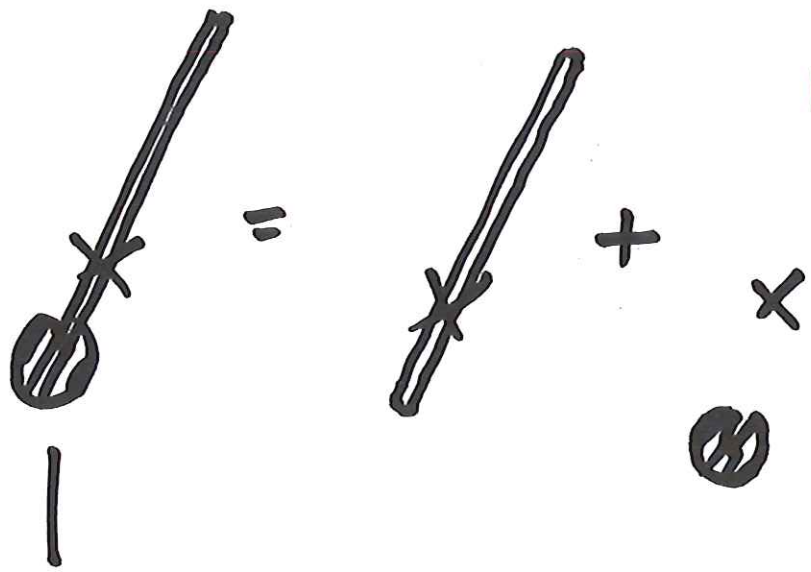
2018-11-15 NYU Physics I

- "Finish" yesterday.
- Qs.
- Ballistics.
- ULS — ~~tomorrow~~ 1067 @ 11
  Matt Kleban

- Newtonian gravity.
- $\frac{GM_m}{R^2}$

$\rightarrow M$



Finishing problem from 2018-11-13

$$I_{total} = \underbrace{\frac{1}{12}ml^2}_{\text{rod around com.}} + \underbrace{m\left(\frac{l}{4}\right)^2}_{\parallel \text{ axis thm. for rod.}} + \underbrace{m\left(\frac{l}{4}\right)^2}_{\text{blob @ } \frac{l}{4}.} = \frac{5}{24}ml^2$$

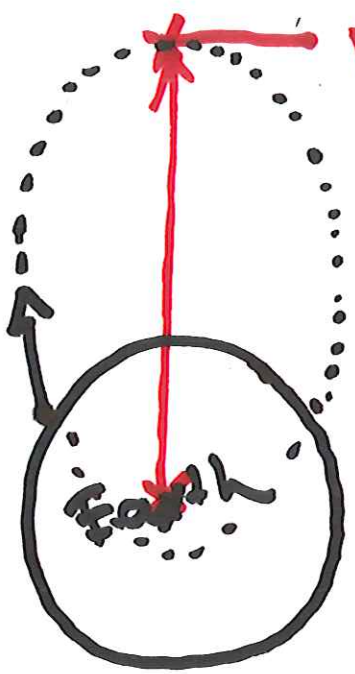
$$I_{total}\,\omega_{cm} = \frac{mul}{4}$$

See 2018-11-13.

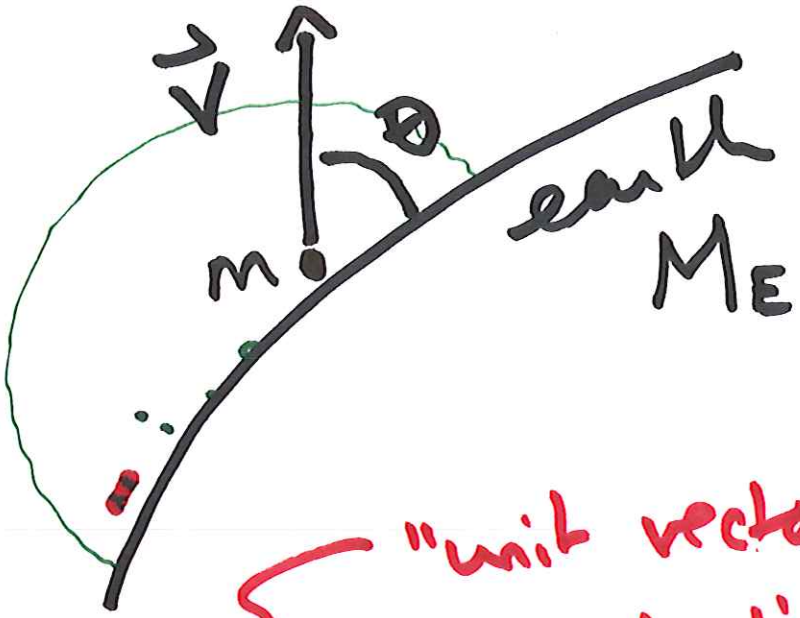
$$\omega_{cm} = \frac{\frac{mul}{4}}{\frac{5}{24}ml^2} = \frac{6}{5}\frac{u}{l}$$

