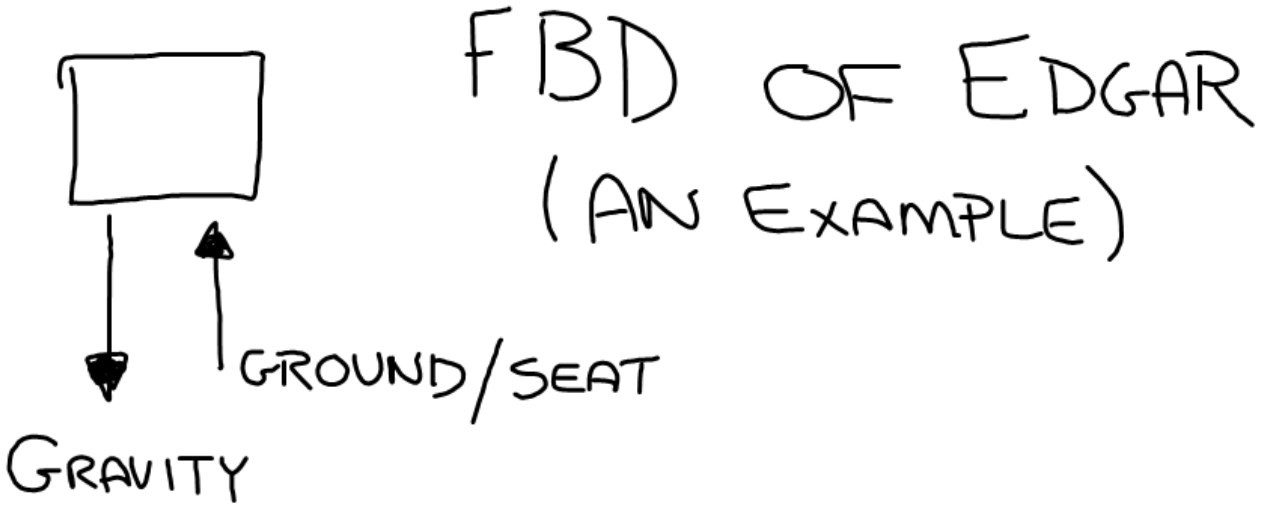
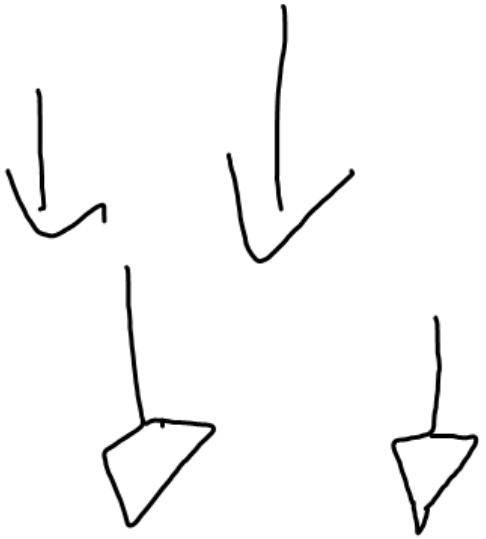
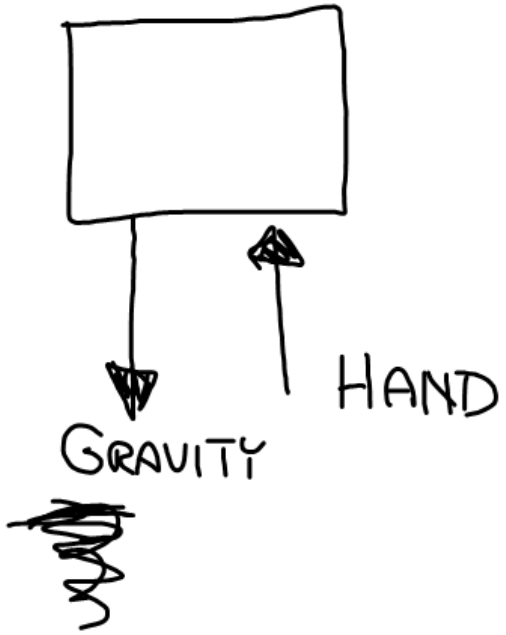
2/28/11 FREE-BODY DIAGRAMS

