



## ACTIVITY 1: FIZZY ROCKETS

### Background:

British mathematician Sir Isaac Newton (1642-1727) was very important to the scientific revolution and to the future of rocketry and space exploration. Among his many important contributions to the field: he built the first reflecting telescope; he proved the Earth revolves around the Sun; and he published a book called *Philosophiae Naturalis Principia Mathematica* ("Mathematical Principles of Natural Philosophy") that holds the key to modern rocket science. In his book, Newton described **Three Laws of Motion** that control how objects move and how they are affected by their environment.

- **Newton's First Law of Motion: An object at rest will stay at rest, unless acted upon by an outside force.** This means that an object that is not moving will not move on its own unless something or someone moves it.
- **Newton's Second Law of Motion: Force equals mass times acceleration.** This means that the amount of force something has is based on how heavy it is and how fast it is moving.
- **Newton's Third Law of Motion: For every action, there is an equal and opposite reaction.** This is an important law for a rocket scientist to know because it means that when burning rocket fuel pushes its way *down* and *out* of an engine, it pushes the engine *up* with the same amount of force.

**Objectives:** Perform an experiment that demonstrates Newton's **Third Law of Motion**. Learn how to form a hypothesis and follow the scientific method. Learn about basic chemical reactions.

### Materials:

- Film Canister
- Scissors
- Crayons/markers
- Water
- Alka-Seltzer tablets
- Fun foam sheets for fins/nose cone
- Scissors
- Crayons/markers

### Activity:

Be sure to do this activity in a room with a fairly high ceiling and far away from any electronics. The Fizzy Rockets will fly high and they are wet!

1. Fill up the film canister about 1/4 of the way up with water. Drop in 1/2 an Alka-Seltzer tablet. Put the cap on the canister. Set it on a table, cap-side down.
2. Back up! You do not want to stand directly above the Fizzy Rocket! It will hurt if it hits you.
3. Meanwhile, inside the film canister, the pressure will be building. When the pressure is too great for the closed canister to handle, the top will pop off and the rest of the canister will fly in to the air!

### Fancy Fizzy Rockets

Of course you can get as creative as you want to with the Fizzy Rockets. You can also experiment to find out how to build rockets that will fly farther and faster. Here are some ideas:

- Use the fun foam to create fins and a nose cone;
- Try taping a paper tube around the film canister to make the rocket taller. Do the fins or nose cone change the way it flies?
- What if you change the size of the fins or the body tube?
- Trying using white vinegar and baking soda instead of Alka-Seltzer. Do you get the same reaction? Does it take more time or less time to react? Does the Fizzy Rocket go higher?

