1 Turning Effect of Forces

Preamble

Objects do not only move in a straight line, they can also move in curves and circles and all kinds of funny shapes. In this chapter we will explore how we can make an object turn by applying a force.

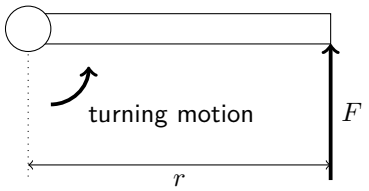
1.1 Moment

Definition 1.1: Moment

The moment of a force is the product of the force F and the perpendicular distance from the pivot to the line of action of the force r

$$M_O = r \times F$$

The SI unit of moment is newton metre [N m].



Definition 1.2: Principle of Moments

The principle of moments states that when a body is in equilibrium, the sum of clockwise moments about a pivot is equal to the sum of anticlockwise moments about the same pivot..

1.2 Centre of Gravity

Definition 1.3: Centre of Gravity

The centre of gravity, or centre of mass, is a point where the weight of an object seems to be acting on. The centre of gravity can lie outside an object.

1.3 Stability

Definition 1.4: Stability

The stability of an object is a measure of its ability to return to its original position after it is s lightly displaced.

An object can be in stable, unstable, or neutral equilibrium.

Type of equilibrium	Stable	Unstable	Neutral
Centre of gravity	Low	High	
Base area	Large	Narrow	A line of contact points with surface
Slight displacement	Return to equilibrium	Topple over	Stay in new position

An object's stability can be increased by lowering the height of the centre of gravity, or increasing the base area of the object.