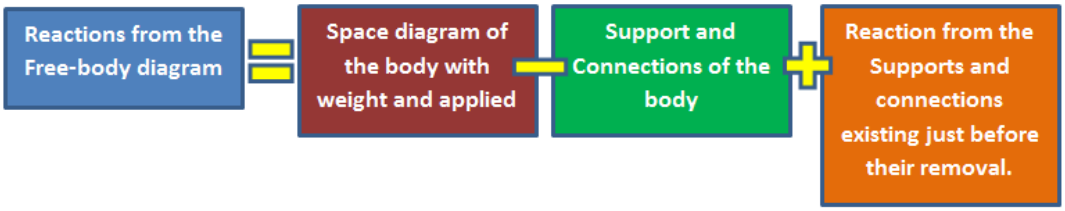
Free Body Diagram- Guides to Drawing a good FBD for Equilibrium

Free Body Diagram (FBD)

Free Body Diagram is a sketch of the body (space diagram) drawn in such a way that it shows all the reaction forces, applied forces, and moments on the body.

It enables us to check the body for equilibrium, A practical definition of the FBD may be written in the form of an equation as follows:



The free-body diagram of the space diagram is to be drawn index to use the equations of static equilibrium, which enables us to find the value of unknown reactions.

Guides for drawing a good free-body diagram

A good free-body diagram is a sketch that correctly and effectively illustrates the system of forces that brings about the state of rest or motion of the body under consideration. The following guides are helpful for drawing a good FBD.

1. The body to be freed (or isolated) for consideration may be the entire system or any Portion of the system. So, it is important to make a clear decision as to which portion of the

system is to be freed.

2. The free body drawn should have no external supports or connections.

3. Any adopted coordinate system whose axes are not in the horizontal and vertical directions should be shown.

4. Appropriate dimensions (including slopes or angles) which are needed in defining the configuration of the force system should be indicated.

5. Each applied load should be indicated with an arrow and labeled either with its known magnitude or with a letter when it is not known.

6. The weight force of the free body should be indicated with a vertical downward arrow and labeled if the weight is not negligible.

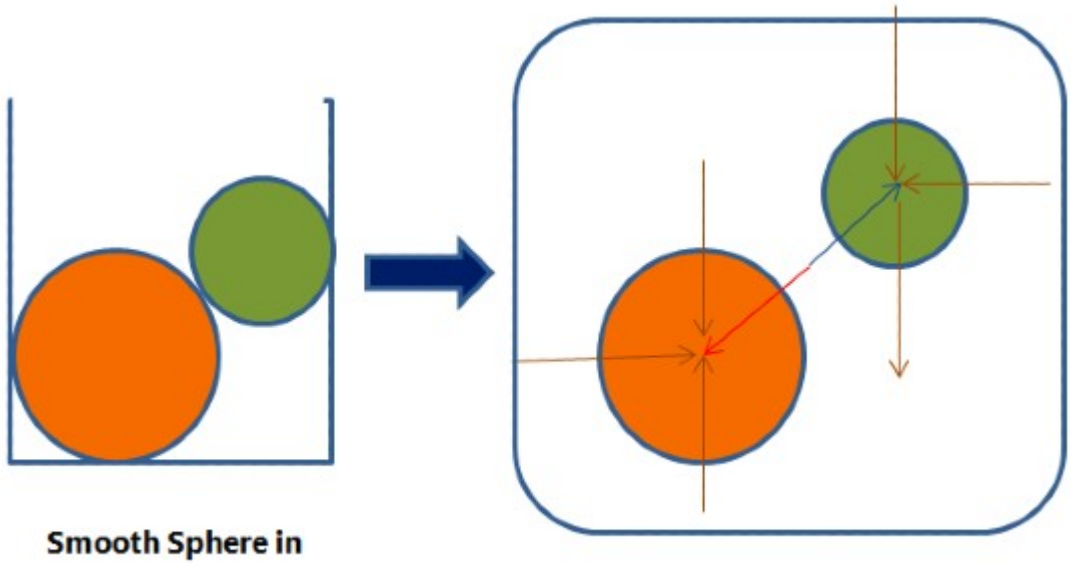
7. The actions exerted by the body on its supports and connections should not be indicated on the free diagram.

8. The reactions (or components of reactions) from the supports and connections should be indicated with arrows and labeled.

9. The sense of an unknown force, when not reasonably obvious, may be assumed and corrected later if the value obtained is negative.

10. The forces in the cords or members that are uncut in the free-body should not be shown.

Example of Free Body Diagram



Smooth Sphere in Equilibrium

Free Body Diagram

I hope this article remains helpful to you.

Happy Learning – Civil Concept

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