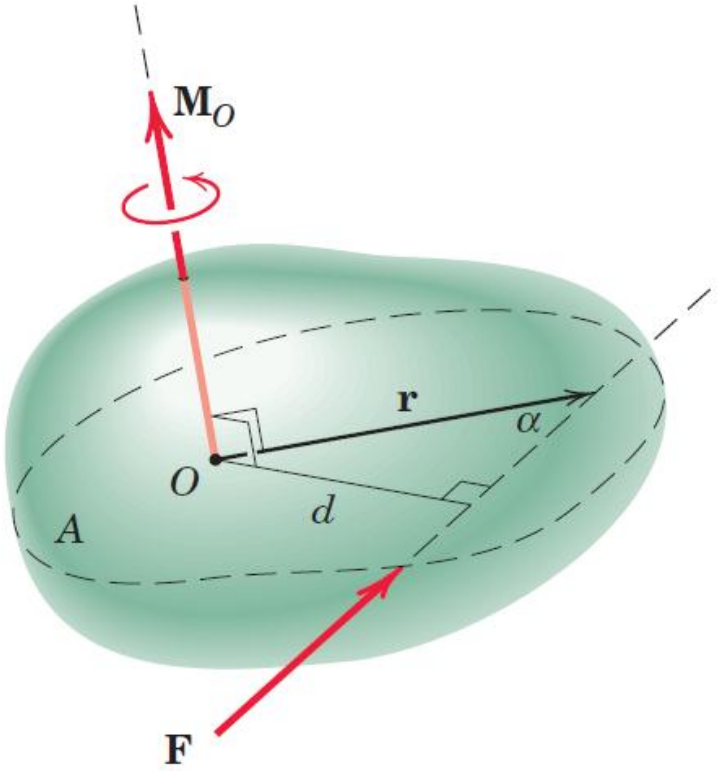
FORCE SYSTEMS

2/8 Moment & Couple

Moment in three dimensions

- Consider a force **F** with a given line of action acting on a body, Fig. **2/21*a***, and any point ***O*** not on this line. Point ***O*** and the line of **F** establish a plane ***A***.

- The moment **M*O*** of **F** about an axis through ***O*** normal to the plane has the magnitude ***Mo = F.d***, where ***d*** is the perpendicular distance from ***O*** to the line of **F.**
- This moment is also referred to as the moment of **F** about the *point* ***O***.



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- The vector $\boldsymbol{MO}$ is normal to the plane and is directed along the axis through O

- The vector $\mathbf{M}\boldsymbol{O}$ is normal to the plane and is directed along the axis through $\boldsymbol{O}$.
- We can describe both the magnitude and the direction of $\mathbf{M}\boldsymbol{O}$ by

$$M_O = Fd,$$

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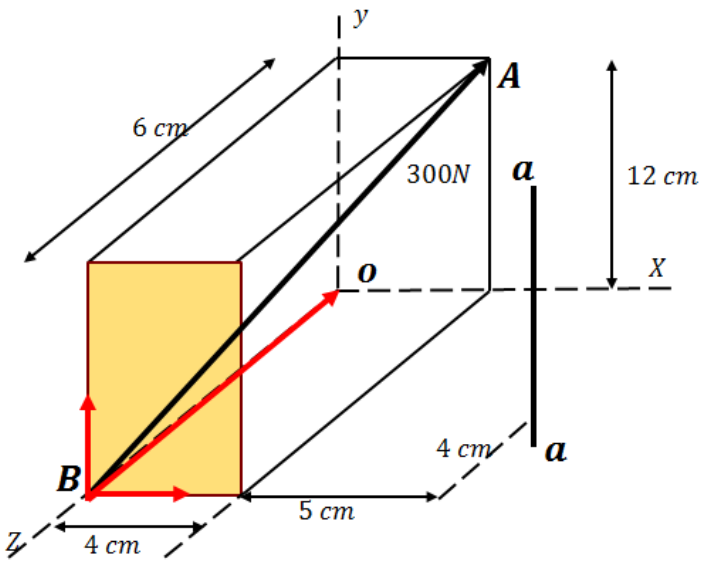
EX:- Determine the moment of the 300N. force in Figure below respect to the (a-a) axis.



solution

scalar components of F =

F_x = 85.5 N
F_y = 257.1N
F_z = 128.4N

} previous example

$\sum M_{a-a}$ = -85.5 (4) + 257.1(0) + 128.4(4+5) = 813.6 N.m.

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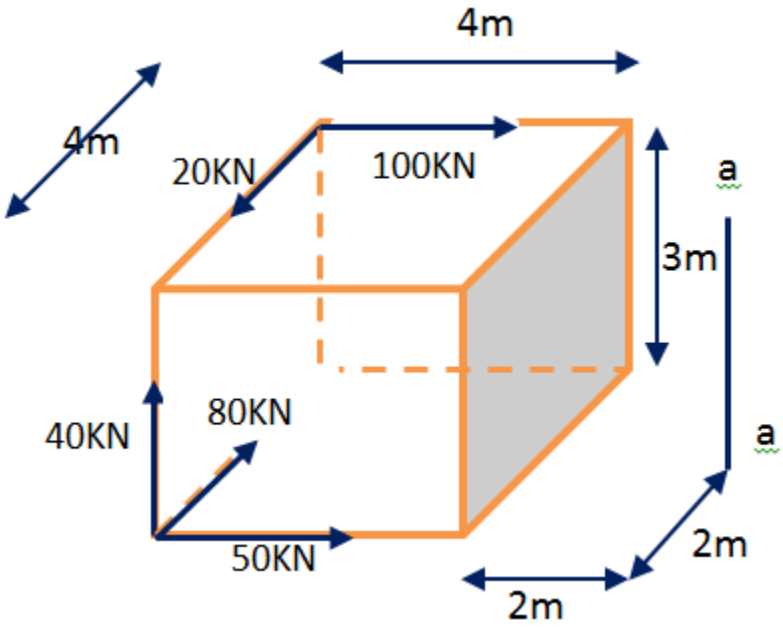
H.w

Q1/ Determine a moment about line **a-a** for all the forces shown in figure below.



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Q2/ Determine a moment about line **b-b** for all the forces shown in figure below.