



STOMP ROCKET LAB

MONROE

Time Frame:		Standards:
45 minutes Longer with extensions		Standard 2, Goal 2.2, 2.3, 2.4
Objectives:		
Students will be able to change parameters of the project to build a more successful rocket. Students will also be able to describe the energy conversions that are happening, and Newton's laws that describe the motion of the rocket.		
Background Information:		
Stomp rockets are a simple way to show energy conversions, and it is most helpful if Newton's Laws of Motion have been introduced at a prior time.		
Materials:		
<ol style="list-style-type: none">1. ½" PVC, schedule 40 piping. It is really cheap, so buy four or five, 10 feet sections of it.2. ½" PVC elbow fittings. They are very, very cheap, so buy about 10 of them.3. Paper. Various sizes, colors, textures and weights. This is a good time to clean out a waste drawer in the production room.4. Tape. Rolls of duct tape for sure, but then get masking tape, transparency tape, and then any other kind you want.5. Glue. White glue, hot glue, and any you might have lying around.6. Drill, and a 7/8" drill bit.7. Plastic drinking bottles. This part is critical. You are going to need at least 5 or 6, at a minimum.8. Scissors. One for each group.		
How the Rocket Works Summary:		
A student stomps on the drinking bottle, which changes the kinetic energy of his foot and leg into compressional potential energy in the air in the bottle. The air in the bottle flows through the 7/8" hole that has been drilled in the cap and sealed with hot glue and duct tape. The energy wave of air, actually sound, moves through the tube to the rocket. In response to the energy in the air, the rocket accelerates. The rocket flies, but slows down, because its energy is transferred to the O ₂ and N ₂ molecules in the atmosphere. The accelerated molecules have more thermal energy because they are moving faster so the air is heating up. In reality, one is heating the atmosphere by stomping on a rocket even though the amount of thermal energy added to the air is far, far too little to be measured.		
Things to Learn:		
The students will be experimenting by trying different configurations of fins, nose cones, rocket lengths, paper materials, and even different types and sizes of soda bottles.		

Construction Instructions:

1. Take a piece of note book paper and wrap it around a scrap piece of ½” PVC pipe. It should not be too loose or too tight.
 2. Tape the seam of the paper (lengthwise) so that it does not unwrap.
 3. Put tape over the top of the rocket so it is not just a tube of paper.
- You are DONE. Granted, your rocket will not fly far or fast, but it is done.
4. Students can experiment with different lengths of rockets.
 5. Students can experiment with different types/numbers of fins.
 6. Students can experiment with different types/shapes of cones.
 7. Students can experiment with different launch angles.

Assessment:

This project can be assessed in any number of ways, depending upon the skill level and ability of the students. The assessment could be based upon,

1. Teacher observation
2. Distance traveled
3. Time aloft
4. Creativity
5. Average speed to a target
6. Accuracy

The shape and configuration of a rocket will be determined by goal of the assessment.

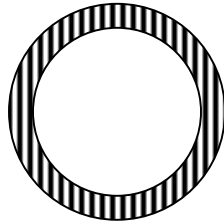
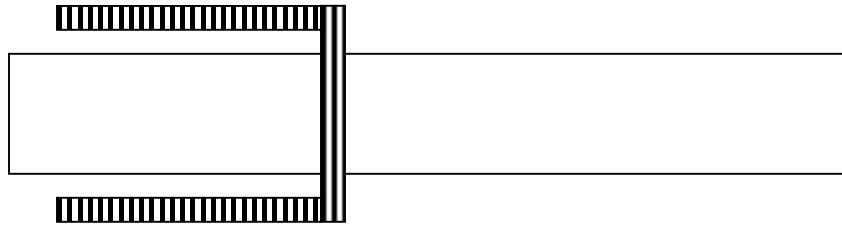
Safety Notes:

This project is a high interest activity for the students. It is not generally quiet, but it does usually hold the focus of students. There are sharp and flying objects. The flying objects are only pieces of paper, but the instructor should still have certain ground rules for launching trial rockets.

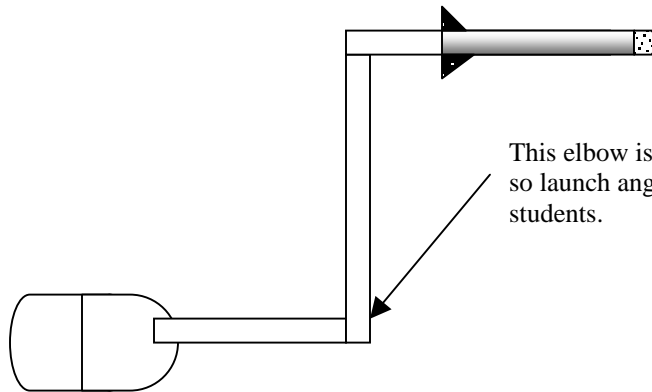
Additional Notes:

The author of this particular project has had students whose rockets have flown in excess of 200 feet. A well made rocket is simply outstanding and the student who made it will feel the same.

Simple Diagram of Screw Cap and Launcher Assembly:



The $\frac{1}{2}$ " pvc pipe is placed inside the $\frac{7}{8}$ " hole drilled in the cap. That way the soda bottle can be replaced, by simply unscrewing one, and screwing in the next.



This elbow is turned at 90 degrees, so launch angle can be changed by students.



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References:

Energy for Educators

Bringing Energy into the Classroom