

## **E5 Simple Design Exercise: The Tennis Ball Shotput**

Using the material provided (duct tape, saran wrap, two 3-foot dowels, and a tennis ball), design an apparatus to maximize the distance the tennis ball will reach when it is launched from the roof of Hicks using a giant slingshot with fixed pull distance (e.g., fixed potential energy).

### **Brainstorming**

Quickly select one person as recorder and one as moderator.

The recorder will keep track of all of the ideas suggested. S/he will record during the class time, but save a record of the notes for your report.

The moderator will keep things flowing and attempt to enforce the rules.

The rules:

- Refrain from passing judgment on ideas during the brainstorming session. Don't point out reasons why something won't work, or is not as good as another idea. All ideas are potentially good, so do not judge them until afterwards. Avoid discussing ideas, which includes not criticizing and not complimenting ideas.
- Write down all ideas. At this point of the process, there are no bad ideas. If the number of ideas at the end of the session is very large, there is a greater chance of finding a really good idea.
- Build and expand on the ideas of others. Try and add extra thoughts to each idea. Use other people's ideas as inspiration for your own. Creative people are also good listeners. Combine several of the suggested ideas to explore new possibilities.
- Each person has a valid viewpoint and a unique perspective on the situation and solution. We want to know yours. In a brainstorming session you can always put forward ideas purely to spark off other people and not just as the final solution. Please participate, even if you need to write your ideas on a piece of paper and hand it out. Encourage participation from everyone.
- Each idea presented belongs to the group, not to the person stating it. It is the group's responsibility and an indication of its ability to brainstorm if all participants feel able to contribute freely and confidently.

### **Construction**

After the Brainstorming Session:

1. Find a time this weekend when everybody can get together for a couple of hours. Not everyone has to be present the whole time.
2. When you get together, spend about 15-20 minutes deciding on an apparatus to build. Use one of the ideas from your brainstorming session. Creativity counts.
3. Spend the rest of the time building a prototype of your design. We will test these out by launching them from the roof of Hicks. Note: a design usually goes through iterations to improve it – in the interest of time we will be skipping these steps.

## Report

This exercise has a simple report. The report will be posted on the web page of somebody on your team. Each member of the team should have a link to the report from his or her web page.

1. The page must include a list of everybody in the group.
2. Include a description of the brainstorming session(s) including the ideas recorded at that time.
3. Describe how you chose your final design.
4. Describe your construction process. You should include a drawing of your apparatus. You can scan it using the scanner/copier in the Hicks Departmental Office and post it as a PDF.
5. Include your final drop distance (the displacement vector from corner of Hicks to the point where your tennis ball hit the ground, as measured by the official distance-measurer).