Date:→ Jan 20, 2025 TENDER HEART HIGH SCHOOL; SEC-33B, CHD.

Subject:- PHYSICS CLASS-IX Pg-1

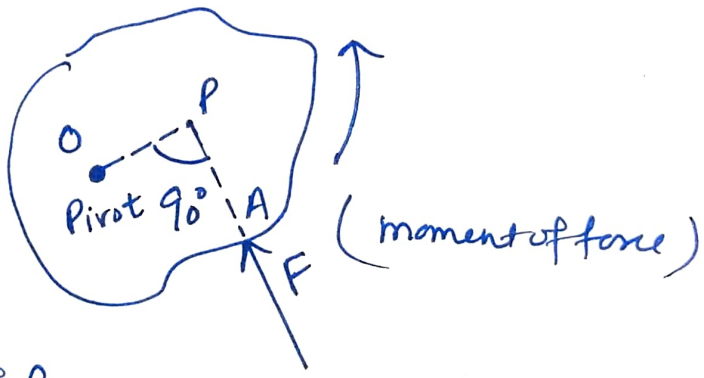
Ch-1 (Force)

Motion → Translation Motion → pushing a ball lying on a floor
→ Rotational Motion → Wheel rotates about an axis through its centre.

⇒ Moment of force (Turning effect of force) (Torque) :→

→ Turning effect on the body about an axis is due to moment of force or torque applied on the body.

→ Moment of force or torque is equal to product of the magnitude of the force and the perpendicular distance of the line of action of the force from the axis of rotation.



* M.O.F ⇓ moment of force

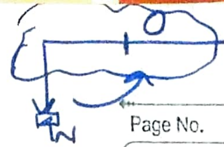
moment of force about an axis passing through the point O is = Force × Perpendicular distance of force from point O

$$\boxed{\text{M.O.F} = F \times OP}$$

Units of m.o.f :→ N-m (Newton × metre)

or 1 kgf × m = 9.8 N m → S.I system
1 gf × cm = 980 dyne cm → C.G.S system

Clockwise → 

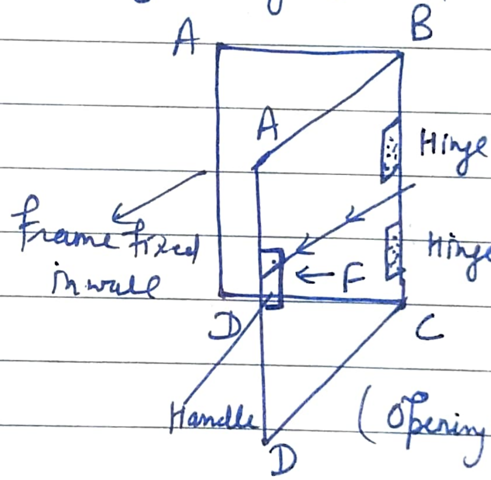
 anticlock wise moment

* Anticlockwise moments are always taken as positive.
* Clockwise moments " " " " Negative.

Common Examples of moments of force :→

① A long spanner is used to loosen a tight nut as long spanner has larger moment arm. Thus small force can produce large turning effect.

② It is easier to open a door by applying force at the free end. because free end is at the maximum distance from the axis of rotation (it passes through hinges). So, lesser force is required

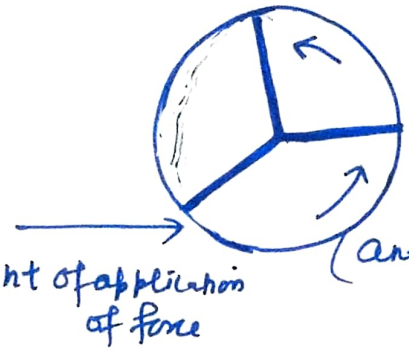


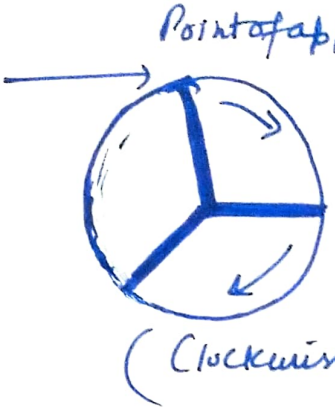
(Opening a door)

③ The hand flour grinder is provided with handle near its rim because perpendicular distance b/w the point of application of force and the axis of rotation is max^m. So lesser force will be required to move the upper grinding stone.

④ Steering wheel is used in a car, truck for changing the direction of motion of the vehicle. To turn a steering wheel, a force is applied tangentially

on the rim of a wheel.





(5) During cycling, the force is applied by the foot on the crank. This force rotates the large toothed wheel. This movement is then transmitted to the axle of the rear wheel.

So* Larger the perpendicular distance, less is the force needed to produce the same turning effect and vice-versa

* Couple :→ Two equal and opposite parallel forces, not acting along the same line, form a couple. A couple is always needed to produce rotation.

fore.g :→ When we open a door, the rotation of the door is produced by couple consisting of two forces
(a) force exerting on the handle of the door.
(b) an equal and opposite force of reaction on the hinge.

In a couple, both the forces produce turning effect in the same direction producing either clockwise or anticlockwise motion.