Classification of Forces

The forces acting on a body may be classified as

1. Action and Reaction:-

When two bodies are in contact with each other, each body exerts a force on the other. If the force exerted by the first body on the second is called "action", then the force exerted by second body on the first is called "reaction".

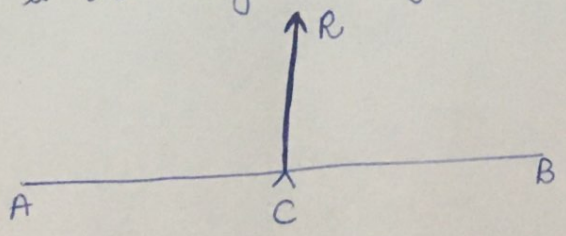
Direction:-

The directions of action and reaction between two bodies depend upon the nature of surfaces in contact.

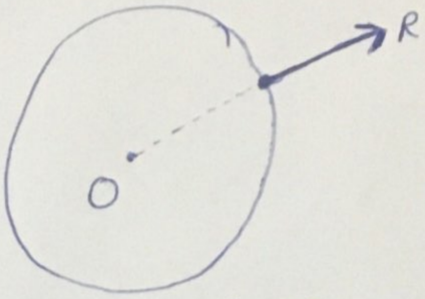
* If the bodies are perfectly smooth — direction is along the common normal to the bodies through their point of contact.
* If one of the bodies has an end point in contact and surface of other extends on both side at the point of contact — the normal reaction is 1^{r} to the surface that extends on both sides.

Examples:-

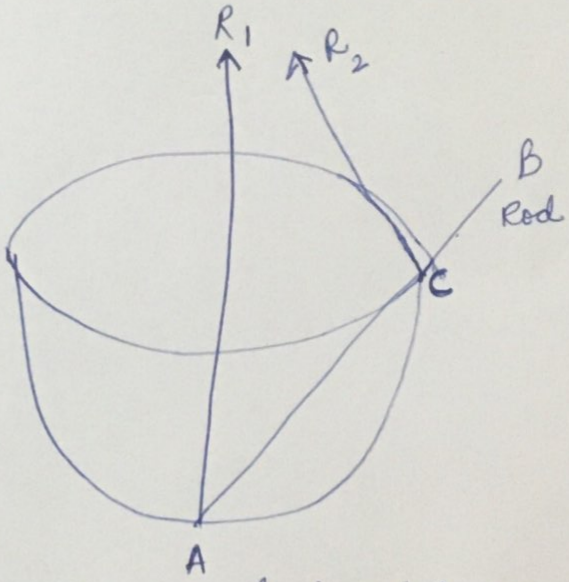
* When a rod AB rests over a smooth peg at C, the reaction R is at right angles to the rod.



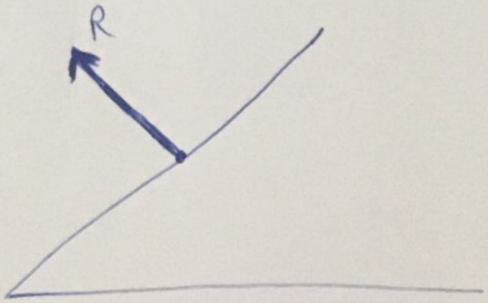
* When a particle rests over a smooth sphere, the reaction is normal to the sphere, hence passes through centre of the sphere.



* When a rod AB rests partly in and partly out a hollow hemi-sphere, the reaction R_1 at A is normal to the hemisphere, whereas the reaction R_2 at C is normal to the rod.

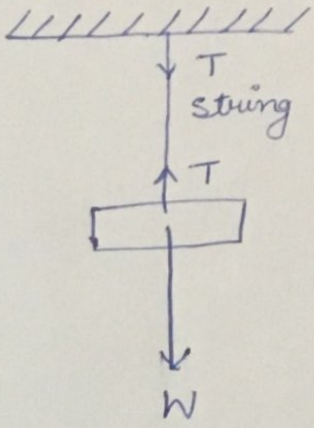


* When a particle rests upon a horizontal or an inclined plane, the reaction is $\perp^r$ to the plane.



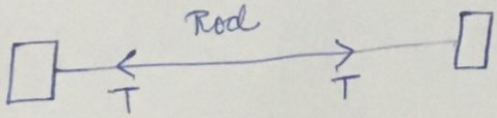
2. Tension and Thrust :-

If we tie one end of a string to any point of a body and pull at the other end of the string, a force (pull) is exerted on the body, called "tension".



If the string is light, i.e., weight of the string is so small that it may be neglected, then the force exerted by the string is same throughout its length. It acts in a direction diverging out of the body.

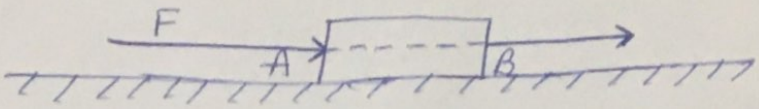
* When we push an object with a rod, the force (push) that is exerted by the rod is called "thrust". It acts in a direction converging to the body.



3. Attraction and Repulsion :-

A force exerted by one body on another is called an attraction or a repulsion if there is no visible direct or indirect between the two bodies. The force is "attraction" if the bodies approach or tend to approach each other. The force is "repulsion" if the bodies move away or tend to move away from each other.

Principle of transmissibility of forces :-



According to this principle, point of application of a force acting on a body can be transmitted along its line of action to another point rigidly connected to the body.

e.g. If a block is being pulled along the horizontal by a force F, the resultant motion of the body is independent of whether the force F pulls the block at B or pushes the block at A.