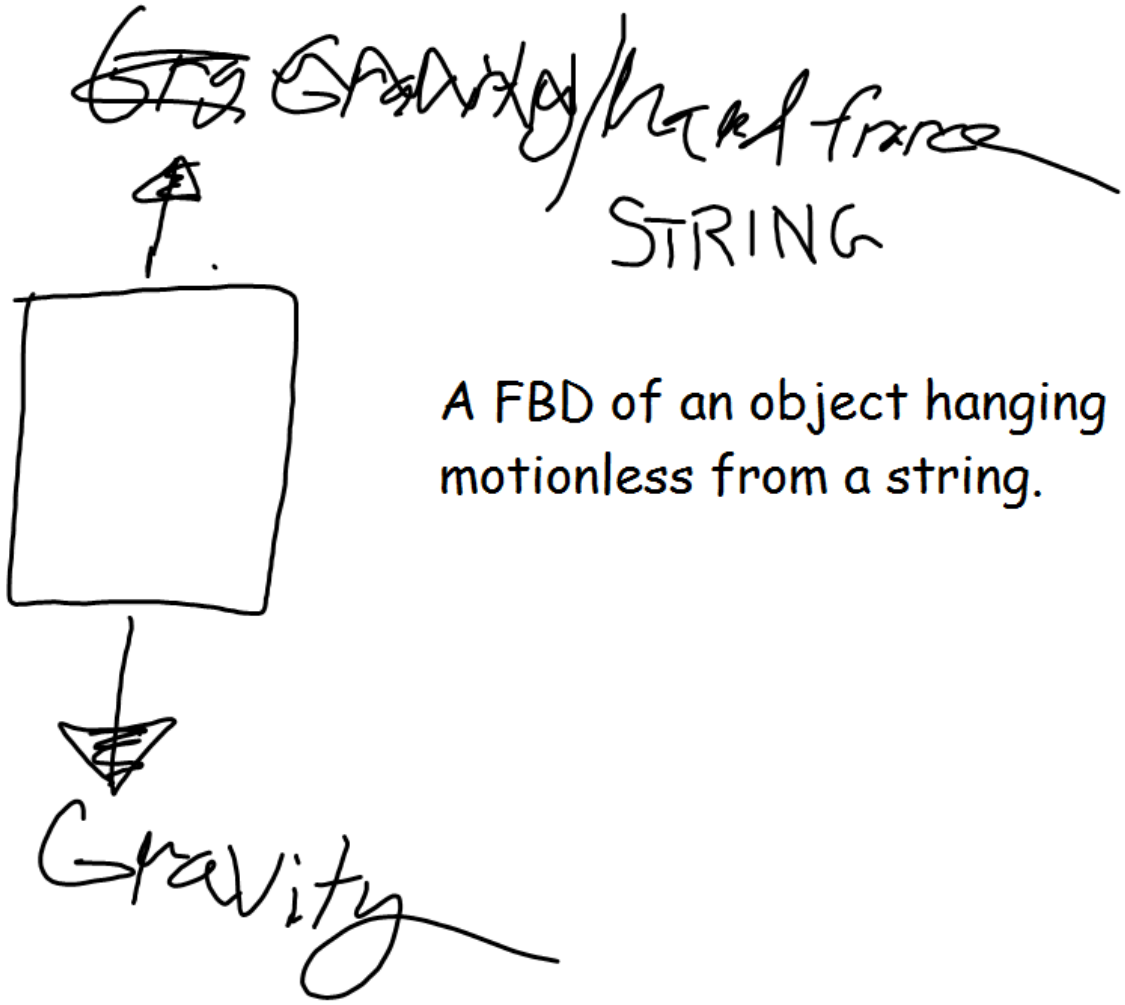


1. Free-body diagrams (FBD) help us understand the forces acting on an object.
2. FBD only show ONE object at a time.
3. Pushing forces can be shown by arrows pointing toward the object.
4. Pulling forces can be shown by arrows pointing away from the object.
5. All arrows should be clearly labelled.
6. Only show forces that are acting ON the object (not forces that the object is exerting on other things).
7. The length of the arrow represents the relative size of the force.

An example of a FBD of an object just sitting in my hand. Since the forces are balanced, the arrows are the same length.

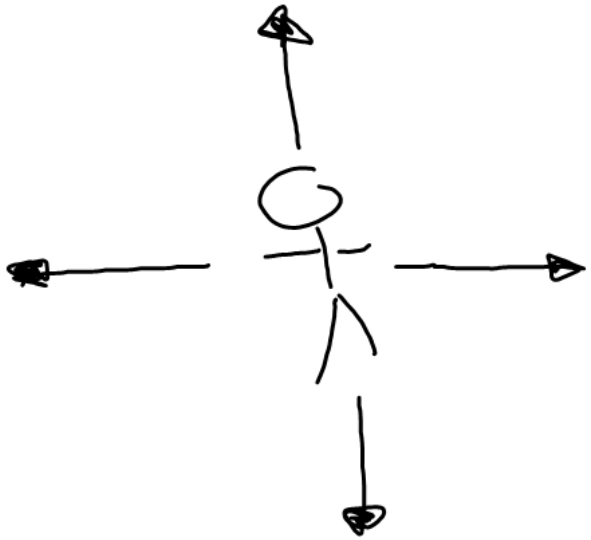






A FBD of an object hanging motionless from a string.

If I am in space and there are a bunch of things around me, I would real forces towards each object.

