Turning effect of forces

Center of gravity

If you a balance a ruler in the middle and apply no force(other than gravity), the ruler will not fall off. This position of the ruler is called the **center of gravity**.

> **The center of gravity is the point of the object of which the whole weight of the object is considered to act.**

Moment of a force

When a force acts on an object, it may cause the object to move or have a turning effect.

> **The turning effect of a force is called the moment of a force.**

The moment of force can be calculated by $moment = F \times d$, where F is the force and d is the perpendicular distance from the pivot.

> **The moment of a force is defined as the product of the force and the perpendicular distance from the pivot.**
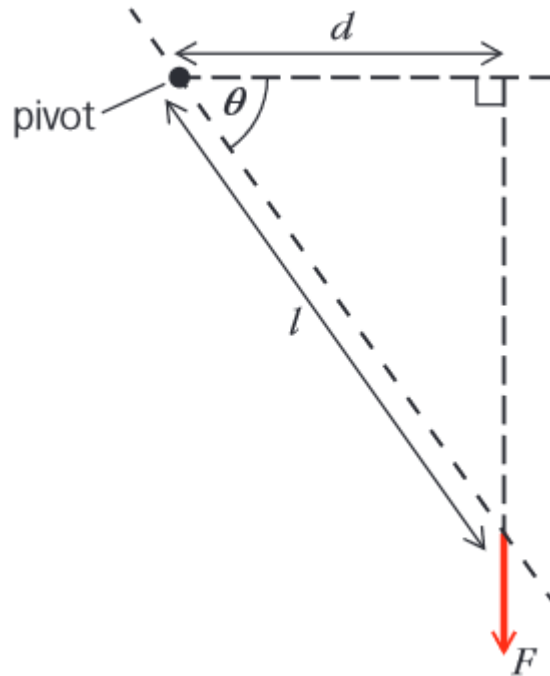
If d is not given but the angle and l is given, we can find the moment using trigonometry.

$moment = F \times l \cos\theta$ (depending on the angle and side of triangle)

Couples

When a screwdriver is used, a turning effect is produced but the object does not turn up or down. Instead it rotates in position. 2 equal forces are applied to the screwdriver in opposite directions.

> **A couple consists of 2 forces, equal in magnitude but opposite in direction whose lines of actions do not coincide.**
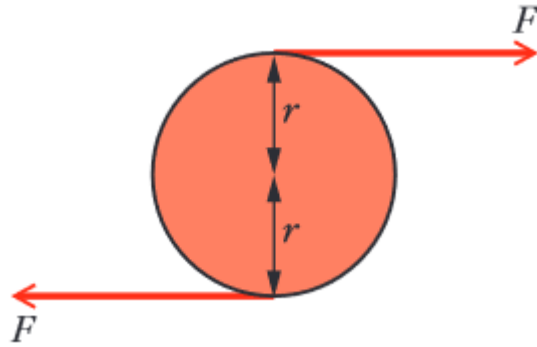
The pivot is in the middle, so the total moment about the center is

$F \times 2r$, where $2r$ is the perpendicular distance between the forces.

This is not called a moment, it is called a **torque** because it has 2 forces acting (instead of 1 like a moment).

> **The torque of a couple is the product of one of the forces and the perpendicular distance between the forces.**