

Physics 11 lesson – Feb 14, 2024

- Dynamics - Newton's laws and FBDs
- Feathers and a bowling ball falling in the world's largest vacuum chamber: <https://www.youtube.com/watch?v=E43-CfukEgs>

Newton's Laws: (we'll develop these ideas in much more depth in the next few weeks)

- **First Law = The Law of Inertia:** Objects maintain their state of motion unless acted upon by an unbalanced Force (i.e. if net force = 0N the object will remain at rest or moving at a constant velocity; if net force is greater than zero the object will accelerate – i.e. will change velocity)
- **Second Law: Net Force = mass × acceleration**
- **Third Law: Action-reaction:** For every action (force) there is an equal and opposite reaction (force)

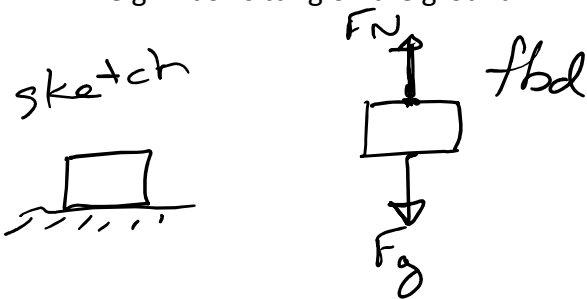
$$\Sigma \vec{F} = m \cdot \vec{a}$$

Free Body Diagrams ---

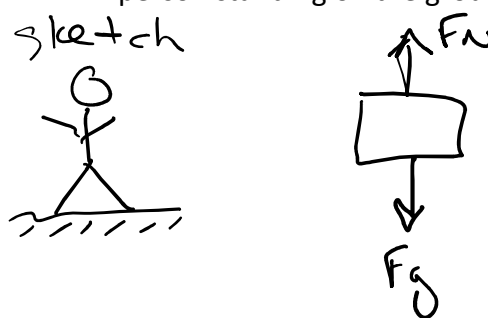
- The object is drawn as a box or dot
- All forces acting on the object are shown as vector arrows originating on the object

F_N = normal force (perpendicular to the surface)

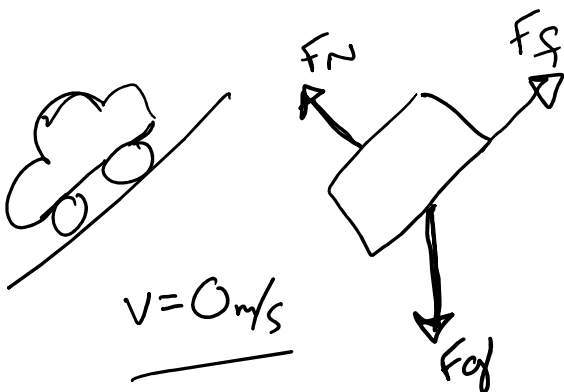
e.g. A box sitting on the ground



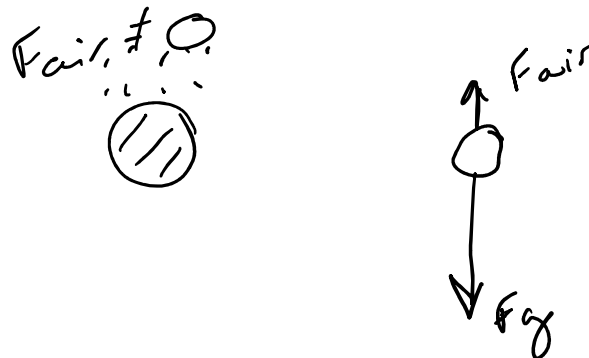
A person standing on the ground



A car parked on a hill

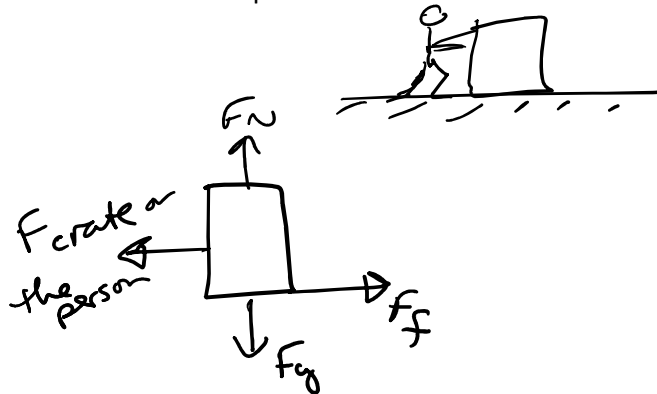


A ball falling through the air

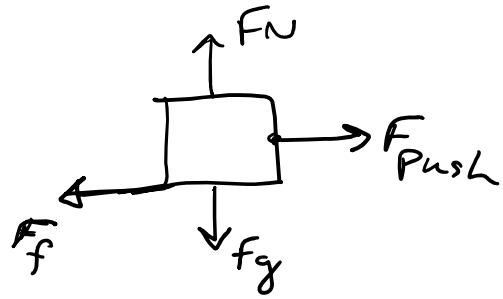


A system A person pushing a crate along the ground

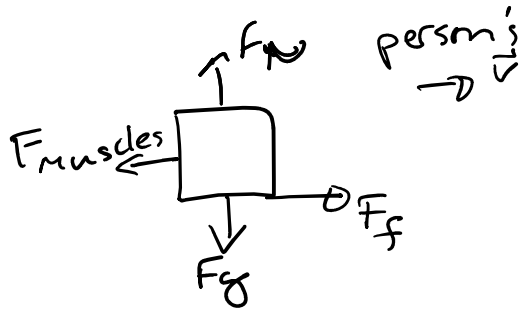
- FBD for the person



- FBD for the crate



A person walking (FBD of their foot)



An ice skater gliding (FBD of their foot/skate)

