Lesson Plan: Rubber band Car Challenge
Cragmont Elementary School

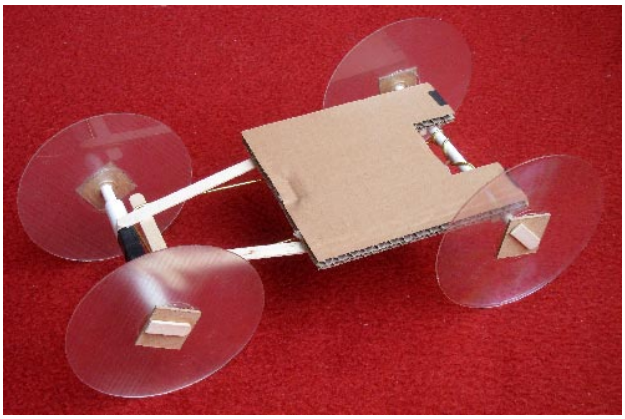
Teaching Plan:
Students will build a rubber band car to see energy transfer in action! Potential energy is supplied to the car as the rubber band is wound up; once released, the potential energy of the rubber band is quickly transferred into kinetic/ rotational energy and the car moves forward. This lesson will also allow the kids to deviate from the simple standard set up in order to see who can build the best / fastest car.

Mentors Scientific Background:
The cars are built with basic materials to show the simplicity of the conversion of potential energy into kinetic/ rotational energy. Using just wheels, axles, and a simple car body, the cars can be "powered" through potential energy stored in the attached rubber band. The rubber band is stretched creating an elastic force and storing potential energy.

Force = kx
Potential Energy = $0.5*kx^2$

When the rubber band is released, the potential energy is quickly converted to kinetic energy, moving the car forward.

Kinetic Energy = $0.5*mv^2$



http://diyfamily.wordpress.com/2011/02/02/rubber-band-powered-car/

Agenda:
1. Introduction to energy/cars (10 mins)
2. Drawing/ designing of cars (15 mins)
3. Making rubberband cars (40 mins)
4. Racing cars (15 mins)
5. Discussion/ cleanup (10 mins)

Introduction for the Mentees:
Ask about position vs. motion. Let them demonstrate their interpretation of what position is and what motion is, preferably they show by physical movement (or lack thereof).

Lead a discussion on what parts of a car are important in its position and motion. Answers should revolve around wheels, engine, main body, and axles, as well as creative response, of course.

Talk about rubber bands and how they can be incorporated into a car to help it move.

Rubber band Cars Challenge:
Demonstration of position vs. motion using rubber band cars!

1. Distribute some worksheets for them to draw initial designs
2. Walk around and discuss with teams of kids why they think their design will work, and provide some guidance
3. Once all the kids have a pretty good grasp on main components of rubber band design, lay out supplies
4. After all have designed their cars, set up a "racetrack" area to see which designs work best

Closing Activity and Discussion:
Discuss how design affects the efficiency of cars.

- How does a greater weight, size of wheels, or amount of rubber band winding/ tension change the motion of the car? Do they go farther?
- Why would a greater weight shorten the distance traveled by the car?
- What is happening (wrt physics) when we wind the rubber band super tight?
- What if we used three different wheel sizes? Which car would go the farthest? The car with the largest or smallest wheels?

Materials: (per group, assuming groups of ~3)

- Cardboard - at least 1 square foot
- Wheels - cardboard (an additional square foot) or CDs (4)
- Axles - dowels, straws, or skewers - 2 of each
- Rubber bands - at least 4
- Paper clips, duct tape, thumb tacks - 1 roll of duct tape, a few paper clips + tacks

References:

- http://technicallylearning.org/ActivityGuides/rubber_band_race_car_design.pdf
- http://pbskids.org/designsquad/pdf/parentseducators/ds_pe_event_guide_rubber_band_car.pdf