Le Travail du poids

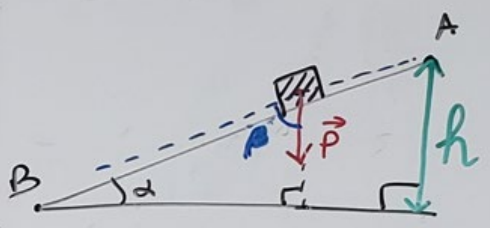
$$W(\vec{P}) = \pm P \times h$$

− : le mouvement du bas vers le haut

+ : " " " haut " " bas

$$W_{AB}(\vec{P}) = P \times AB \times \cos\left(\vec{P}\,\hat{;}\,\overrightarrow{AB}\right)$$

Démonstration



$$W_{AB}(\vec{P}) = P \times AB \times \cos\left(\vec{P}\,\hat{;}\,\overrightarrow{AB}\right) = P \times AB \times \cos\beta$$

$\left(\vec{P}\,\hat{;}\,\overrightarrow{AB}\right) = \beta$

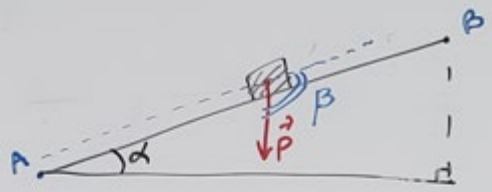
$$\beta + \alpha = \frac{\pi}{2} \rightarrow \beta = \frac{\pi}{2} - \alpha$$

$$\cos\beta = \cos\left(\frac{\pi}{2} - \alpha\right) = \sin\alpha$$

$$W_{AB}(\vec{P}) = P \times (AB \times \sin\alpha)$$

$$\sin\alpha = \frac{h}{AB} \rightarrow h = (AB \cdot \sin\alpha)$$

$$\rightarrow \boxed{W_{AB}(\vec{P}) = \pm P \times h}$$



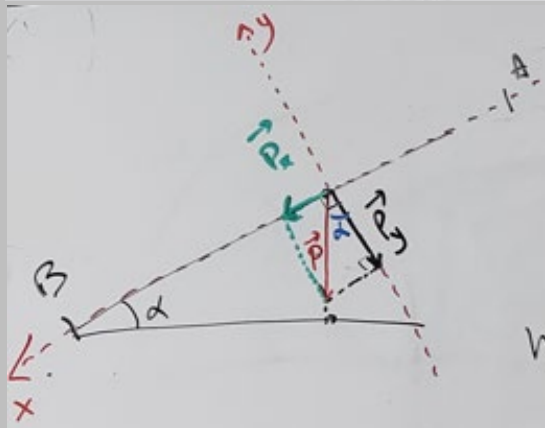
$$\beta = \frac{\pi}{2} + \alpha$$

$$\cos\beta = \cos\left(\frac{\pi}{2} + \alpha\right) = -\sin\alpha$$

$$W_{AB}(\vec{P}) = P_x \times AB \times \cos\beta = P_x AB(-\sin\alpha)$$

$$= -P_x AB \sin\alpha = -P_x \cancel{AB} \frac{h}{\cancel{AB}}$$

$$\boxed{W_{AB}(\vec{P}) = -P_x h}$$



$$\vec{P} = \vec{P_x} + \vec{P_y}$$

$$W_{AB}(\vec{P}) = W_{AB}(\vec{P_x} + \vec{P_y})$$

$$W_{AB}(\vec{P}) = W_{AB}(\vec{P_x}) + W_{AB}(\vec{P_y})$$

$$W_{AB}(\vec{P}) = P_x \cdot AB \cdot \underbrace{\cos(0^\circ)}_{1} + \underbrace{P_y \times AB \times \cos(90^\circ)}_{0}$$

$$= P_x \cdot AB$$

$P_x = ?$

$$\sin\alpha = \frac{P_x}{P} \rightarrow P_x = P \cdot \sin\alpha$$

$$W_{AB}(\vec{P}) = P \cdot (\sin\alpha \cdot AB) = P \cdot h$$