

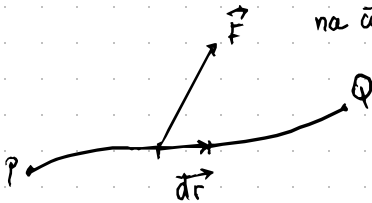
# 4. RAD, SNAGA I ENERGIJA

Rad sile:  $dW \equiv \vec{F} \cdot d\vec{r}$

sila  
na česticu

pomak čestice  
(element putanje)

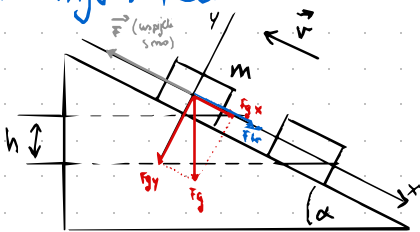
$\vec{F}[\vec{r}]$  jer ovisi o  
u prostoru



$$W_{PQ} = \int_P^Q dW = \int_P^Q \vec{F}[\vec{r}] \cdot d\vec{r}$$

\* u kružnom gibanju tangencijalna sila čini rad, centripetalna ne  
→ sila u smjeru gibanja = pozitivan rad

Primer: kosina



komponenta od x-osi

$$F_x = -mg \cdot \sin \alpha$$

$$dW = F_x \cdot dx$$

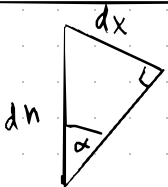
\* gibanje tijela uz kosinu određeno  
parametrima  $d, \mu$  i mi stalnom brzinom  
W pri uspinjanju na h?

$$dW = \vec{F} \cdot d\vec{r}$$

$$F_x \hat{x} + F_y \hat{y} + F_z \hat{z} \rightarrow dx \hat{x} + dy \hat{y} + dz \hat{z}$$

$$dW = F_x dx + F_y dy + F_z dz$$

visinski pomak:



$$\Rightarrow |dh| = \sin \alpha |dx|$$

ali budući da je pomak  
u suprotnom smjeru pokretanja  
od x →  $\ominus$

$$\Rightarrow dx = -dh \frac{1}{\sin \alpha}$$

$$* dh = -dx \cdot \sin \alpha$$

$$\begin{aligned} dW = F_x dx &= -mg(\sin \alpha + \mu \cos \alpha) \left( \frac{-dh}{\sin \alpha} \right) \\ &= mg(1 + \mu \cot \alpha) dh \end{aligned}$$

$$W = mg(1 + \mu \cot \alpha) h$$

$$|dh| = \sin \alpha |dx|$$

$$dh = -dx \cdot \sin \alpha, \quad dx = \frac{dh}{\sin \alpha}$$