The Free-Body Diagram

1. A free-body diagram is a diagram for *one object only*. For example, if a person is in an elevator, we can draw a free-body diagram for the person, which *does not include* a drawing of the elevator. We could also draw (separately) a free-body diagram for the elevator, which would *not include* a drawing of the person.

2. Include on the free-body diagram all of the forces that act *on* the *one* object in the diagram. For each force, make an arrow that points in the direction of the force, and *label each force* with a symbol, or the (positive) numerical value of the force if you know it. For example, if an object is near Earth's surface, you could draw a downward-pointing arrow with "m g" written next to it.

3. Do NOT include any of the following items on the free-body diagram.

   - *ma* (for mass times acceleration). *ma* comes into Newton's second law, and it is very important, but it does not belong on a free-body diagram.
   - a separate arrow for the net force. The net force is the name we give to the vector sum of all of the forces that act on an object.
   - a separate arrow for "centripetal force". Centripetal force is the name given to a collection of forces that act to keep an object in circular motion. Instead of labeling something "centripetal force", label the individual forces *by what produces the force* (normal force, force of wall, etc.).
   - arrows for items that are not forces, such as "a" or "g."
   - other objects in addition to the *one object* that the free-body diagram is for.
   - forces exerted *by* the object in the diagram.

4. DO include any of the following items on the free-body diagram.

   - the force of Earth's gravity, if appropriate
   - the normal force applied by a surface, if appropriate
   - the tension applied by a rope, if a rope is attached to the object