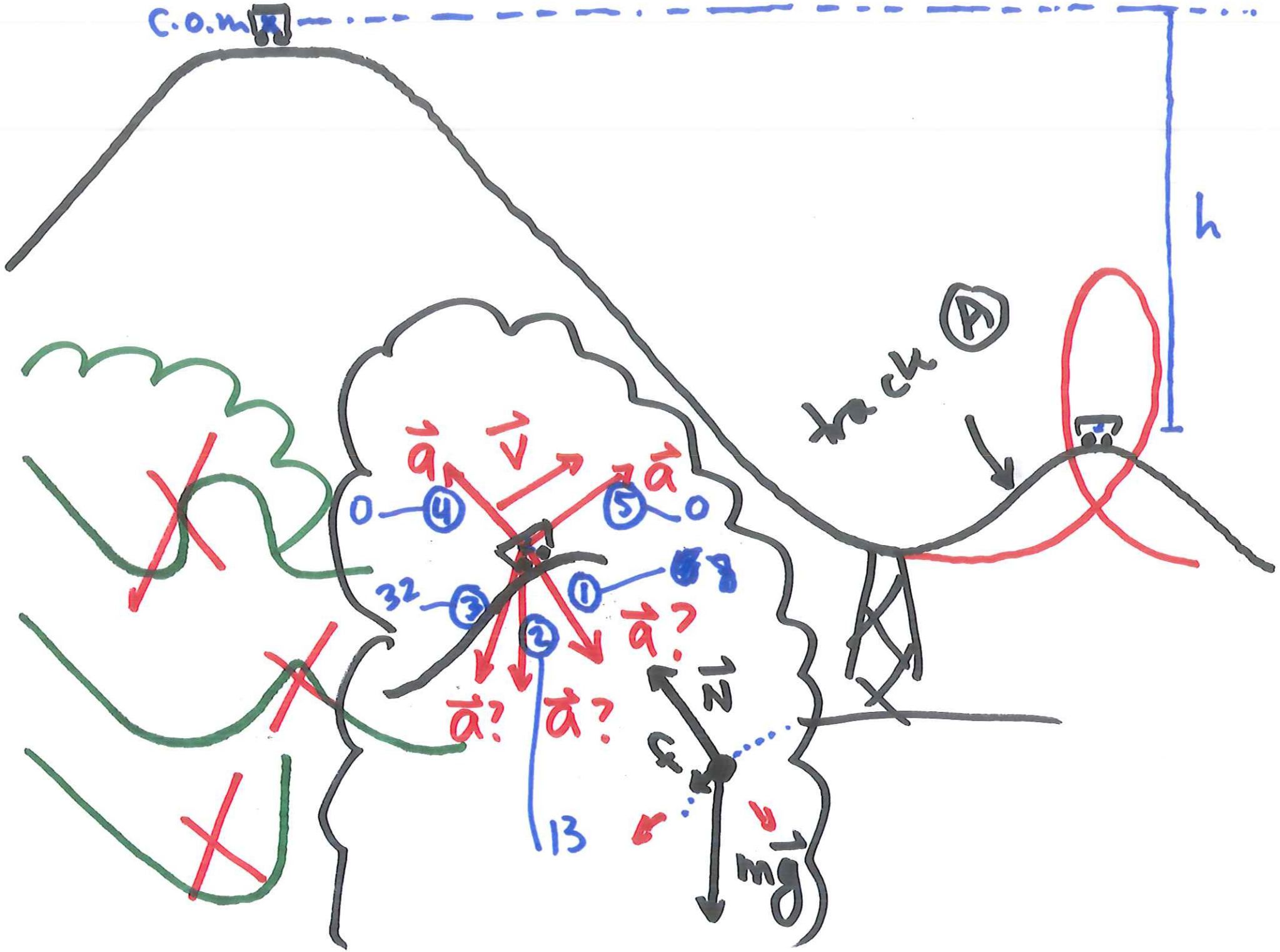
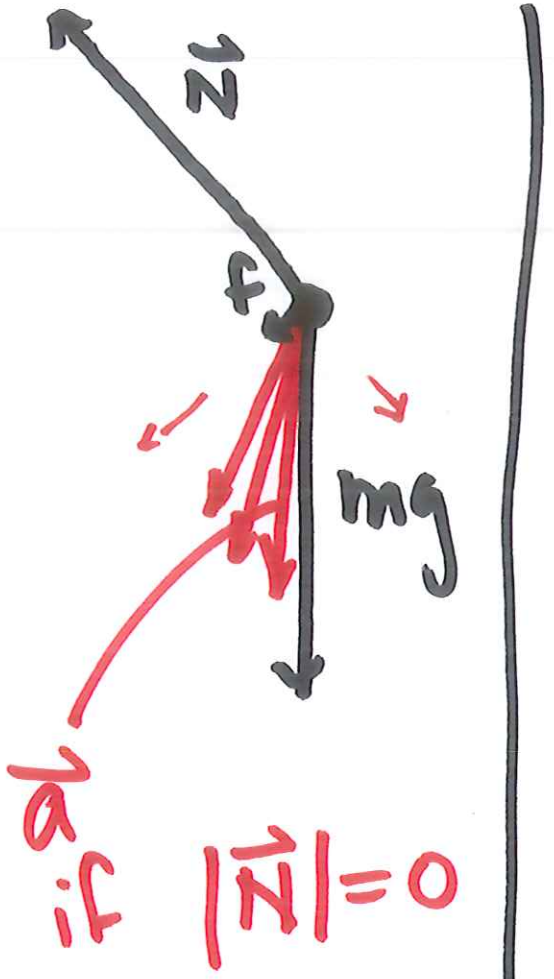
NYU Physics I – 2016-09-29.

