Moment of a Couple

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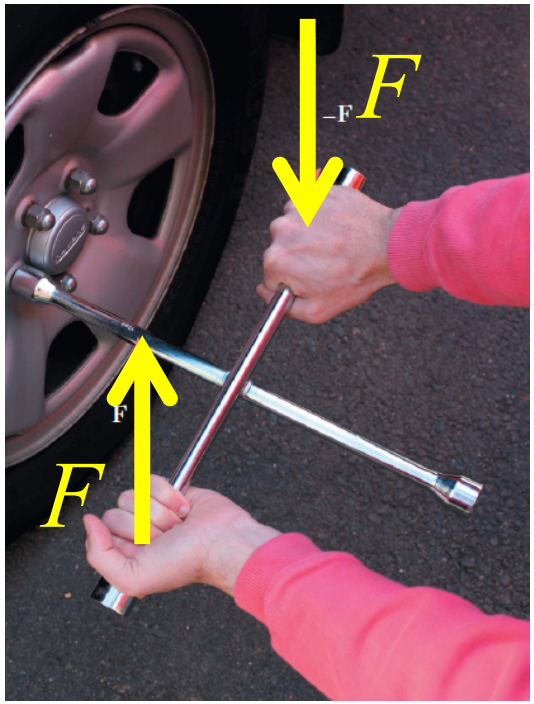
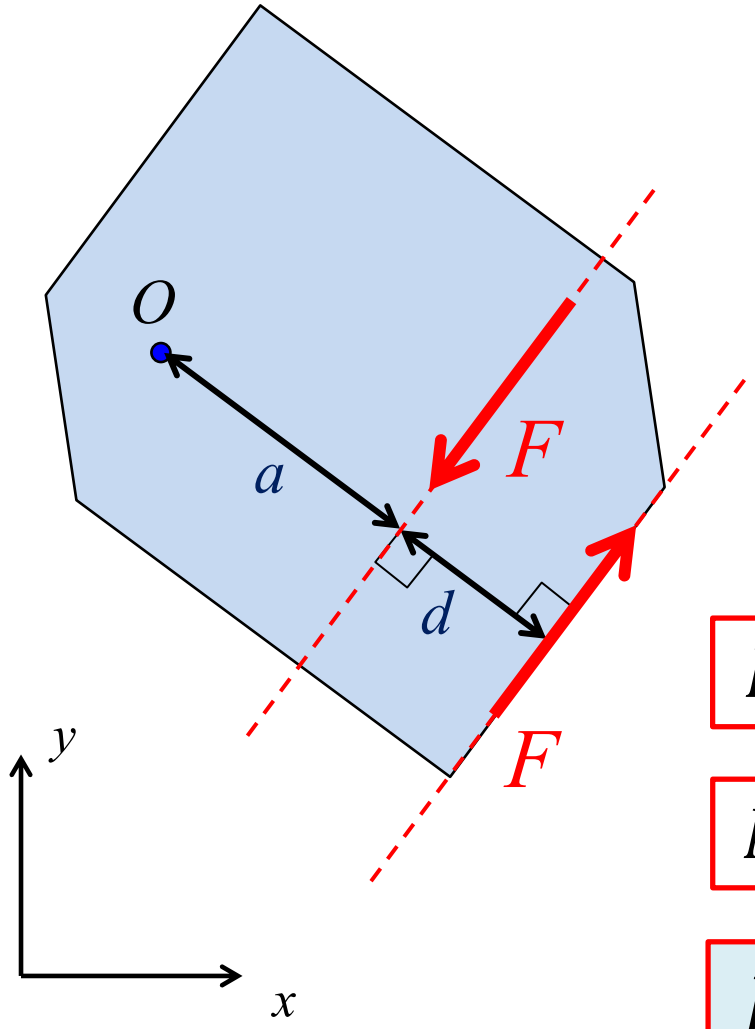
Definition of a Couple



A **couple** is defined as **two forces** that have the **same magnitude**, **parallel lines of action**, and **opposite sense**.

We will show that a couple produces pure rotation

Moment of a Couple Acting on a Planar Body



Find the moment of the couple about point ***O***

$$M_{O1} = -aF$$

$$M_{O2} = +(a+d)F$$

$$M_O = -aF + (a+d)F$$

$$M_O = dF$$

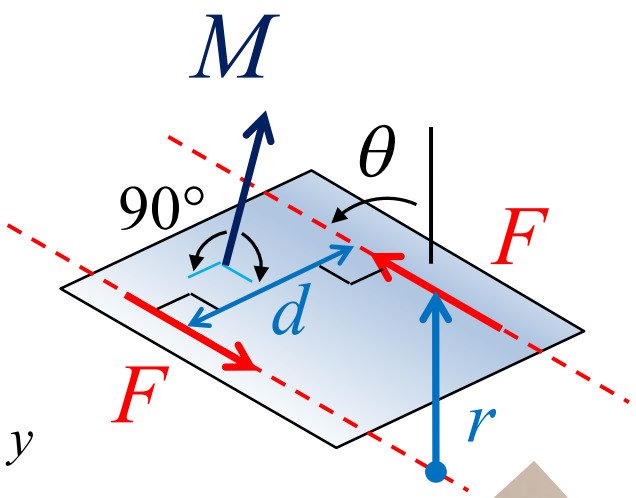
$$M = dF$$

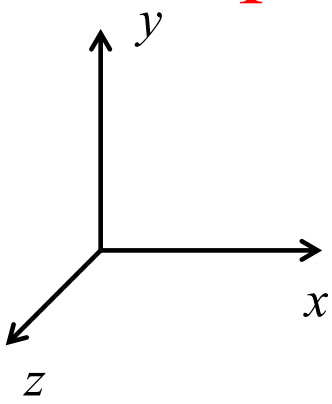
The moment of the couple is the same for any point on the body!

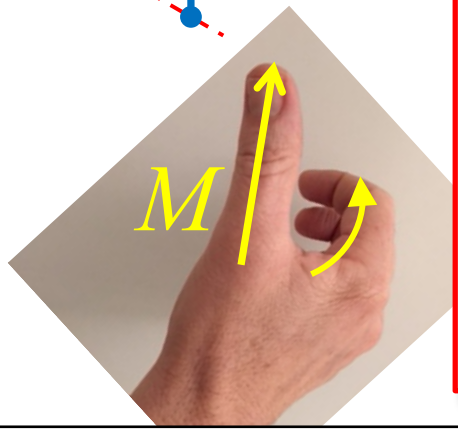
Moment a Couple

$$\boldsymbol{M} = \boldsymbol{r} \times \boldsymbol{F}$$

$$M = rF \sin\theta = dF$$







r is a position vector that must satisfy:

- Tail of ***r*** is on any point on the line-of-action of the one force, ***F***
- Tip of ***r*** is on any point on the line-of-action of the other force, ***F***

Direction of ***M*** is perpendicular to the plane defined by the couple

Sense of ***M*** is defined by the right-hand rule