



Drexel-SDP GK-12 LESSON

- *Air Powered Car*
- *Engineering Module*
- Subject Area (Unit): ***Engineering***
- Concept: Motion, Acceleration, Speed, Rotation and Vehicle Design
- Objectives: *Students build and race a car powered by 2 balloons and constructed from everyday household items that are provided or that they can find in their homes*
- PA Academic Standards: *3.1.7ABCE, 3.2.7ABC, 3.4.7AC, 3.6.7BC, 3.7.7E*
- Grade Level: **6**
- Setting/Group Size: Classroom split into smaller 3-4 person groups.
- Duration/Time Required: ***3 60 minute sessions***
- Materials List: General construction material including cardboard, straws, stiff wire (hanger works well), material for wheels (plastic bottle caps, tea candles or poker chips work well), tools for cutting the wire, scissors for cutting cardboard and an awl or other tool for creating holes in the wheels.
- Context: *This is a continuing part of the engineering module that gives students a sense of what engineers do. This lesson can also be tied to several physics and science concepts including motion, rotation and acceleration. It can also be linked to alternative fuels for cars. The activity lends itself to several discussions in the field of science that can be initiated by student questions and guided by the instructor*

- **Methods and Procedure:**

1. First outline for the students the rules of the race:
 - a. Each car can only be powered by up to 2 balloons
 - b. The cars must race for 15 feet, and must be designed so that the balloons can be inflated and released on que
 - c. Only non-car parts can be used in the construction, meaning they cannot bring in parts from RC or other toy cars to use for construction
 - d. The race will be a double elimination race, meaning that each car has to lose a race twice to be eliminated, this allows for bad starts and small problems they may arise in their first race
2. Provide the students with the building material, remind them to keep several items in mind in their initial design ideas:
 - a. How will the wheels turn?
 - b. Where will the balloons be attached and how?
3. As the students construct their vehicle move around to comment on and critique each design, pointing out issues that each team might encounter.
4. Allows the students to test and modify their designs by laying out the track shortly after beginning the project.
5. Officiate several “test races” before the final race begins
6. Begin the final race using a double (or triple for smaller groups) strategy to determine the winner

- *Assessment: Once the winner is determined, ask the students to place each car in a place where they can be inspected. Have each student write up a short paragraph that discusses why their car did or did not win, what features on the winning car allowed it to be fastest. If they could design one more car, what features from other cars would they incorporate into theirs and why. Additionally ask them to write answers to several questions including:*
 - *Name three things that influenced a cars acceleration*
 - *Name three things that influenced a cars top speed*
 - *How might these balloon cars relate to the space shuttle during take off?*

- **Keywords:** Vehicles, motion, acceleration

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