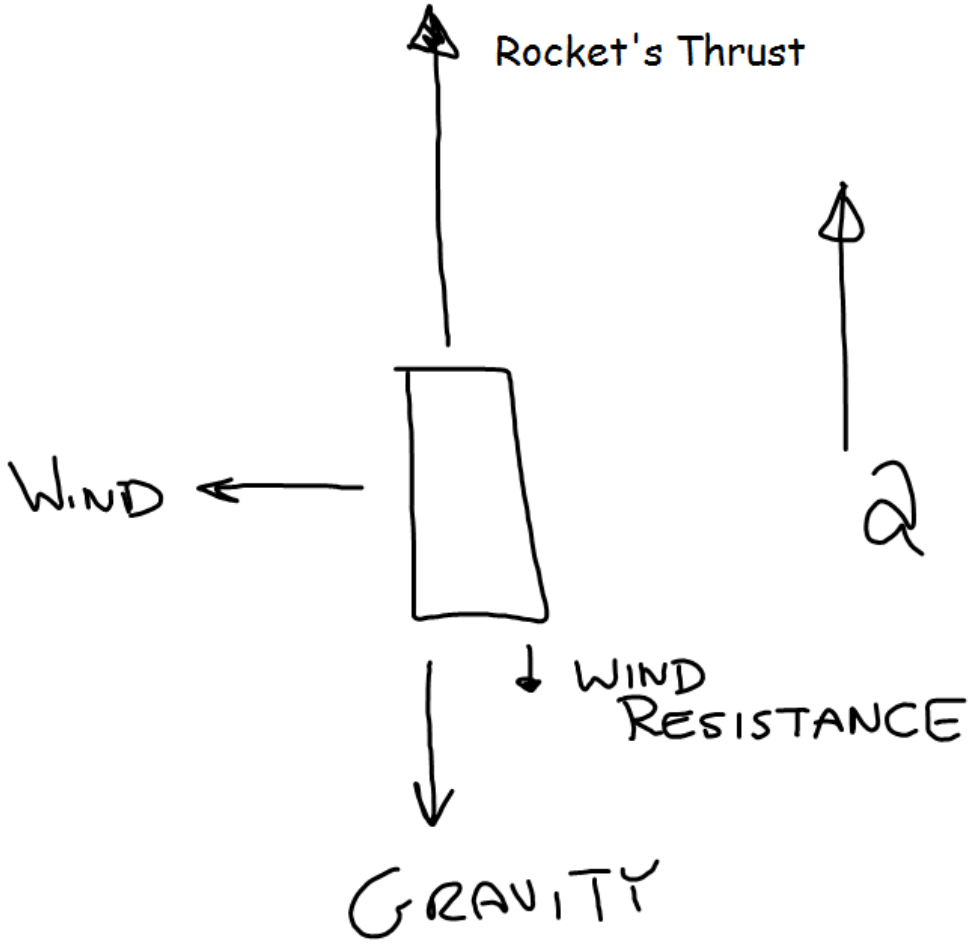


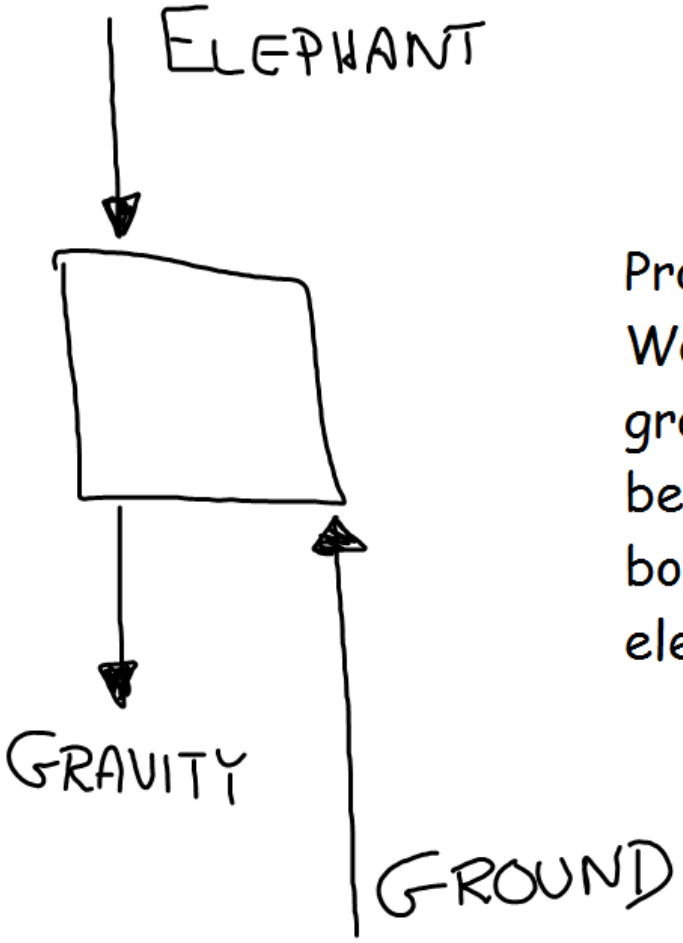
WHEN THE FORCES ARE BALANCED ON SOMETHING, THAT SOMETHING EITHER

- REMAINS MOTIONLESS
- KEEPS MOVING @ A CONSTANT VELOCITY

- THE OBJECT <u>WILL NOT</u> ACCELERATE

A FBD of a rocket taking off -- it is accelerating upward so the upward force must be larger than the downward one.





Problem #1 on the FBD Worksheet -- note that the ground force is larger because it must balance both the force from the elephant and gravity.