Soda-Straw Rockets

(Modified from NASA Jet Propulsion Laboratory and Engineering in the Classroom)

Materials

For building

- Straw Rocket Template and Data Logs (from NASA)
- Plastic drinking straws for each participant
- Scrap paper
- Tape
- Scissors
- Data log

For testing

- Tape measure

Tips for Group Leaders

- Rocket launching should take place in an open enough area where students are able to stand out of the way of rockets being launched.
- A gym or indoor courtyard work well. Outside settings may have too much wind and will affect the results (the wind becomes a variable!)

Goals

- Students will understand basic rocket processes as applied to space flight;
- Students will demonstrate the ability to conduct an experiment and analyze and interpret the results.

Student Activity (approx. 45 min-1 hour)

- On the day of the activity, organize students into groups of 4-6. This will encourage cooperative learning and allow students to observe and build rockets with different length nose cones.
- Introduce the activity by telling the students they are about to become rocket scientists! Tell them they will build paper rockets and launch them with soda straws and will have the opportunity to re-design their rockets for maximum flight.
- Ask the students to construct the **same (control)** straw rockets by following the straw rocket template from NASA (they will get to do modifications afterward):

a. Carefully cut out the rectangle. This will be the body tube of the rocket. Wrap the rectangle around a pencil length-wise and tape the rectangle so that it forms a tube.
b. Carefully cut out the two fin units. Align the rectangle that extends between the two fins with the end of your body tube and tape it to the body tube. Nothing should stick out past the body tube! Do the same thing for the other fin unit, but tape it on the other side of the pencil, so you have a "fin sandwich".
c. Bend one fin on each fin unit 90 degrees so that each fin is at a right angle to its neighbor. When you look along the back of the rocket, the fins should form a "+" mark.
d. Using the sharpened end of your pencil, twist the top of the body tube into a nose cone. Measure your nose cone from its base to its tip and record the length on your Data Log (on page 2 of this document) and on the rocket itself.
e. Remove the pencil and replace it with a soda straw. Blow into the straw to launch your rocket! Record the distance it travels on your Data Log.

- Ask students to launch their rockets one at a time and record the distance traveled in centimeters on the data log. Encourage them to include any observations they make as they conduct their experiments.
- Students should conduct five trials of the experiment and record the results on their Data Log.
- Ask the students if they think they can make their rockets fly better by changing one thing about them (wing shape/placement, straw length, weight, etc.).
- Tell the students to go ahead and make the change—remind them that they are changing only one variable (refer to the earlier conversation about controls and variables).
- Ask the students to make a prediction about the distance the new rocket will go. Ask the students to launch their rockets and record the distance traveled in centimeters on the data log handout. Encourage them to include any observations they make as they
- conduct their experiments. Ask the students to compare the data from the original rocket (control) to the new rocket (variable). Ask them to explain the difference in flight.

Reflection Questions

1. What would you change to get an even better flight? Would you go back to the original design?
2. Was your rocket's flight affected by flying it inside or outside? What adjustments could be made based on the location of the flight?
3. What else would you like to change? Why?