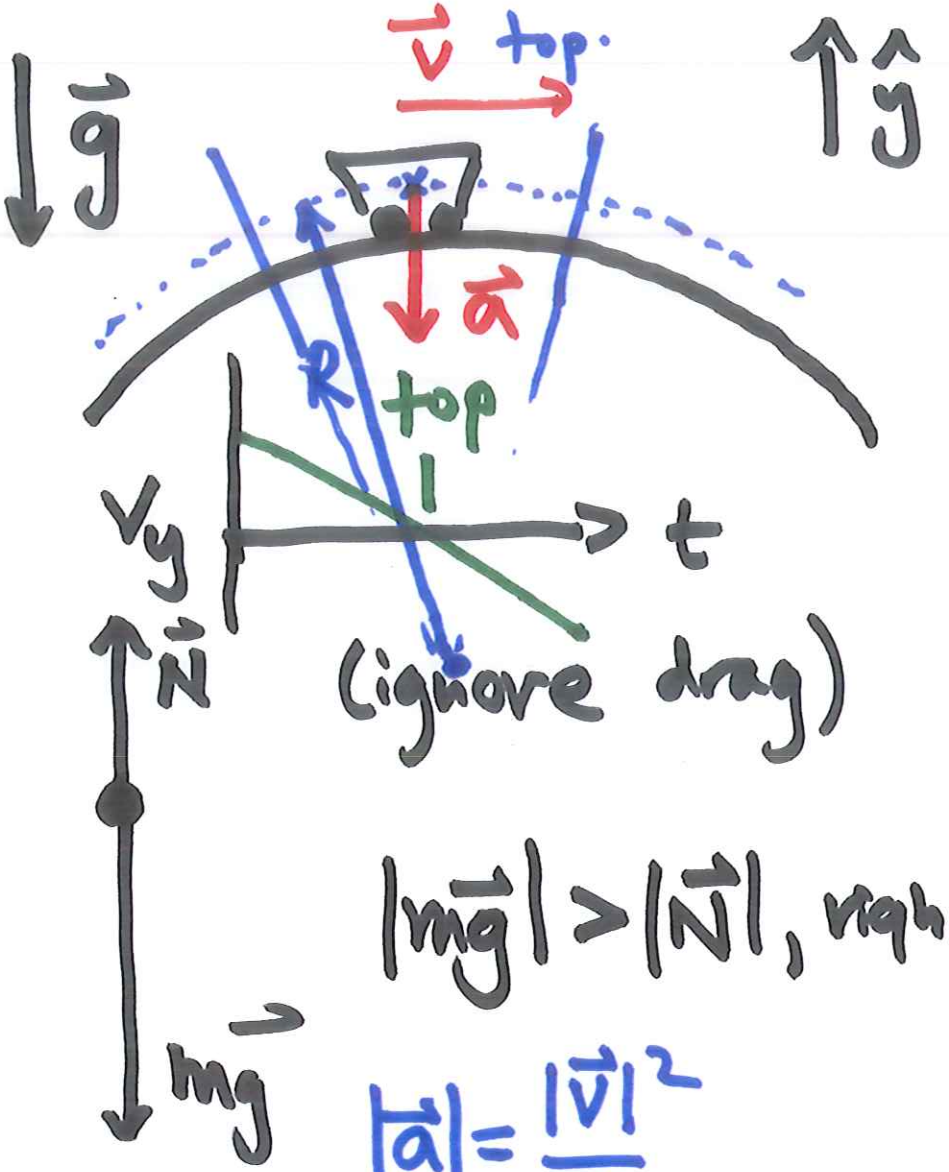
Agenda: - Qs
- returned work.
- reading.
- Roller Coaster Design School.




