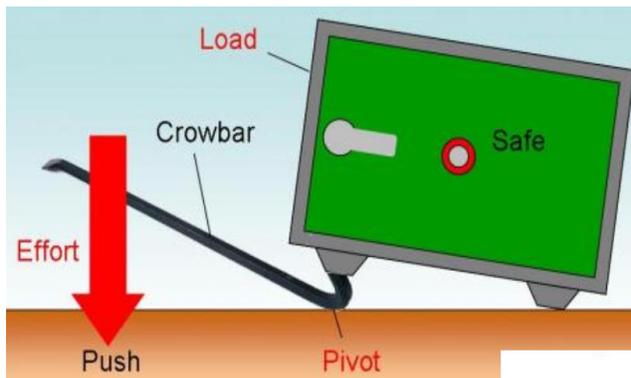# Turning Effect of Forces

Moments (Torque):

Turning effect of a force about a pivot is called moment.

Examples:

- ➢ Opening a door.
- ➢ Losing and tighten nut using spanner or wrench.
- ➢ Lifting a load with wheelbarrow
- ➢ Lifting a heavy object using crowbar/lever

Moment of a force can be calculated by using the formula:

Moment of a force = force × perpendicular distance from pivot to line of action of force

$m = F \times d$

Unit of moment is Newton meter (Nm) or Newton centimeter (Ncm)

<u>The moment of a force can be increase:</u>

- • by applying higher force
- • increasing perpendicular distance from pivot

Equilibrium > Balance

<u>Conditions for equilibrium:</u>

When a beam is balanced, we say that is in equilibrium. If an object is in equilibrium:

- • The force on it must be balanced (no resultant force)
- • The turning effects of the forces on it must also be balanced (no resultant turning effect).

Principle of moment:

If an object is in equilibrium: the sum of the clockwise moments about any point is equal to the sum of the anti-clockwise moments about that point.

Total clockwise moment = Total anti-clockwise moment

Centre of gravity (Centre of mass):

Centre of gravity (mass) of a body is the point about which the entire weight (mass) of the body seems to act.

- The center of gravity may be regarded as the point of balance.
- The center of gravity of a body is in the same position as its center of mass.
- The center of gravity of regular and uniform (made all of the same material) objects are at their geometrical centers'.
- For a uniform ruler, C.G is at the center and when supported at this point it balances and when supported at any other point it topples.
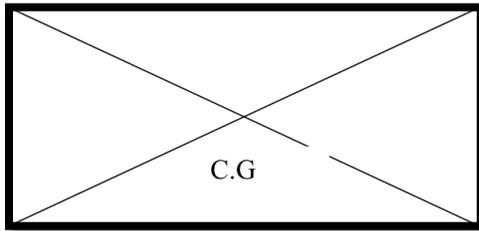
- Centre of gravity of certain objects lies outside the actual material of the object.

C.G

Stability:

Ability of returning its original position after pushed and then released is stability of an object.

Stability can be increased by:

- Lowering the center of gravity of the object
- Increasing the base area of the object

Example:

➢ Racing cars low center of gravity and a wider wheel base for higher stability.