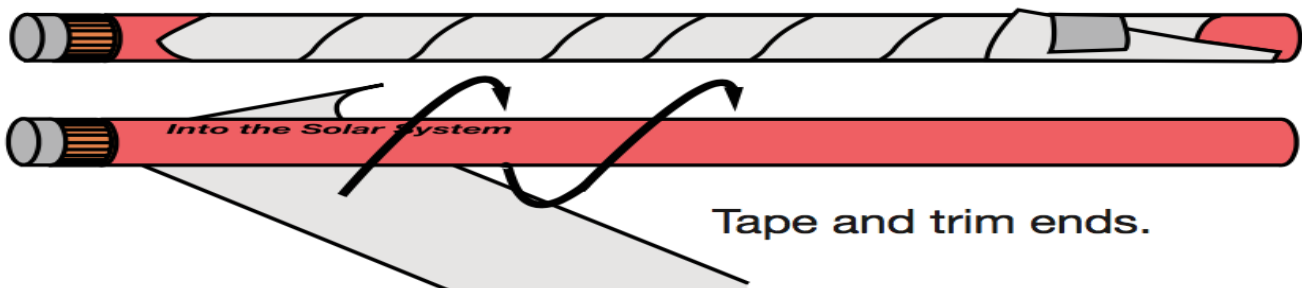




Rocket Your Socks Off!

Straw Rockets Station Instructions

1. Please take the strip of register tape out of your baggie (leave the straw in the baggie for now).
2. Using a *pencil* and the strip of register tape, roll the strip of register tape around the pencil and tape the end to the paper (Do not tape the paper to the pencil, only to itself. As you



- wrap it, be sure not to wrap it too tight or too loose, it needs to be just right).
3. Gently pull the pencil out and set to the side.
 4. Carefully push down one end of the tube and tape.
 5. Take the straw out of the baggie. Take the straw and tube to the designated launch station.
 6. Insert the straw into the hole on the tube and blow! While at the launch station, try the following:
 - a. Hold your head straight and launch your rocket. What happened? Where did your rocket travel? How far did your rocket travel?
 - b. Holding your mouth facing the ceiling, blow your straw rocket. What happened? Where did your rocket travel? How far did your rocket travel?
 - c. Looking straight ahead, slightly angle your mouth and blow the straw rocket. What happened? Where did your rocket travel? How far did your rocket travel?

What did we learn?

Trajectory- the path a moving object takes when force is applied.

The trajectory (or angle), I set for my rocket will decide how far and in which direction my rocket will go. When getting a space vehicle to re-enter Earth's atmosphere, NASA must precisely map out the trajectory to ensure the space vehicle enters at the appropriate angle in order to land in the proper location.



Rocket Your Socks Off!

Fizz Rockets Lesson Plan

Grade Level: *This lesson was created with 4th and 5th graders in mind, but can be adapted to any level for K-12.*

Objective(s):

When called upon during a class discussion, students will be able to correctly identify at least three ways to apply Newton's First Law of Motion to the launch of a fizz rocket.

Concept:

- 1. An object at rest will remain at rest until acted upon by an outside force.*
- 2. An object in motion will remain in motion until acted upon by an outside force.*

Materials:

- *Interlocking film canister (one per student)*
- *2 note cards per student (any size will work)*
- *½ of an Alka Seltzer tablet per student (generic brand works great)*
- *Water*
- *Launch area*
- *Scotch tape*

Procedures:

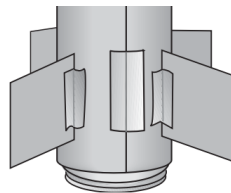
- 1. The students and teacher will put their rockets together. The teacher will use his/her rocket as a model to demonstrate how to construct the rockets.*
 - a. First, take the lid off of the film canister and set it to the side. Place the film canister on the table with the open end touching the table. Tape an index card with the short side to the side of the canister. Be sure not to place tape on the bottom of the rocket (or the top of the canister). Wrap the card around the canister, creating a tube, and tape it on the side.*
 - b. Next, have the students cut a nose cone and 4 fins out of the other note card using the patterns provided. Make sure the students tape the nose cone on the opposite end from the top of the canister. It is important that the students tape the four fins equidistant from each other and that the bottom of the fins do not come below the open end of the canister.*
- 2. The teacher will explain to the students that each person will have their rocket, a cup of water, and ½ an Alka Seltzer tablet. They may use all of these items, or just the rocket. Each student has to figure out how he/she will use Newton's First Law of Motion to make his/her rocket move. Any answer that uses Newton's First Law of Motion to make the rocket move, is acceptable.*
- 3. The students will share their ideas with the class. Some of the students will say kicking it, hitting it, pushing it, etc. Many of the students will catch onto the fact that Alka Seltzer and water will create a force if enclosed in the canister. The teacher needs to validate all of the students' answers.*
- 4. Launch each of the rockets using the Alka Seltzer and the water in the film canister outside. Be sure to have a launch area that is clear of all students. It is advisable to use goggles, if they are available.*



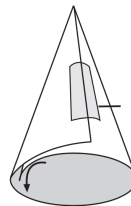
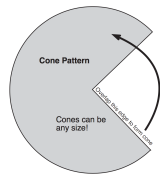
Rocket Your Socks Off!

