

Physics

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Resource Doc

Free-Body Diagrams

Free-Body diagrams show all the forces that act on a single body. Drawing free-body diagrams are used to analyze the forces acting on a body and help determine how the body's motion is affected by those forces. In later lessons, we will learn how to use free-body diagrams to apply Newton's laws of motion.

When drawing a free-body diagram

- we imagine freeing the body from its surrounding environment
- thinking about what other objects it interacts with the body
- drawing an arrow for each force vector corresponding to an interaction
- label each force vector arrow with subscripts that identify a specific force type

Force Types to Include in a FBD

- 1) Gravity Label > F_g or W or mg
- 2) Normal Label > F_n or N or n
- 3) Applied Label > F_a or T (tension force – cables, chains, ropes)
- 4) Friction Label > F_f or f

Important Points to Remember

- include a coordinate reference axis
- be certain each force vector label has a correct subscript
- be certain all forces that act on the body are included in the FBD
- draw the body in correct orientation as it exists in real
- check that arrow directions correctly show the direction that the force is acting in real