



A bent rod is fixed to the wall at O and supports two forces \vec{F}_1 and \vec{F}_2 . Replace these forces with an equivalent force and couple moment acting on O .

$$F_{Rx} = F_{x1} + F_{x2}$$

$$F_{Ry} = F_{y1} + F_{y2}$$

$$F_{Rz} = F_{z1} + F_{z2}$$

$$\Rightarrow \vec{F}_R = F_{Rx}\hat{i} + F_{Ry}\hat{j} + F_{Rz}\hat{k}$$

$$M_x = d_1 \cdot (F_{z1} + F_{z2}) + d_3 \cdot F_{y2}$$

$$M_y = -d_3 \cdot F_{x2} - d_2 \cdot F_{z2}$$

$$M_z = -d_1 \cdot (F_{x1} + F_{x2}) + d_2 \cdot F_{y2}$$

$$\Rightarrow \overrightarrow{M_O} = M_x \hat{i} + M_y \hat{j} + M_z \hat{k}$$