**Pre AP Conceptual Physics**

**Summer Assignment—2012**

**Design and Construct a Rubber Band-Powered Car**

**Overview**

For this project, students will research how to design and build a rubber band powered car. The student will then construct the vehicle and be ready to show its ability to perform to the class on the first day of school, August 15th. Students can utilize the Internet to find design ideas, but must meet the design requirements outlined below.

Failure to meet the design requirements will result in a loss of points on the final grading.

**Student Outcomes**

1. Design and build a vehicle that is able to run across a concrete track powered only by rubber band bands.
2. Design this vehicle for optimal performance in speed, distance & power. Have fun with your decorations!
3. Enter this vehicle in a competition with other student-designed vehicles.
4. Write a report describing the physics behind the rubber band-powered car.
5. Complete a follow-up assignment that includes outcomes, analysis & conclusions (this will be done in class).

**Part I: Rubber Band Car Design Requirements (est. time: 5 hours\*)**

1. You may **NOT** use any commercially available rubber band car kits, pine car kits, CO2 car kits, LEGO, K’NEX, Lincoln logs or any other building blocks of any material. **Doing so will result in a zero!**
2. Use easily available materials such as cardboard, wood, plastics, glue, tape, hot glue, etc. that is inexpensive and easily found at home, hobby or discount stores.
3. Must be of original design (ie. student designed)
4. Must have at least **3 wheels**, all of which must support the total weight of the vehicle. **Less than 3 wheels will result in a zero!**
5. Must be powered by one or more rubber bands.
6. You may use a propeller but most find wind propulsion difficult.
7. The vehicle must start from a resting position and **cannot** otherwise be **catapulted or slung** into motion (you can’t make a sling shot or launch pad). Once released, the vehicle must operate without intervention.
8. **Must be ready to perform on Wednesday August 15th , 2011 during your regularly scheduled class period. NO LATE PROJECTS WILL BE ACCEPTED.**

**Grading:**

The cars will be graded on their best run of four. (1 meter = 3.28 feet)

100 – Car is able to travel 4 + meters.

95 – Car is able to travel 3 – 3.99 meters.

90 – Car is able to travel 2 – 2.99 meters.

85 – Car is able to travel 1 – 1.99 meter.

80 – Car is able to travel 0.1 – 0.99

75 – Car is turned in on time but does not move at least 1 centimeter

0 – No car is turned in OR a car does not abide by the design requirements above.

**Part II: Written Report Requirements (est. time: 1.5 hours\*)**

You will submit with your car a 1-page (only!), **TYPED**, double spaced **ORIGINAL** report that describes the physics behind how the rubber-band powered car “works”. You can include terms such as: force, power, energy, work, speed, acceleration, distance, time. You may describe the design specifications and the role each plays in contributing to the speed, distance, and power, etc. of the car.

A five paragraph essay should be used with an introductory paragraph, 3 body (supporting) paragraphs and a conclusion paragraph.

Standard format: Top margin should be no more than 1 ½ inch. Side and bottom margins should be no more than 1 inch. No larger than 12 point font may be used.

If you do not have a computer to do your research or type your report, you may come to the school Monday through Thursday from 8:30 -3:00 (except July 4th) and use a school computer and printer. Not having a computer or a functioning printer will not be accepted as reason to not complete the assignment.

Copying and pasting information from the Internet or any other source is plagiarism and will not be accepted. Any information that is not your original work must be sited and listed in a bibliography.

Based on an assignment developed by P.K. Imbrie, Texas A&M University, 2002