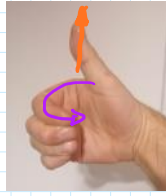
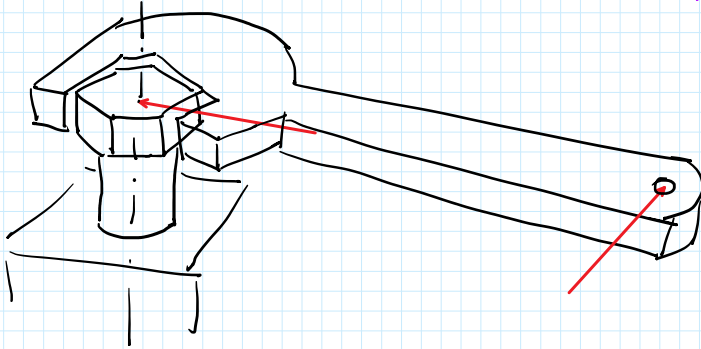
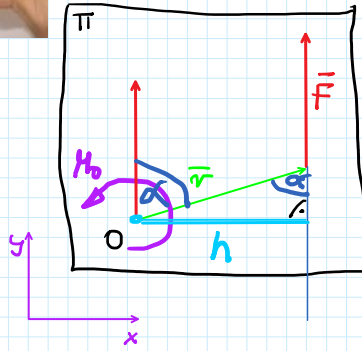
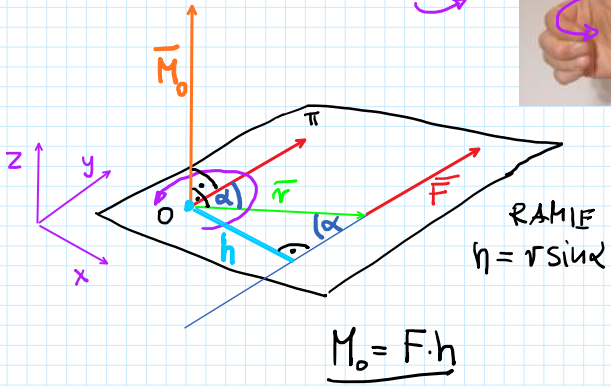


MOMENT SIŁY

$$\vec{M}_o = \vec{r} \times \vec{F}$$



$$|\vec{M}_o| = M_o = |\vec{r}| \cdot |\vec{F}| \cdot \sin \alpha = r \cdot F \cdot \sin \alpha = F \cdot r \cdot \sin \alpha$$

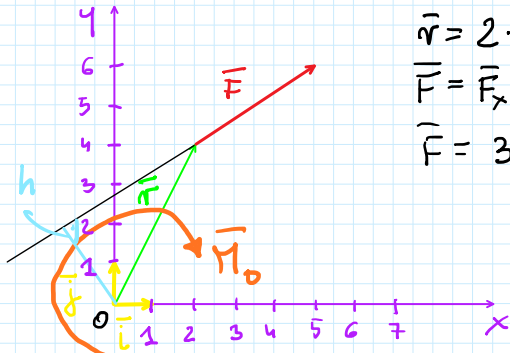


$$\vec{r} = r_x \vec{i} + r_y \vec{j} + r_z \vec{k}$$

$$\vec{r} = 2 \cdot \vec{i} + 4 \cdot \vec{j} + 0 \cdot \vec{k}$$

$$\vec{F} = F_x \vec{i} + F_y \vec{j} + F_z \vec{k}$$

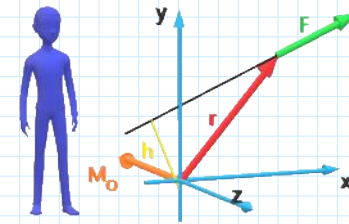
$$\vec{F} = 3 \cdot \vec{i} + 2 \cdot \vec{j} + 0 \cdot \vec{k}$$



