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**Grade Level:** This lesson was created with 4th and 5th graders in mind, but can be adapted to any level for K-12.

**Title:** 3-2-1 Pop!

**Behavioral Objective:**

When called upon during a class discussion, students will be able to correctly identify at least three ways to apply Newton’s First Law of Motion to the launch of a fizz rocket.

**Concept Statement:**

An object at rest will remain at rest until acted upon by an outside force.

An object in motion will remain in motion until acted upon by an outside force.

**Materials:**

Sandwich bag containing a toy car, top, unsharpened pencil, and bouncy ball

(enough for each group of four students to have a bag)

Inner locking film canister (one for each student)

2 note cards for each student (any size will work)

½ of an Alka Seltzer tablet for each student (generic brand works great)

Water

Launch Area

Scotch Tape

**Procedures and Strategies:**

*Exploration:*

1. The teacher will give each group a sandwich bag (containing a toy car, a top, an unsharpened pencil, and a bouncy ball) and a data sheet. The students will need to physically do something to each object in order to make it move and stop. All observations should be recorded by the students.
2. The teacher will make sure that the students understand the instructions. He/she will then serve as a facilitator and only help as needed.

*Concept Invention:*

1. The students will use the data they collected in the exploration to write a general statement about what they saw happen with the object. First, they will write their statements individually. Then, they will discuss their statements with their group members and create one general statement.
2. Each group will write their general statement on the board and read it aloud to the class.
3. The teacher will give scientific terms to the students’ statements. The teacher will use all of the statements to help them understand the concept.

Newton’s First Law: An object at rest will remain at rest until acted upon by an outside force. An object in motion will remain in motion until acted upon by an outside force.

*Expansion*

1. The students and teacher will put their rockets together. The teacher will use his/her rocket as a model to demonstrate how to construct the rockets.
   1. First, take the lid off of the film canister and set it to the side. Place the film canister on the table with the open end touching the table. Tape an index card with the short side to the side of the canister. Be sure not to place tape on the bottom or the top of the canister. Wrap the card around the canister creating a tube and tape it on the side.
   2. Next, have the students cut a nose cone and 4 fins out of the other note card using the patterns provided. Make sure the students tape the nose cone on the opposite end from the top of the canister. It is important that the students tape the four fins equidistant from each other and that the bottom of the fins does not come below the open end of the canister.
2. The students’ task is to apply what they learned in the Exploration to the Expansion. The teacher will explain to the students that each person will have their rocket, a cup of water, and ½ an Alka Seltzer tablet. They may use all of these items, or just the rocket. Each student has to figure out how he/she will use Newton’s First Law of Motion to make his/her rocket move. Any answer that uses Newton’s First Law of Motion to make the rocket move, is acceptable.
3. The students will share their ideas with the class. Some of the students will say kicking it, hitting it, pushing it, etc. Many of the students will catch onto the fact that Alka Seltzer and water will create a force if enclosed in the canister. The teacher needs to validate all of the students’ answers.
4. Launch each of the rockets using the Alka Seltzer and the water in the film canister outside. Be sure to have a launch area that is clear of all students. It is advisable to use goggles, if they are available.

