

Bottle Rocket Project

GOAL:

How can you build a rocket out of a pop bottle that will stay aloft in the air the longest and return it's pilot safely to the ground?

PROCEDURE:

Students will build a rocket made from a typical 2-liter soda bottle. The opening of the bottle must be the normal sized opening (9/16" inside diameter). The bottle will be turned so that the opening is down and will expel water and air downward, thus pushing the bottle upward.



The rocket must be made to fit the following parameters:

1. The pressurized portion of the rocket must consist of one plastic 2-liter pop bottle. The manufactured structural integrity of the bottle cannot be altered. In other words, "Do not poke a hole in the bottle!!!" No metal parts will be allowed on the pressurized rocket body. The mass of the empty rocket assembly cannot exceed 400 grams with egg.
2. All energy imparted to the rocket must originate from the water/air pressure combination. No other potential or kinetic source of energy will be permitted.
3. All rockets will be launched at a pressure not to exceed 60 pounds per square inch. Once the rocket is pressurized, no student can touch or approach the rocket.
4. Each rocket launched must pass a safety inspection and have a mass measurement taken.
5. Though various rocket components may separate during the flight, all must remain linked together with a maximum distance not to exceed three (3) meters. If a nose cone is used, it can separate, but should remain attached to the rocket body. If the any part of the rocket becomes unattached during flight, the rocket will be marked as a detachment and no bonus points will be awarded.
6. *Caution:* No materials will be allowed that can compromise the integrity of the plastic bottles. Cold glue is acceptable. Sanding or other abrasion of the plastic used for the pressurized body is not allowable. Use of duct tape is highly recommended as the main type of fastener.

SCORING:

There will be two actual launches per group. All rockets will be launched using the launching pad provided by Mr. Wessner. The judges will time the rocket's flight. Timing of the rocket starts when the rocket leaves the launch pad, and stops when the first part of the rocket hits the ground, when the rocket disappears from the judges' sight, or when the rocket impacts or gets entangled in an object (e.g. the rocket collides with a tree.)

Bonus points will be awarded for those rockets who set time above standards. The winning rocket will be determined by the greatest time aloft (recorded to the nearest hundredth of a second). Three timers will be used and the time recorded will be an average of the three times.

HOW TO COMPLETE THIS ASSIGNMENT:

Each individual group will be marked on the following criteria:

1. Design

-a labeled blueprint of their rocket design must be submitted to Mr. Wessner before starting to build. The design needs to be done on graph paper, showing all of the parts, with the parts labeled with a ruler on the right hand side of the page. The design needs to include the body of the rocket, fins, nose cone, how the parachute will be attached, and how you are going to attach each part. Neatness counts. Needs to be done in pencil only.

2. Construction/Creativity

-How the rocket is put together? How did you implement your design into your rocket? What does your rocket look like? How does it stand out? Is it balanced? What type of theme did you make for your rocket?

3. Flight

-how did the rocket fly? How long did it stay in the air? Did it fly straight? Did the parachute deploy? Did the entire structure (body, nosecone, parachute) stay together? Did the egg pilot survive?

4. Classwork/Group work

-was class time used wisely? Did both you and your partner put equal work into the project? Did you keep your area clean?

Links:

Mr. Hayhurst's Quick and Easy Bottle Rocket
(<http://www.lnhs.org/hayhurst/rockets/>)