$$\vec{M}_o = \vec{r} \times \vec{F} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ r_x & r_y & r_z \\ F_x & F_y & F_z \end{vmatrix} = \vec{i}(r_y F_z - r_z F_y) + \vec{j}(r_z F_x - r_x F_z) + \vec{k}(r_x F_y - r_y F_x)$$

$$\vec{M}_o = \vec{i}(4 \cdot 0 - 0 \cdot 2) + \vec{j}(0 \cdot 3 - 2 \cdot 0) + \vec{k}(2 \cdot 2 - 4 \cdot 3) =$$

$$\vec{M}_o = 0 \cdot \vec{i} + 0 \cdot \vec{j} - 8 \cdot \vec{k} = -8 \vec{k}$$



TW. VARIACJA

$$\vec{F} = 4 \vec{i} + 1 \vec{j} + 0 \vec{k}$$

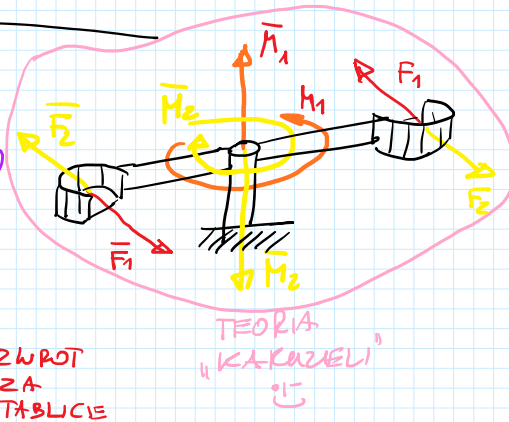
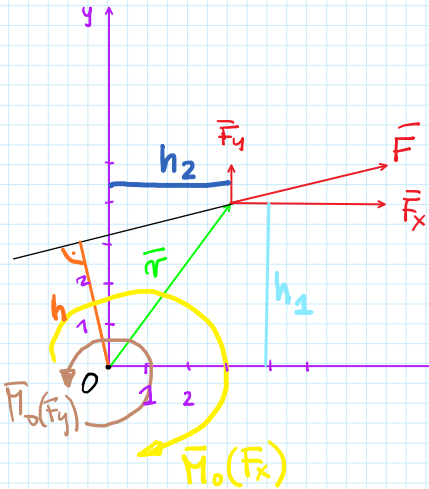
$$\vec{r} = 3 \vec{i} + 4 \vec{j} + 0 \vec{k}$$

$$\vec{M}_o = \vec{M}_o(F_x) + \vec{M}_o(F_y) \quad h_1 = r_y \quad h_2 = r_x$$

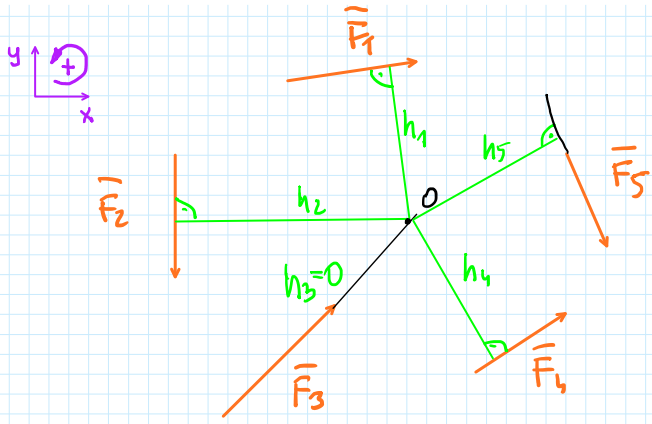
$$\vec{F} = \vec{F}_x + \vec{F}_y$$

$$|\vec{M}_o| = M_o = -F_x \cdot h_1 + F_y \cdot h_2 =$$

$$= -4 \cdot 4 + 1 \cdot 3 = -13$$



ZWROT ZA TABLICZKĄ



$$\vec{M}_o = \sum_{i=1}^5 \vec{M}_{o_i}$$

$$M_o = -F_1 \cdot h_1 + F_2 \cdot h_2 + F_3 \cdot 0 + F_4 \cdot h_4 - F_5 \cdot h_5$$