!

that finishes the problem from last time.



r_{ap} apocenter apogee



M_E

$$F = -\frac{GM_\oplus m}{r^2}\hat{r}$$

"unit vector" radial direction

$|\hat{r}| = 1$

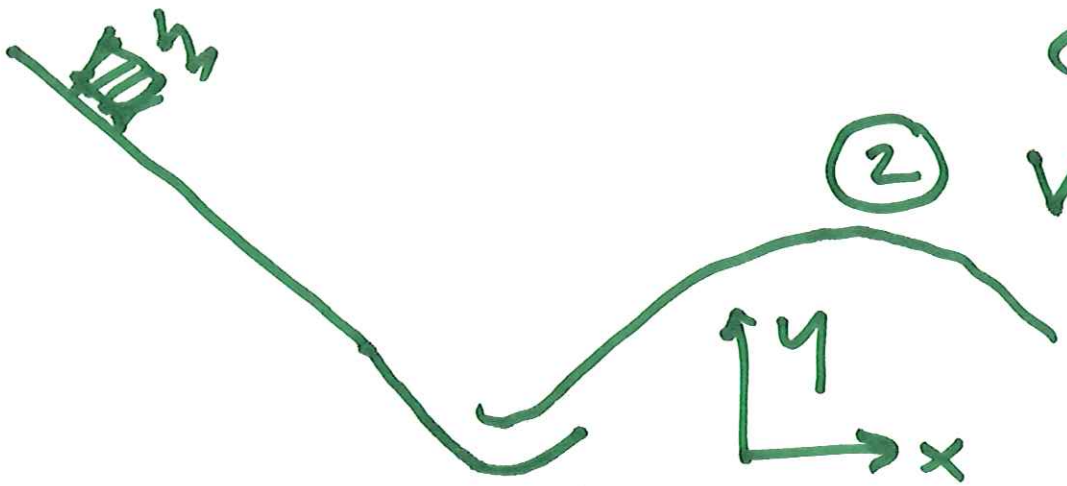
negative sign.

remember?

① Energy conservation

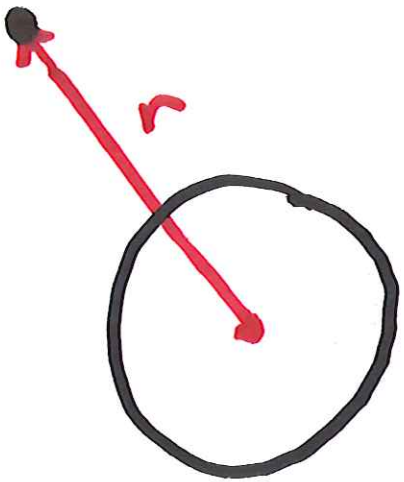
PE + KE

② V_x is <u>invariant</u>



"invariant" — does not change

"conserved" — changes can be <u>accounted for</u>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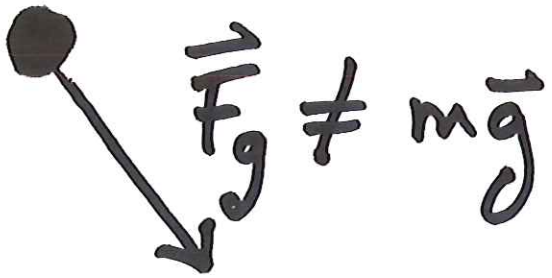
$\vec{F}_g \neq m\vec{g}$