C.O.M
h
track
A
$\vec{a}$
$\vec{v}$
$\vec{a}$
0
4
5
0
32
3
1
2
$\vec{a}$?
$\vec{a}$?
$\vec{a}$?
13
$\vec{N}$
$\vec{f}$
$m\vec{g}$



if $|\vec{N}| = 0$



$|m\vec{g}| > |\vec{N}|$, why?

$$|\vec{a}| = \frac{|\vec{v}|^2}{R}$$

y: $$|\vec{N}| - |m\vec{g}| = -m|\vec{a}| = -m\frac{|\vec{v}|^2}{R}$$

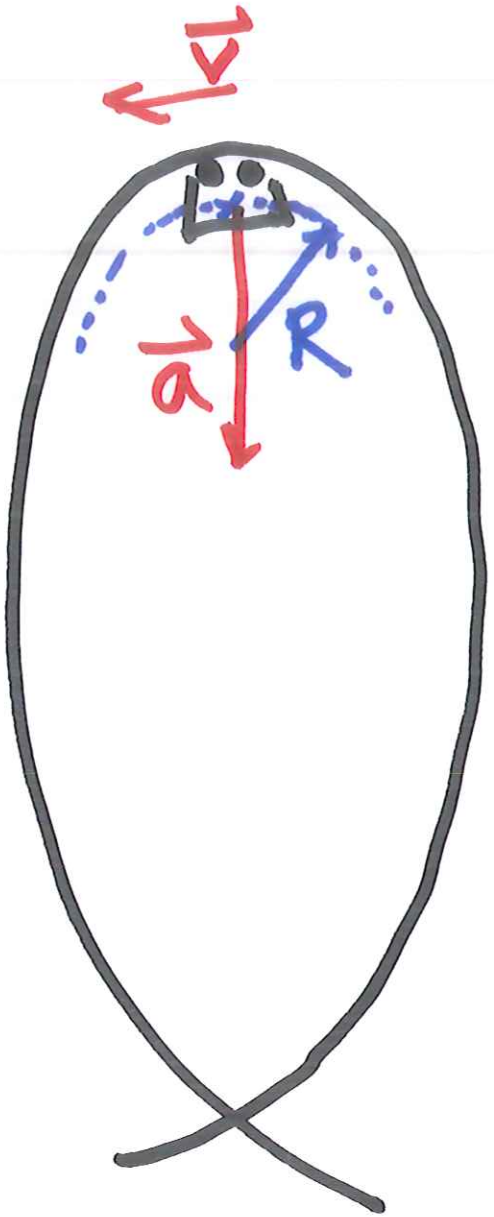
$$N - mg = -m\frac{v^2}{R}$$

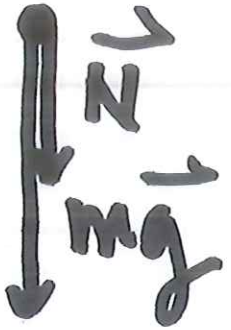
$|\vec{N}| = m|\vec{g}| - m\frac{|\vec{v}|^2}{R}$ (only works if N is pushing away from the tracks.)

$\frac{1}{2}m|\vec{v}|^2 = mgh$

$|\vec{N}| = m|\vec{g}| - m\frac{2gh}{R} = mg - mg\left(\frac{2h}{R}\right) = mg\left(1 - \frac{2h}{R}\right)$

#1 rule of R.C.D.S.: Don't let the magnitude of the Normal force get negative





$$-N - mg = -m\frac{v^2}{R}$$

$$N = m\frac{v^2}{R} - mg$$