

# Water Rocket Project

**Goal:** Build a successful water rocket that will launch an egg over 100 feet in the air and bring it back to Earth without cracking.

**Team roles:** In order for big projects with multiple people to be successful, specific tasks need to be delegated. Your roles for this project are described below. Assign roles and write your names next to the role.

- **Rocket Scientist:** Connects rocket design to scientific principles \_\_\_\_\_
- **Rocket Engineer:** Evaluates materials and design constraints \_\_\_\_\_
- **Rocket Analyst:** Analyzes test launches and proposes next steps \_\_\_\_\_

Your whole group is still responsible for all assignments. Part of your grade for the project will be self-, peer-, and teacher-assessments on how effectively you worked with your group.

**Benchmark 1:** Successfully design and launch an Alka-Seltzer rocket. Analyze its motion using Newton's Three Laws.

- Newton's 1st Law of Motion
- Newton's 2nd Law of Motion
- Newton's 3rd Law of Motion
- Projectile Motion
- Air Resistance

**Benchmark 2:** Design and launch a prototype water rocket a payload to test your design ideas for maximum height.

- Pressure: Force per unit area
- Potential and Kinetic Energy
- Conservation of Energy



**Benchmark 3:** Improve your initial design based on your previous test and theoretical knowledge. Launch a final water rocket with a raw egg as its payload.

- Momentum
- Conservation of Momentum
- Impulse

For each rocket you test, you will need to gather the following data:


- 🚀 Pre-launch, dry mass of your rocket
- 🚀 maximum launch height
- 🚀 maximum launch velocity
- 🚀 acceleration of the rocket
- 🚀 net force of thrust coming out the rocket

For each rocket, you will create:

- 🚀 Pre-launch report
- 🚀 A blueprint of your rocket labeled with dimensions, features, and materials



 A video of your rocket launch **within a single, still frame**

 Post-launch analysis