

Using Free Body Diagrams

- I: Choose a specific object or group of objects. Write a sentence telling me what the object is. Draw an outline sketch of **just** your chosen object, without any other items near it. Do not re-orient this sketch.
- II. Draw and **name** all forces *that act on your object*. Each force must have a unique symbolic name: W_D , or N_B , etc.
- III. Draw a coordinate system. Be especially clear about all directions.
- IV. If some of your forces are oriented diagonally with respect to your coordinate system, start over again at step II. *You should not erase your earlier version!* In the new version, instead of each “diagonal” force, draw two separate forces, each of which is a component of the “diagonal” force. All the same forces should be on this diagram as were on the original, except that a few will now be there in component form.
- V. Write Newton’s 2nd law for each possible component direction (including rotation!), *symbolically*. If a force was drawn in the same direction as a coordinate axis, it is positive when you include it in ΣF , otherwise it is negative. Moments are positive when they are in the same direction as the coordinate axis (in the example below, $+z$ is counter clockwise). Also, write any geometric constraints as equations.
- VI. Do algebra until you have solved for the item you wanted to know, then box your answer.

