Puff Rockets

Adapted from
http://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Rockets.html

Objectives

Students will:

- Design, build, and launch an air-powered rocket.
- Investigate nose cone differences that influence distance of flight.

Suggested Grade Level

K-2nd

Subject Areas

Science
Math

Timeline

60 – 120 Minutes

Standards

NGSS

- K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
- K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs

Common Core Math

CCS.MATH.CONTENT.K.MD.A.2

Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference.

CCSS.MATH.CONTENT.2.MD.A.1

Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

CCSS.MATH.CONTENT.2.MD.A.3

Estimate lengths using units of inches, feet, centimeters, and meters.

21st Century Essential Skills

- Critical thinking/Problem solving
- Collaboration and Teamwork
- Organizing concepts
- Carrying out investigations
- Obtaining/evaluating/communicating ideas

Background

Rocketry is a fun and easy way to bring many science and math principles into the classroom. These simple classroom rockets make it easy to bring rocketry principles to your students.

Rockets are used to send people and supplies to space. Students will create straw rockets to model the physics of a rocket launch. Newton's Third Law of Motion: For every action, there is an equal and opposite reaction. The simplest explanation of physics in rocketry is that gas/pressure/power is released from the rocket in one direction, which causes the rocket/object to be forced into the opposite direction.

To create a force (push or pull) on the rocket, we will use the air in our bodies to create a pushing force. This in turn will create a lot of pressure. Pressure is the amount of force over an area. The more air you force through the straw, the more pressure there is on the inside, so the more force there is pushing out of the straw. When enough pressure is created in the straw, the rocket will be forced to move off the straw.

This activity was taken from the NASA Rockets educator guide on p. 40.

Vocabulary

- Force: is a push or pull
- Pressure: force pushing on an area or surface; pushes in all directions
- Body Tube: the basic frame of a rocket
- Fin: is the vertical part of the tail
- Lift: A force that pushes objects upward.
- Nose Cone: the front end of a rocket

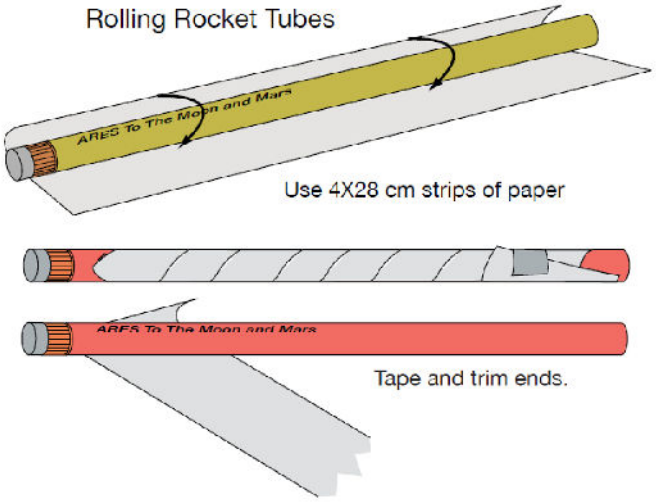
Materials

- 8.5" x 11" paper or Puff Rocket Template
- Clear tape
- Scissors
- Straws
- Round pencils

Lesson

Assembly

1. Cut a strip of paper for the rocket body (about 4 cm wide by 28 cm long).
2. Use a round pencil as a form and roll the strip around the pencil.
3. Tape the long seam.



4. Close off one end to make a nose cone.
5. Cut out three or four fins.
6. Tape the fins to the open (lower) end of the rocket.
7. Bend them outward to space them equally.

Extensions

Have students measure the distance of each rocket flight. Have the students do estimations and averages of performance.

- Re-Design:
  - Compare each student's rocket and their flight distance as a group.
  - Is there a difference in the shape of the body, nose cone and/or fins?
  - Inquiry: Does that affect how the rocket will fly?
  - What can the student change on their rocket to have it fly better?
  - Re-design/Re-test

Visit Space Foundation's website for more STEAM lessons and activities: https://www.discoverspace.org/.

Resources

Dunbar, B. (2012, July 30). Rockets Educator Guide. Retrieved from https://www.nasa.gov/audience/foreducators/topnav/materials/listbytype/Rockets.html