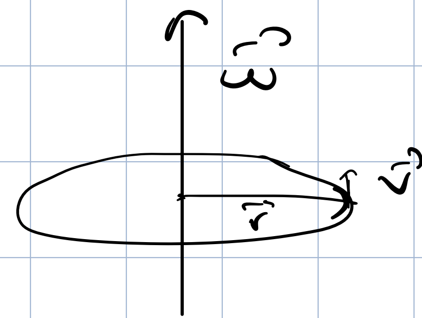
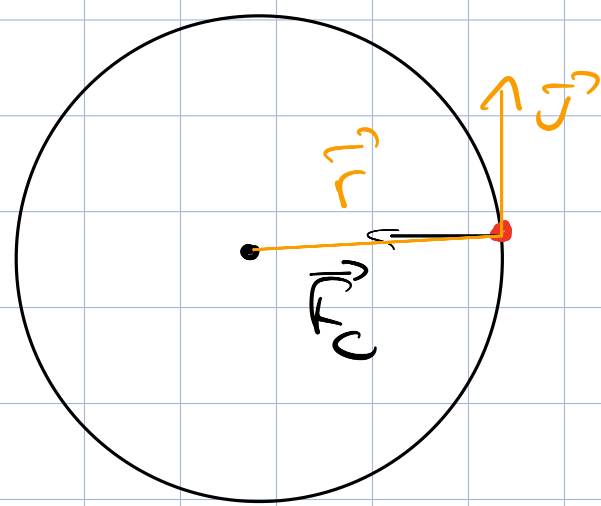
Série 8 prep



(1)

(a)

mouvement central
$\Leftrightarrow$ moment cinétique cste



$$\vec{L}_O = \vec{r} \wedge m\vec{v}$$

$$= m\vec{r} \wedge (\vec{\omega} \wedge \vec{r}) \qquad \vec{v} = \vec{\omega} \wedge \vec{r}$$

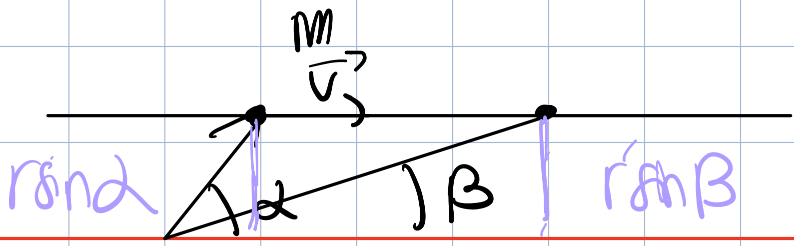
$$= m(\vec{r} \cdot \vec{r})\vec{\omega} - (\vec{r} \cdot \vec{\omega})\vec{r}$$

$$= \underline{m r^2 \vec{\omega} \ (-0)}$$

$$|\vec{L}_O| = |\vec{r}||\vec{v}| m$$

$$\vec{a} \wedge (\vec{b} \wedge \vec{c})$$
$$= (\vec{a} \cdot \vec{c})\vec{b} - (\vec{a} \cdot \vec{b})\vec{c}$$

b



$$\left|\vec{L}\right| = \vec{r} \wedge m\vec{v} = |\vec{r}||\vec{v}| \sin\alpha \, m$$

$$= \left|\vec{L}\right| = \vec{r} \wedge m\vec{v} = |\vec{r}||\vec{v}| \sin\beta \, m$$

<u>cste</u>

② Force de gravitation

$$\vec{g} = -G \frac{M}{d^2} \frac{\vec{r}}{r}$$

$$E_m = K + V(\vec{r})$$

$$= \frac{1}{2} m v^2 - \frac{GMm}{R} + C$$

$E_m = \text{cste}$

Qd le corps quitte la Terre :

