RUBBER BAND CAR STEM ACTIVITY

5E lesson plan modified from current student project by **Scott Faris**
(for KEEP 731 Fall 2012)

Wisconsin Science Standards:

D.8.5 While conducting investigations, explain the motion of objects by describing the forces acting on them

D.8.6 While conducting investigations, explain the motion of objects using concepts of speed, velocity, acceleration, friction, momentum, and changes over time, among others, and apply these concepts to real-life situations outside of the classroom

D.8.7 While conducting investigations of common physical and chemical interactions occurring in the laboratory and the outside world, use commonly accepted definitions of energy and the idea of energy conservation

Objectives: Use your knowledge of inertia, kinetic & potential energy, wheel & axel, mechanical advantage, friction, & momentum to build a rubber band powered car that will compete for distance honors.

Engagement: Ask the students who would like to get their drivers licenses.
Ask how cars are powered (discuss)
Ask what makes some cars more efficient than others

Exploration: Teacher: Pass out the Challenge activity (below) and offer available supplies

Students: will investigate the problem using the various materials provided in small groups

Explanation: Teacher: ask each group to present their model to the class

Students: will demonstrate their model and use their knowledge of inertia, kinetic & potential energy, wheel & axel, mechanical advantage, friction, & momentum to explain how their rubber band powered car works, and answer questions from their peers about their project

Elaboration: Teacher: choose a few groups to demonstrate their models again while discussing the concepts of inertia, kinetic & potential energy, wheel & axel, mechanical advantage, friction, & momentum

Students: will answer additional questions about their models

Evaluation:

50 points possible

Building a car ..... 35 points

Distance
- 1 meter ..... 37 points
- 2 meters ..... 39 points
- 3 meters ..... 42 points
- 4 meters ..... 44 points
- 5 meters ..... 45 points
- 6 meters ..... 46 points
- 7 meters ..... 47 points
- 8 meters ..... 48 points
- 9 meters ..... 49 points
- 10 meters ..... 50 points

1 point will be awarded for each meter beyond 10 meters. Some part of the car must be touching the meter mark. There are no ½ meter distances. All of the car must be behind the starting line at the beginning of the run.

Students will also take a common assessment covering the concepts of inertia, kinetic & potential energy, wheel & axel, mechanical advantage, friction, & momentum

Student Sheet Below:

Name_____

Rules:

1. You may use cardboard, coat hangar wire, string, glue, wood, tape, Styrofoam, plastic, etc. Note; nothing may be used that has been designed specifically for that use; for example, wheels that are made to be wheels, propellers that are designed to be propellers, etc. **Any exceptions must be approved.** I will provide many materials but you may bring in additional materials as well.
2. Each car must be powered by 1 or 2 rubber bands supplied by the school.
3. You will be given **3** rubber bands TOTAL for the testing AND running of the car.
4. Your car must start on a level surface and cannot be powered in a "slingshot" fashion.
5. Decorations are permitted as long as they don't hide illegal construction
6. Only rubber band power can be used. NO PUSHING
7. Decisions of judges are final.

GRADING:

1. 50 points possible
2. Building a car.....35 points
3. Distance
   - 1 meter.....37 points
   - 2 meters.....39 points
   - 3 meters.....42 points
   - 4 meters.....44 points
   - 5 meters.....45 points
   - 6 meters.....46 points
   - 7 meters.....47 points
   - 8 meters.....48 points
   - 9 meters.....49 points
   - 10 meters.....50 points
4. 1 point will be awarded for each meter beyond 10 meters. Some part of the car must be touching the meter mark. There are no ½ meter distances. All of the car must be behind the starting line at the beginning of the run.

PREPERATION: You will have three days in class with your group to complete the project. The **more times you test your car** and make modifications the better your potential point total will be. Use your knowledge of **inertia, potential & kinetic energy, wheel and axle, mechanical advantage** and work to build a superior car.

Building tips: Strong frame, good sized wheels, not tiny ones, wheels that don't rub on the body, "round" wheels that all touch the ground, front wheels that roll straight and not "snowplow" ahead; wheels and axle should be one unit.

FOR ADDITIONAL POINTS ON THE CAR PROJECT YOU MAY:

1. Turn in a **summary** that includes the following:
   a. Log or written journal on your building progress(assuming that you kept one).
   b. A written explanation at least one page in length telling how your car works. Be sure to use your knowledge from the first four chapters and use the following vocabulary terms: inertia, friction, potential energy, kinetic energy, wheel and axle, and work.