Wooden Car Activity

In this activity, students will investigate Newton's First Law of Motion that in part says that an object in motion stays in motion unless acted upon by another force. Utilizing rubber band powered wooden cars, students will attempt to 1. Provide evidence that unbalanced forces are present in the car system which supports Newton's First Law. 2. Collect data that analyzes the relationship between potential and kinetic energy in the car system. Following their time for investigation, students will discuss what they have observed, proposing explanations for the evidence that they collected.

Materials for each group of 3-5:

- Rubber band powered car (Available from Educational Innovations; www.teachersource.com)
- Rubber bands of various sizes
- Various surfaces to test cars on (foam board, sand paper, wooden floor, table top)
- Various tools for measuring length (e.g. measuring tape, meter stick)

Step 1: Demonstrate the Phenomenon

1. Wind up the car, place it on the surface you are using and release it. *(The car will eventually stop after a distance)*
2. **Ask:** "What is it that stops the car from remaining in motion? Write down your ideas on the piece of paper." Encourage participants to include a drawing to help them to explain their idea.

Step 2: Explore the Phenomenon

1. **Ask / state:** "We do not 'believe' things in science – we collect evidence to support our assertions. Your goal today is to observe this phenomenon, and then use the car and various materials at your table to collect evidence that helps to explain why the car does not continue to travel. Additionally, you will collect data that helps to explain the relationship between the potential and kinetic energy in the car system. In 30 minutes, you will share your findings with the group."
2. Participants take ~30 minutes to explore, using the materials at their tables.
3. Facilitator could provide a visual timer, or remind at 5-minute intervals.

Step 3: Discuss the Phenomenon

1. Facilitate a discussion with the group of participants, starting by allowing each group to share their findings. Be sure to clarify participants' 'findings' (what was observed) vs. their conclusions (what was inferred).
2. Some sample language includes:
    a. What evidence do you have to support your assertion?
    b. How did you arrive at that conclusion? What made you think that?
    c. Did it always work that way?
    d. Who can add on to the idea that this group is building?
    e. Are you saying the same thing as what the other group says, or something different? How is it different?

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Step 4: Evaluate our Understanding

1. **Ask:** "Considering what you have seen and heard today, summarize your thinking on a sheet of paper in front of you. How would you add to / change your initial statement?"
2. Compare to neighbors for self-evaluation, or collect from participants.

Note to Teacher: The rational for why the car stops is relatively straightforward. The impact of friction and gravity on the object in motion (in this example, the car) causes it to lose momentum and roll to a stop. If an object is pushed in the vacuum of space, it would continue on in motion until acted upon by the gravity or impact of another object.

The relationship between the potential and kinetic energy for the car system could be measured through tracking number of winds vs. distance traveled. After graphing of the data, consideration must be taken for many things including the elasticity of the bands that are used, friction encountered between the wood axels and between the tires and floor, surface the car rolls on, and whether or not "tires" are used on the rear tires.