$$E_{m\,\text{sortie}} = \frac{1}{2} m v_0^2 - \frac{GMm}{R} + C$$

$$E_{m\,\text{inf}} = \frac{1}{2} m v_\infty^2 - \frac{GMm}{r} + C$$

$v_\infty \simeq 0 \quad r \simeq \infty$

$$= 0 + 0 + C.$$

$$\frac{1}{2} m v_0^2 = \frac{GMm}{R}$$

$$\Leftrightarrow \quad v_0^2 = \frac{2GMm}{mR}$$

$$\Leftrightarrow \quad v_0 = \sqrt{\frac{2GMm}{mR}}$$

③ $\vec{L} = \vec{r} \wedge m\vec{v}$

$= |\vec{r}| \cdot |\vec{v}| \cdot \sin\alpha \cdot m$

- force est centrale

$\Rightarrow L$ constant

$F_{elec} = q\vec{E}$ $\left(V = m\,Pot(x)\right)$

energie potentielle

toute force dérive

$$\int_{0}^{x} \vec{F}\, dR = Pot(x) - \underline{Pot(0)}$$

$Pot(0) = 0$

$\int$

$$E_m = K + V(\vec{r})$$

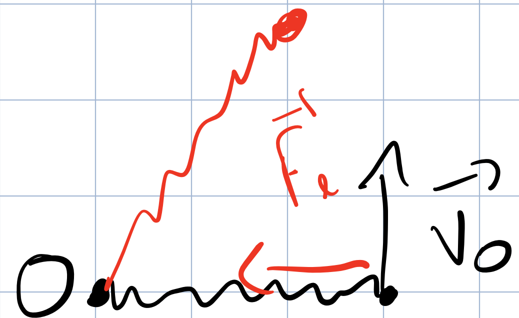
$$= \frac{1}{2} m v^2 - G \frac{Mm}{R} + \frac{1}{2} k (\Delta x)^2$$

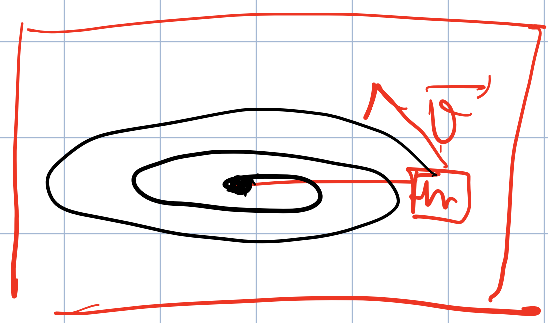
$$V(\vec{r}) =$$

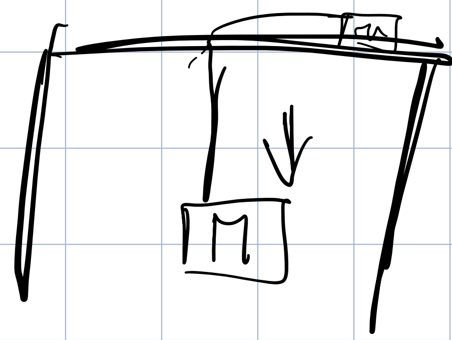
$$\int_0^x F \, dx = Pot(x) - Pot(0)$$

$$Pot(0) = 0$$

$$Pot(x) = \sqrt{h^2 + x^2} \, K l_0 - \frac{1}{2} x^2$$







$\vec{L_O}$ M et m

<u>Energies</u>

$$\vec{L_O} = |\vec{OP}| \cdot \boxed{|\vec{v}|} \cdot \boxed{\sin\alpha} \cdot m$$

$$\vec{v} = \dot{\rho}\,\vec{u_\rho} + \rho\dot{\theta}\,\vec{u_\theta}$$

$$\vec{OP} = \left(\rho\,\vec{u_\rho} + \theta\,\vec{u_\theta}\right)$$

$$\vec{L_O} = m\,(\rho\,\vec{u_\rho}) \times \left(\dot{\rho}\,\vec{u_\rho} + \rho\dot{\theta}\,\vec{u_\theta}\right)$$

$$= m\,\rho^2\dot{\theta}\,\vec{e_z}$$

$\dot{\rho}\rho$

$$\vec{M_O} = m\left(2\rho\dot{\rho}\dot{\theta} + \rho\ddot{\theta}\right)\vec{e_z} = 0.$$

$$f(x) = x^2$$

$$p(r)$$

$$f(p(r))$$