TRB 3:3 - Investigation 5 - Balloon Rockets

Summary
Students will make a balloon rocket and learn about the relationship between the force applied to an object and the resulting motion.

Main Core Tie
Science - 3rd Grade
Standard 3 Objective 2

Group Size
Individual

Materials
- Balloon Rocket Observation Log (pdf)
Activity 1, 2 & 3
  Long balloon
  Straw
  String
  Paper cup
  Nuts and bolts
  Tape
  Stopwatch
Straw Rocket Activity
  Soft plastic bottle, with a pop-up lid
  Modeling Clay
  Two straws (one smaller than the other one in diameter)
  Scissors
  Rulers
Additional Resources
Books:
- Tell Me How Fast It Goes
  (Whiz Kids) by Shirley Willis (Franklin Watts)
- Feel the Wind
  by Arthus Dorros (Children's Book)
- The Berenstain Bears Science Fair
  by Stan and Jan Berenstain (Random House, Inc.)
- Gizmos and Gadgets: Creating Science Contraptions that Work and Knowing Why
  by Jill Frankel Hauser (Williamson Publishing)
- Forces
  by Graham Peacock (Steck-Vaughn)
Laser Discs:
  Windows on Science, Primary Vol. 3, Force and Motion Lessons 6-10, 14-17

Background for Teachers
The balloon is made of rubber and has shape that it prefers. It will return to that shape when it can. When the balloon is inflated, the rubber is stretched way past where it wants to be. As soon as it gets
a chance, the rubber will push the air out of the balloon and return to its original shape.

Intended Learning Outcomes
1. Use a Science Process and Thinking Skills
3. Understand Science Concepts and Principles
4. Communicate Effectively Using Science Language and Reasoning

Instructional Procedures
Pre-Assessment/Invitation to Learn
Tell students the balloon is lazy. It likes to stay flat and lifeless. Have a volunteer blow up the balloon. Ask the students what the lazy balloon wants to do. Does it want to return to its "lazy" state? Tell the students that they are going to get a lazy balloon to do some work before they let it resume its flat, lifeless state.

Instructional Procedure
Activity 1
Thread a piece of string through a straw.
Attach the ends of the string to the ceiling and the floor. (You can also have a child stand on the chair and hold the string.)
Tape an inflated balloon to the straw.
Predict what will happen when you release the neck of the balloon and how fast the balloon will travel.
Do the experiment and observe what happens. Time how quickly the balloon rocket goes up the string. Design a chart to record the results.

Activity 2
Attach three strings to a paper cup.
Tape the strings to the inflated balloon so that the cup is suspended like a gondola beneath it.
Predict what will happen when you release the neck of the balloon. Predict how fast the balloon will travel.
Do the experiment and observe what happens. Time how quickly the balloon rocket goes up the string. Record the results.

Activity 3
Do experiment 2 several times, but now add weight (nuts and bolts) to the paper cup. Use a different weight each time you launch the rocket.
Predict what will happen to the balloon rocket as more weight is added.
Predict the maximum weight the balloon rocket can lift.
Do the experiment until the balloon rocket will no longer lift-off.
Record the results.

Extensions
Language Arts-
Create a Venn Diagram comparing the different balloon flights. How were they the same? How were they different? (Standard VII, Objective 2)

Science-
Make a Straw Rocket (ILO 1)
Cut both straws 6" in length.
Make four 3/8" slits around one edge of the smaller diameter straw.
Bend the four sections out (should look like an X or a + sign).
With the cap closed, place the slit end of the smaller straw in the center of the lid. Secure in
place with the clay. This is your launch pad.
Make a nose for the rocket (large diameter straw) with a small amount of clay.
Slide the rocket over the launch pad.
PREDICT what will happen when the plastic bottle is squeezed firmly.
Actually squeeze the bottle and OBSERVE what happens.
Does it make a difference how hard you squeeze the bottle? Try it to find out.

Homework & Family Connections
Have the students make a straw rocket at home.

Assessment Plan
Did the students complete the Balloon Rocket Observation Log accurately? Were their predictions accurate as they filled out the chart?

Authors
Utah LessonPlans