

Academy of Technology



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Power Point Presentation on

**APPLICATION OF FREE BODY DIAGRAM (FBD) IN PROBLEM
SOLVING**

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INTRODUCTION

- A free body diagram consists of a diagrammatic representation of a single body or a subsystem of bodies isolated from its surroundings showing all the forces acting on it.
- In physics and engineering, a free body diagram (FBD; also called a force diagram) is a graphical illustration used to visualize the applied forces, moments, and resulting reactions on a body in a given condition.
- It depicts a body or connected bodies with all the applied forces and moments, and reactions, which act on the body(ies).
- The body may consist of multiple internal members (such as a truss), or be a compact body (such as a beam).
- A series of free bodies and other diagrams may be necessary to solve complex problems.

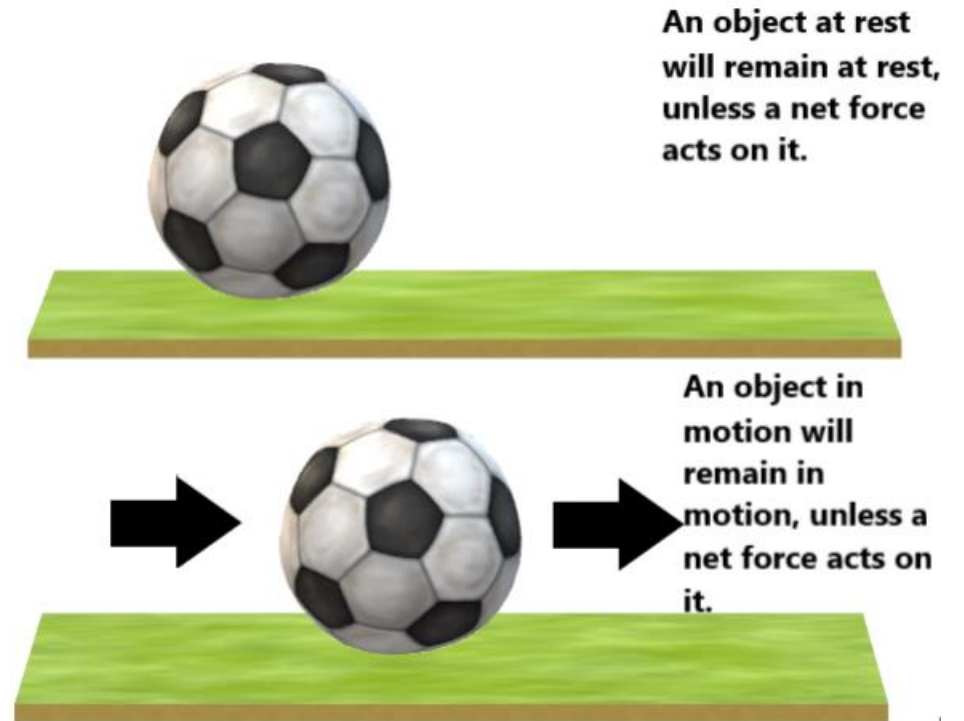
Newton's 1st Law and Inertia

An object in motion stays in motion in a straight line, unless acted upon by unbalanced force.

A push or pull will cause object to speed up, slow down, or change direction.

Basically, objects just keep on doing whatever they are doing unless they are acted upon by an unbalanced force .

FIRST LAW OF MOTION



Free Body Diagram (FBD)

Free Body Diagram(FBD) are useful aids for representing the relative magnitude and direction of all forces acting upon an object in a given situation. The first step in analyzing and describing most physical phenomena involves the careful drawing of a free body diagram. In a free-body diagram, the size of the arrow denotes the magnitude of the force, while the direction of the arrow denotes the direction in which the force acts . A Free Body Diagram includes:-

- A simplified version of the body (often a dot or a box)
- Active Forces and reactive forces shown as straight arrows pointing in the direction they act on the body
- Moments are shown as curves with an arrow head or a vector with two arrow heads pointing in the direction they act on the body
- One or more reference coordinate systems

