Box 7904 / 118 Page Hall
Raleigh, NC 27695-7904
www.engr.ncsu.edu/theengineeringplace/

PUFF MOBILE

Grade Level: 4 and up

Group/Team Size: 3 or 4

Time Required: 45 minutes

Expendable Cost Per Group: 1 US Dollars

Summary: Students will use simple materials to construct and race cars, using only their breath for propulsion.

Engineering Connection: Engineers are often given a finite amount of resources and are asked to complete a given task. Land sailing is motion across land in a wheeled vehicle powered by wind through the use of a sail. It is primarily a sport that has been practiced since the 1950's and pilots of these crafts can go three to four times faster than wind speed. Land sailing works best in windy, flat areas - taking place mainly on beaches, air fields, and dry lakebeds (playas) in desert regions.

You and your partner are considering designing a craft to participate in the 2008 World Championship land sailing race in Patagonia, Argentina in order to promote the skills of your engineering design company. But, before you spend the money and time on the craft, you would like to build a scale model to validate some of your ideas. Using the following materials to plan and build your design.

Educational Standards:
From the North Carolina Standard Course of Study (http://www.ncpublicschools.org/curriculum/ncscos)

- Control and manipulate variables.
- Apply safe and appropriate abilities to manipulate materials, equipment, and technologies.

Learning Objectives:

- Planning
- Teamwork
- Building design/innovation
- Expectations for the students to learn a concept of engineering involving different constraints such as time, materials, and money. Student should become aware that engineers face these difficulties every day. Hope the students will receive a broader idea of engineering concepts.

Materials: Each group will need:

- 3 Straws
- 4 Life-Savers
- 1 Piece of Paper
- 2 Paper Clips
- 50 Centimeters of Tape
- stop watch
- a bag of miscellaneous scrap materials (ie foam, string)

Safety: Caution children about choking on candy, paper cuts, and the sharpness of the paper clips. Caution students with asthma.

Introduction: Use the Engineering connection to introduce the activity. Tell the students we are using high-tech and high-quality materials to build race cars that are powered by air. Make sure the students understand what we mean by "air-powered".

Procedure:

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1. Explain the activity, give a start time and time them
2. Break students into groups, give 1 or 2 minutes to break into the groups.
3. Hand out the materials.
4. Give students 10 minutes to construct their cars.
5. Mark out a 1-3 yard long track for the race.
6. Instruct the students to come up with a team name, use these to create heats
7. Allow two teams to race at a time creating heats
8. Line the students up across the line giving directions to not interfere with the other teams in any way, spacing the student far enough apart will help
9. Give 5-10 minutes to race the cars, using only breath for propulsion.
10. Winner gets a prize, and challenges the leader's car.
11. Clean up materials and restore order to the classroom.

Activity/Age Scaling: While students are working, assess how the groups are doing. Make sure they are not struggling, and give assistance if needed. Encourage the groups, and point out areas where they could use help. Repeat command not to eat the Life-Savers. Address the idea that incorporating a cost of material will could affect scale. Address the ideas that weight may play as a factor. Talk to the students about air power being a factor and ideas on alternate air powered sources like a fan.

Additional Resources: www.pbskids.org

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