

Film Cannister Rockets

REMEMBER BEFORE YOU START TO

1. Label Laboratory Notebook with the title of experiment & date you perform it
2. Gather all your materials
3. Read the CAUTIONS
4. Read ALL Methods
5. Write **predictions** in your Laboratory Notebook
6. Wear your goggles, gloves, and lab coat

GOAL: Learn about Newton's Laws of Motion

Materials

Water
Film Cannisters
Alka Seltzer Tablets



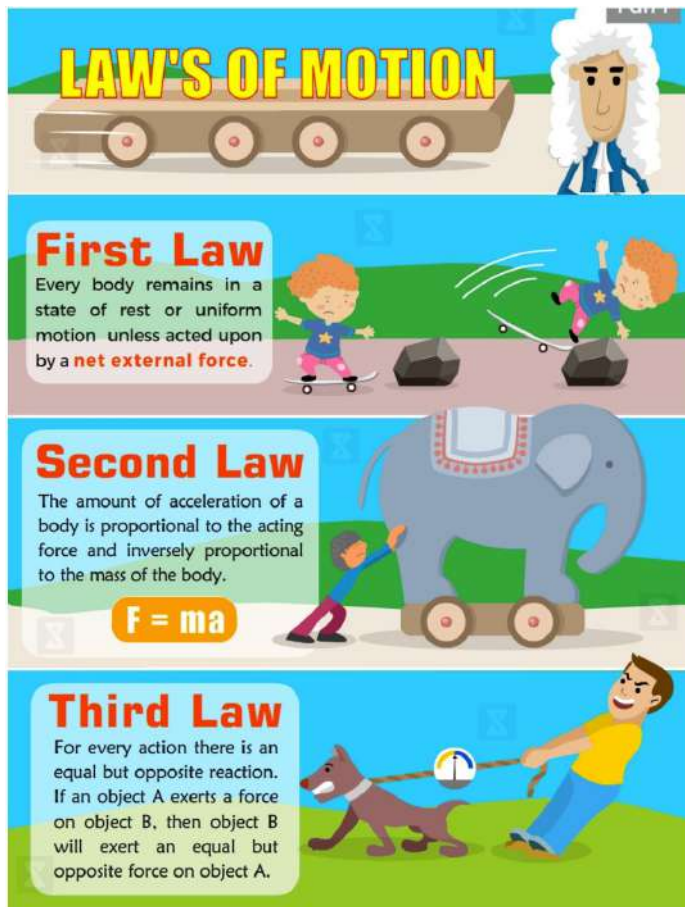
Objects will fly at high speed in unexpected directions. Wear goggles and be careful!

Methods

1. Fill your canister about a third full with water. **What do you think will happen when you add the tablet to the water and put the lid on? Write your predictions in your Laboratory Notebook.**
2. Drop in one tablet.
3. Place the lid on firmly, and then stand back!
4. Watch what happens. **Write your observations in your Laboratory Notebook.**
5. There is likely still more of a tablet left in the cannister once it lands. Add more water and repeat the experiment.
6. Additional experiments and questions:
 - a. **What happens if you add more or less water?**
 - b. **How many launches can you get from one tablet, by adding more water after each launch?**

What's Happening

- When the alka seltzer or vitamin tablet reacts with the water it releases carbon dioxide (a gas). The carbon dioxide builds up inside the canister, increasing the air pressure so much that when the canister can take no more it pops off and shoots up into the air.
- Film canister rockets are perfect for demonstrating Newton's Laws of Motion. First the rocket lifts off because it is acted upon by an external force (**Newton's First Law** caused by the buildup of gas produced inside the canister. This causes the lid to blow off, launching the film canister into the air.
- The rocket travels upward with a force that is equal and opposite to the downward force propelling the water, gas and lid (**Newton's Third Law**).
- The amount of force is directly proportional to the amount of water and gas released from the canister and how fast it accelerates (**Newton's Second Law**).



Who Uses This in Real Life?

Physicists study **matter** and the **forces** (pushes or pulls) that act on it. (**Matter** is what makes up all physical objects). Mechanics deals with the effect of forces on objects and the motions of objects.



Vera Rubin was a physicist and astronomer who conducted pioneering work on galaxy rotation rates, providing evidence for the existence of dark matter. By studying galactic rotation curves, Rubin uncovered a discrepancy between the predicted and the observed angular motion of galaxies. This provided convincing evidence for dark matter – a hypothetical, invisible form of matter which is central to the current understanding of cosmology. Rubin became a lifelong advocate for women in science and was honored with the National Medal of Science.