Physics 131 Some extra problems for those that want them! You're welcome! Dr. AP

**Newton's 1st law:** What comes in a straight line at a constant speed, goes in a straight line at a constant speed (unless it interacts with something else) [Note: that constant speed may be the special case $v(t) = 0$.]

**Newton's 2nd law:** If the various interactions (forces) on something ***don't balance,*** then the vector sum of those interactions causes that something to accelerate an amount inversely proportional to its mass.

**Newton's 3rd law:** if something interacts with something else, the two objects experience that same force in opposite directions.

**Newton's "0th" law:** things only react to interactions *on* them, NOT *from* them, and ONLY while those interactions are occurring. ("object egotism")

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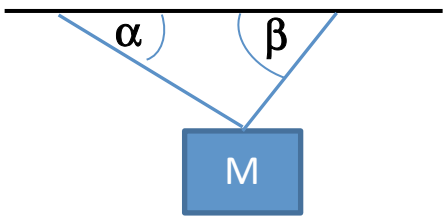
1. Classic "statics" problem. Imagine a box hanging from the ceiling in this unlikely way on two ropes:




   a. Draw the free body diagram for the box. Do not "break" any forces into components just yet.
   b. If $\alpha$ is $30^o$ and $\beta$ is $60^o$, what would be a clever choice of axes?
   c. If M is 10 kg, what are the tensions in the two ropes?

2. Another classic problem. Block B hangs over a "frictionless" pulley on a rope which attaches to bock A. A weighs 6 lb, B weighs 4 lb.

   a. How fast does A accelerate from rest if the table is so slick there's almost no friction?
   b. What is the *minimum* coefficient of static friction between A and the table need to be so that the system is at rest?
   c. What is the coefficient of kinetic friction between A and the table need to be so that B and A move with constant speed?
   d. For the situation in c., can you figure out what that speed must be? If you can, solve for it; if you can't explain why not.