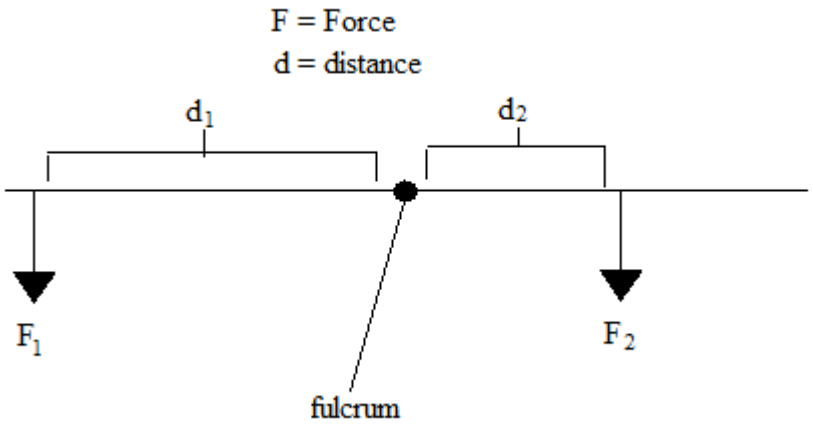
Intro to Engineering

The Balance Lab

On Wednesday, October, 1, my Intro to Engineering class exercised a different side to balancing forces. With a focus of understanding the nature of balancing forces, we were required to use calculations to know where different masses would balance each other on a dowel held at its fulcrum. The overall purpose of the lab was to bring to life the material we had been learning in class previously, such as the equation $F_1D_1 = F_2D_2$. On a visual scale, the equation is demonstrated here:

