

# Moment of Couple

The moment of couple is equal to any force multiplied by the perpendicular separation between the two forces. When two equal and opposite forces are applied simultaneously at different points on a body, their resultant force is zero. Still, these equal and opposite forces try to rotate the body in the same direction. These forces are called Couples.

## Moment of Couple Example

Such a force pair tends to rotate that body. Consider A and B as the two points on a body on which two forces  $F$  of the equal result are applied in opposite directions parallel to each other. Due to the effect of this force, this body starts rotating in the anti-clockwise direction or tries to rotate about the axis passing through  $O$ . Keep in mind that if the line of action of these two equal forces is the same or they act at the same point, they will cancel each other.

A moment of couple operates on a body as a result of a couple's activity, causing the body to spin around a fixed point.

## SI Unit of Moment of Couple

A couple is a pair of forces with an equal magnitude but a different line of force action. The product of either force and the separation between the forces' perpendicular axes yields the moment of the couple. Its SI unit of moment of couple is Nm.

## Characteristics of the Couples

A couple is a pair of forces equal in magnitude, oppositely directed, and separated by a perpendicular distance or moment. The most basic pair type consists of two equal and opposing forces with opposing lines of action. The following are the characteristics of the couple:

- The couple does not produce translational motion because the two forces that make up the couple are equal and in opposition.
- When it operates on a body, the net resulting force on the body is zero.
- Pure rotational motion in the body results from the algebraic sum of the moments of the two forces around any point in their plane is not zero.

- The moment of a pair around any point in its plane is fixed in size and orientation.

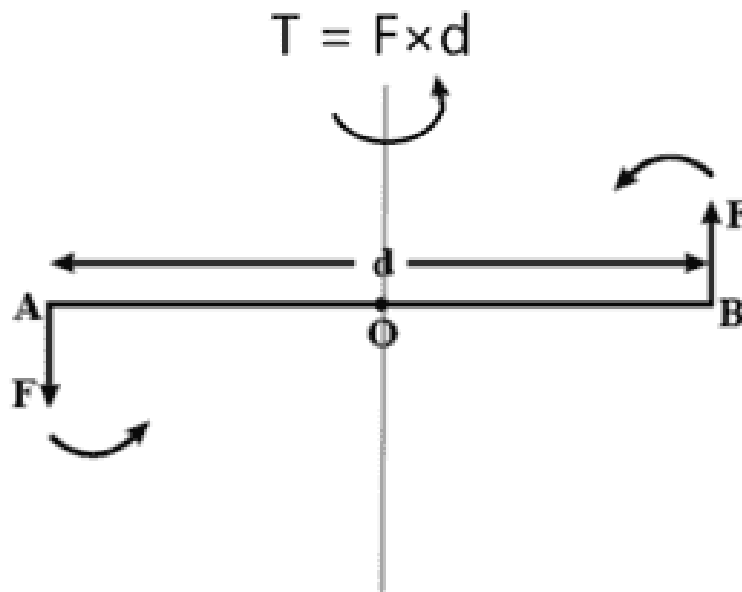
## Mathematical Representation of Moment of Couple

The moment of the couple is described mathematically as the product of the force and the perpendicular distance between the two forces' lines of action. The arm of the Couple is another name for the distance that separates two forces' directions of action perpendicularly in this context.

### Moment of Couple Formula

The applied force multiplied by the sum of the arms of any two forces gives the moment of force. Therefore, the moment of couple of forces is provided by,

$$T = F \times d$$



The formula for the moment of a pair of forces clearly states that the moment of couple of forces will be more extraordinary if:

- The force is more significant in terms of magnitude.
- The distance between the lines of action of the two forces is greater because the arm of the pair of forces is longer.

## Practical Application of Moment of Couple

The resultant force of two equal and opposing forces acting simultaneously on distinct places of a body is zero. Still, these forces attempt to rotate the body in the same direction. These forces are referred to as Couple. A force pair of this type has a tendency to rotate that body. The following are practical applications for couples.

- We use our hands to force the handle when turning a moving bicycle.
- whenever we open and close the tap's spout.
- A pair of forces is performed with the fingers to open and close the device's lid.
- When the palms of both hands are run in the opposite direction while holding the pencil between them, the pencil begins to rotate.
- Another example of a pair is when the churn begins to rotate while holding the ends of the rope with one hand while moving the other in the opposite direction.