APPLICATIONS OF FBD IN PROBLEM SOLVING

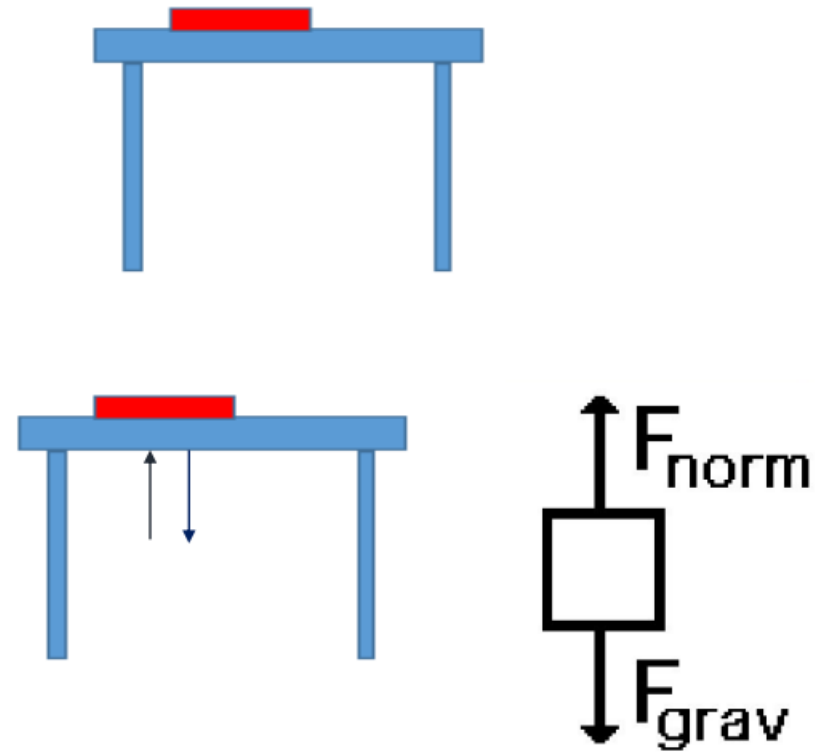
PROBLEM 1:

A book is at rest on a table top.

Diagram the forces acting on the book.

ANSWER:

In this diagram, there are normal and gravitational forces on the book. The forces are balanced (they cancel each other out)

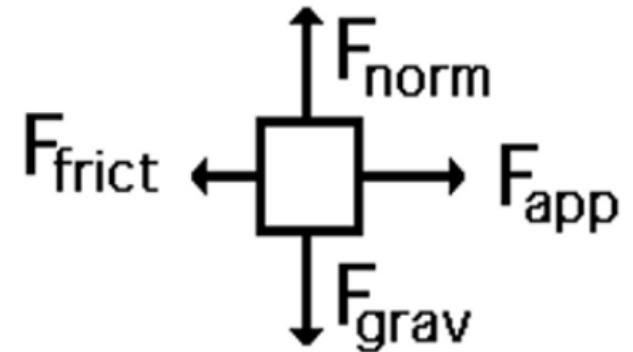


PROBLEM 2:

A man drags a sled across loosely packed snow with a rightward acceleration. Draw a free-body diagram of the forces acting on the sled.

ANSWER:

The rightward force arrow points to the right. Friction slows his progress and pulls in the opposite direction. Since there is not information that we are in a blizzard, normal forces still apply as does gravitational force since we are on planet Earth.



CONCLUSION

The Presentation has covered a basic idea about free body and their Characteristics. It also covers the basics of newton first law. There are some problems in solving on free body diagram.

REFERENCE

1. J. L. Meriam and L. G. Kraige, “Engineering Mechanics: dynamics”, Wiley, 2011.
2. 1. M. F. Beatty, “Principles of Engineering Mechanics”.

THANK YOU