Fizz Rockets Station Instructions

1. The volunteer will give you one baggie. Please keep all of the items in the baggie until the instructions state to remove that specific item.
2. Take the film canister **ONLY** out of the baggie. Remove the lid from the film canister. The open hole of the canister should be facing up towards the ceiling. Now flip the canister over so that the hole is facing the table top and set the canister on the table. The hole should now be hidden from your view. Set the lid on the table next to the canister.
3. Open the baggie and take out the four rectangles (or fins). Stack all four rectangles together and set the stack on the table.
4. On the short side of your stack, bend 1/4 of the surface of the card upward. Take the cards out of the stack. On each card you have created, place a small piece of tape.
5. With the film canister still on the table and the hole facing the tabletop, tape one fin onto the side of the film canister. Tape the next fin on the exact opposite side. In between the fins, tape the other two fins on either side. You should now have 4 semi-equidistant fins taped on your film canister.



6. Open the baggie and take out the “Pacman” or nose cone. Placing your index finger and thumb on one corner and your other index finger and thumb on the other corner, wrap the card into a nose cone and tape.



Roll a cone of paper and tape it to the rocket's upper end.

7. Place two small pieces of tape on either side of the nose cone (yes, we realize circles don't have sides) and tape the nose cone to the top of the film canister (the flat side without a hole).
8. You are now ready to launch your fizz rocket! Take the rocket and lid over to the launch station and the volunteer will give you further instructions.



Rocket Your Socks Off!

Stomp Rockets Lesson Plan

Grade Level: K-12

Objective(s):

- *Students will be able to successfully design and launch a paper rocket.*
- *Students will understand that air takes up space.*
- *Students will understand that air can act as a force of thrust.*
- *Students will experiment, discuss, and model the correlation of angles and trajectory.*

Concept:

Depending on student level many different concepts can be covered (design, thrust, force, mass, angles, trajectory, etc.).

Materials:

- Construction paper
- Tape
- Targets
- PVC Pipe launchers

Procedures:

NASA uses many different styles of rockets depending on the goal of the mission. Notice that they are all different shapes, sizes, and designs. Today, your mission is to try and go the furthest distance possible!

Use the materials to design and create a rocket for your mission.

Launcher Construction Steps:

1. The 2-liter bottle will be attached to the **bottom** end of the PVC pipe launcher.
2. The rockets are placed on the **top** of the PVC pipe launcher.
3. The rocket will slide over the open portion of the launcher.
4. Adjust the PVC launcher to the best angle for your design.
5. Make sure you warn everyone around you! Then count down from 3, and **stomp** on the 2-liter bottle.

*Make sure to measure your rocket around the launcher (1 piece of PVC pipe at each table will help make sure all rockets fit on the launcher).

Javelin Rockets Lesson Plan

Grade Level: K-12



Rocket Your Socks Off!

Objective(s):

- *Students will be able to successfully design and launch a foam rocket.*
- *Students will experiment, discuss, and model the correlation of angles and trajectory.*
- *Students will experiment, discuss, and model the effects of various amounts of energy on trajectory.*

Concept:

Depending on level many different concepts can be covered (design, thrust, force, angles, trajectory, etc.).

Materials:

- *Fun foam*
- *Pipe insulation (found at Hardware store)*
- *Rubber bands*
- *Duct Tape*
- *Targets*
- *Yardsticks*
- *Protractor*

Procedures:

*NASA uses different designs of rockets depending on the objective. Your mission today is **accuracy!** You must launch your rocket and land inside the target. The closer to the middle the better!*

Design a Javelin Rocket:

- 1. Remove film from foam insulation and adhere the two sides together, creating a sealed tube.*
- 2. Make 4 evenly placed slits up the bottom sides of the foam tube.*
- 3. Design an interlocking fin design and cut from fun foam.*
- 4. Slide fins into slits, using duct tape to seal the tube together again under the fins.*
- 5. Take a strip of duct tape, cut it in half long ways and then lay on top of each other creating a stronger piece of tape.*
- 6. Slide the strip of tape through a rubber band, then apply tape over the top of the rocket, covering the open hole.*

To Launch the Rockets:

- 1. Use your yard stick as a launch station for your rocket.*
- 2. You place the rubber band on the end of the yardstick.*
- 3. Slowly and carefully pull the rocket toward your body.*
- 4. Warn everyone around you and let go of the rocket to fire!*

****Be sure to adjust the angle of your yardstick, should it go up or down?***

-Use protractors to get a more accurate measurement of angles.

****How could you measure the amount of power or force you are applying?***

-Yard sticks or rulers have measurement marks to use for evaluating power levels.