Balloon Hovercraft
Engineering Activity Teacher's Guide

Goals:

- The goal of this activity is to teach your students the simple concepts of thrust and action/reaction forces (Newton's Laws).
- This project is designed for students between 4th and 6th grade.
- Although some thinking and designing is required, this activity should not seem overly difficult for the students.
- The design and racing of the hovercraft should be a fun and effective learning tool to explore some simple physics and engineering principles.

Materials:

- The students can be asked to each bring a CD of any type, and a film canister.
- Also needed is:
- Scissors
- Tape
- Super Glue (if students are younger you might need to super glue the canister onto the CD for them)
- Large balloons, at least twice as many that students.
- A large table for the competition.
- Markers for them to decorate their hovercrafts.

How to make the hovercraft:

The simplest design is made by taking the film canister and gluing it to the top of the center of the CD with the openings lining up. Each canister should have a hole cut in the bottom and several holes cut around the sides (pictures can be found online). Each group can design as many hovercrafts as people in the group, but only one can be used in the competition.

Once the canister has been glued securely to the CD, blowing up a balloon and placing it over the film canister and releasing will allow the air to push down through the canister and give lift to the craft (similar to an air hockey table). This is the simplest of designs. But opening or closing the holes on the side of the canister you can cause the craft to move in particular directions. Furthermore, placing a straw into one of the holes and covering up the rest will give the craft the best straight line

movement. (When the students are designing, they may discover that this works the best, if not, try to hint at them to at least try using the straws in many different ways).

You should really encourage the students to try many different ways to make the craft move. If the craft spins to easily, ask them to think of a way to stabilize the balloon on top of the craft. They can use straws taped or glued to the canister to make a "holder."

What to do:

- First begin with a short explanation of what thrust is, the teachers demonstration kit can be easily used, or you can assemble your own hovercraft.
- Then explain how the class will be separated into small groups of 2 or 3 and pass out the student activity worksheet packets.
- Make sure you explain to them that this is not only a competition but it is a design activity that they must ALL participate in.
- Tell the student about the competition and show them the table that they will be competing on, as well as the size of the goal.
- The students should be approximately 20-25 minutes to design and test their craft, will the help of others, walk around and observe the students and address an questions they may have.
- Offer hints as to what to do with the straws, and ask them questions about their designs.
- Attempt to see if they understand the general concepts, such as how the craft moves and in what directions.

Final Competition:

- Using a table at least 6 feet long, set up a square, soccer type goal using cardboard or even balloons.
- The student must get their craft through the goal.
- Time each heat with two teams going at once.
- The "bumper car" effect can be quite entertaining
- If the competition is too simple, try a larger table

Wrap-Up

- Have a quick discussion to determine what the kids have learned
- Explain the simple ideas of thrust and action/reaction with them
- Present examples of real world things that use thrust (space shuttle, airplanes, etc…)
- Stress the idea of design as a critical aspect of engineering.
- Your students have just become engineers!

This can be a simple and rewarding activity to teach your students the general concepts of physics, and design, both integral aspects of engineering.