

## 9.2: Activities

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### Things You Will Need

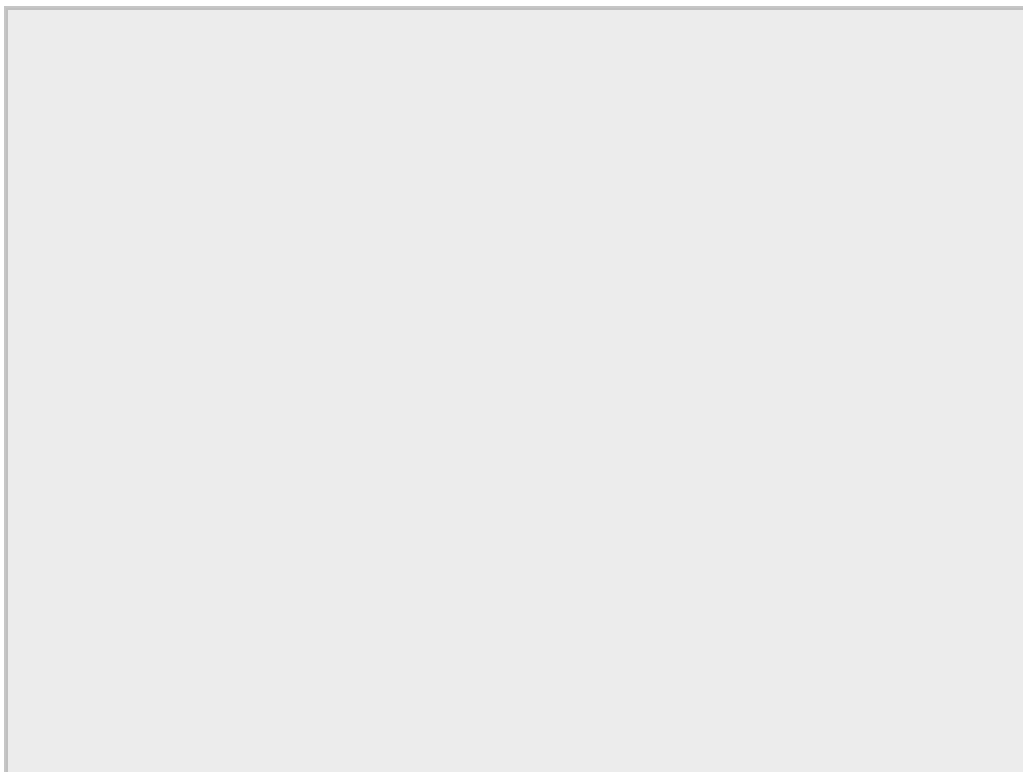
- an old deck of cards (or any uniform rectangular prisms)
- a ruler
- two forks
- a drinking glass
- anything else that you think would be cool

### Have Some Fun!

This lab is all about static equilibrium, and more specifically, balancing extended objects at their centers of gravity. Below you will see two demonstrations of this idea. You should try these for yourself. The card structure will require some calculations and meticulous measuring to get a good result, while the fork balance is all about trial-and error. If you have an idea to jazz-up these examples, or an idea for another balancing act, by all means, go for it. In the end, your Gradescope submission will be photographs of two things that you managed – make them as spectacular as you can!

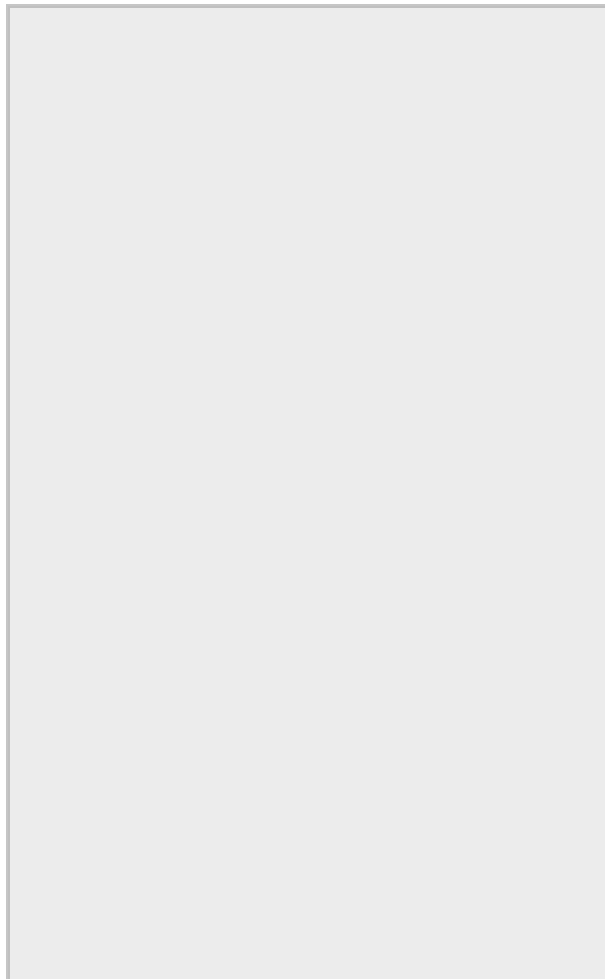
### Card Cantilever

The [Background Material](#) gives a method for organizing bricks (in this case, playing cards, or some other similar objects) such that they stick out well past the edge of a table. Precision measurements and marking the proper positions of cards on top of each other with a fine point pen are useful in reaching success in this task. You will want to use an old deck, so that you don't have to ruin a new one with marks, but also an older deck of cards will have more friction between cards, preventing them from sliding off each other due to the unavoidable bend that occurs in the card extension. In the photo below, 6 such cards were marked, and then many others are added beneath with what can only be described as "extremely approximate" spacing. In theory, 31 cards is enough to get an extension of 2 full card lengths, while this one used a whole deck, and still fell somewhat short of two card lengths. Still, the effect is quite striking!



## Flying Forks

In this example, we create an object that balances on the edge of a drinking glass because its center of gravity aligns with that edge (draw a line tangent to the rim of the glass at the point of contact, and that line divides the forks along their combined center of gravity). The small white rectangle that you see coming through the top tines of the forks is just an index card that has been folded-over many times (you could use a folded playing card, since you have already ruined a deck for the previous example). Very often this "trick" is done with a quarter instead of this stiff paper. In this particular case, the handles of the forks are very heavy, so the center of gravity is farther down the handles than with other forks, which means that a coin does not provide a sufficiently long moment arm for the forks to balance. The point is, you may need to make creative adjustments compared to the picture (don't bend the forks too much!) in order to get this to balance.



## Lab Report

Your "lab report" consists of pictures of two balancing acts – they can be your versions of those given above, or something entirely different. Let's see how extreme you can make these (but no trick photography, please)! Please note that Canvas allows for submissions of jpegs, which is probably going to be an easier format to use for pictures than pdf.

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