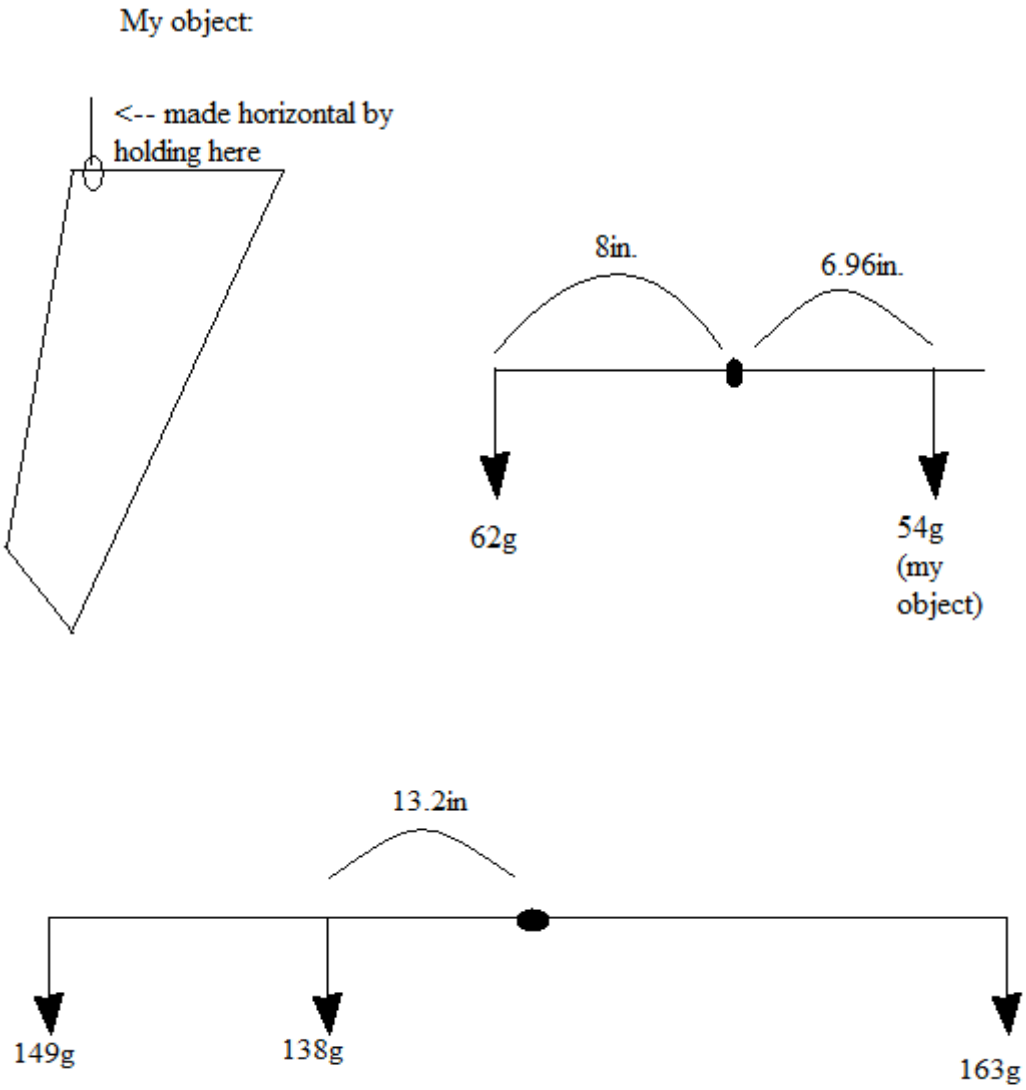


Materials used in the lab were oddly shaped pieces of a cardboard-like material. All the pieces were different by definition of the number of sides and the angles of the corners. These pieces of cardboard were attached to 16 inch dowels at certain points with a string of three paper clips. Although there were not many materials, we made use of them excessively. Other materials include a rope, a pulley, and large rod.

The procedure of the lab was very simple. As individuals, we began by picking our own piece of oddly shaped cardboard, and looked for a point on that piece of cardboard that if held

there, would make the top horizontal equal to one-hundred eighty degrees. Partners were picked and now it was our job to hang each of our masses from a 16in. wooden dowel, but it would have to be pre-calculated. We massed our objects, used the equation, and made our objects balance each other. From here, we joined with two other sets of partners and balanced these three already balanced pieces of cardboards and dowels so now there would be three points on a larger dowel that the three smaller projects hung from. Now, as a class, we had to hang these balanced mobiles from something even bigger, the ceiling. We walked into another room to discover that there was a rope attached to the ceiling with a fairly large rod attached to it at the fulcrum. We attempted to create something pretty by hanging all of these projects on the large rod so that it would balance as did our smaller projects. In total, there were 4 of the larger projects to be hung.

The results of the lab consisted of the masses of our individual pieces and partner pieces, as well as the distances from the fulcrum. My object massed as 54g and my partners was 62g. When we put our projects together on the first dowel, we placed my object 8 inches from the center and my partners object 6.96 inches from the center on the opposing side. When we combined with the two other sets of partners, we each had our own respective masses to attach to the larger dowel. My and mine partners total mass was 149g with the other two masses being 163g and 138g. We placed the two larger weights on the ends of the dowel and calculated where we would place the smallest mass relative to the center. That distance was concluded to be 13.2 inches. And from there, we placed all those on the largest dowel hanging from the ceiling.



Initially, I expected the project to be easier, but I was wrong. The distances to calculate were easy at first because there were only two masses to be dealt with, but when it came to three, the difficulty jumped quickly, but still doable. The results as a whole, such as approximated distances I would make in my head, came out to be roughly what the real distances were and not much had caught me by surprise in the lab. If I were to change the exercise, I would make it more difficult by maybe having the class attempt the project before we were made aware of the equation. It would force the students to come up with the

calculations and perhaps stumble upon the equation that all the calculations in this lab were made around. In the end, our completed mobile looked not so pretty, but it still accomplished the purpose of the lab. It would have been better, I believe, to hang some of the objects at different heights rather than all at the same relative height, because it would make our class mobile look less cluttered and thrown together.