Principles of Flight

Lesson Plan: Balloon Rocket

Grade Level: K-4

Subject Area: Science and Math

Time Required: ***Preparation:*** 30 minutes
Activity: 1 hour

National Standards Correlation:

Science (grades K-4)

- Unifying Concepts and Processes Standard: Evidence, models, and explanation.
- Unifying Concepts and Processes Standard: Change, constancy, and measurement.
- Physical Science Standard: Position and motion of objects.
- Science as Inquiry Standard: Abilities necessary to do scientific inquiry.
- Science as Inquiry Standard: Understandings about scientific inquiry.

Math (grades K-2)

- Measurement Standard: Apply appropriate techniques, tools, and formulas to determine measurements.
- Data Analysis and Probability Standard: Develop and evaluate inferences and predictions that are based on data.

Math (grades 3-5)

- Measurement Standard: Apply appropriate techniques, tools, and formulas to determine measurements.
- Data Analysis and Probability Standard: Develop and evaluate inferences and predictions that are based on data.

Summary: Students will experiment with a balloon rocket to observe Newton's Third Law of Motion and the principle of rocket propulsion. This activity may be done as a demonstration for the younger students.

Objectives: Students will:

- Construct a balloon rocket
- Observe Newton's Third Law of Motion
- Measure the duration of the flight
- Measure the distance of the flight
- Collect, organize and present data

Materials: For each demonstration or team:

- Balloons in various sizes
- Clothespins - pinch-type
- Straw
- Fishing line or heavy thread
- Duct tape
- Marker
- Stop watch
- Ruler

Originally published as part of *Project SOAR™: Science in Ohio through Aerospace Resources, Volume I-III.* Dayton, Ohio: The National Museum of the United States Air Force and The Air Force Museum Foundation, Inc. 1997-1999.

Safety Instructions: Use caution in blowing up the balloons. If one pops, be certain that all pieces are located and recovered. Do not let students share balloons when inflating (use a balloon pump, if possible). Caution students not to walk into the fishing line or string.

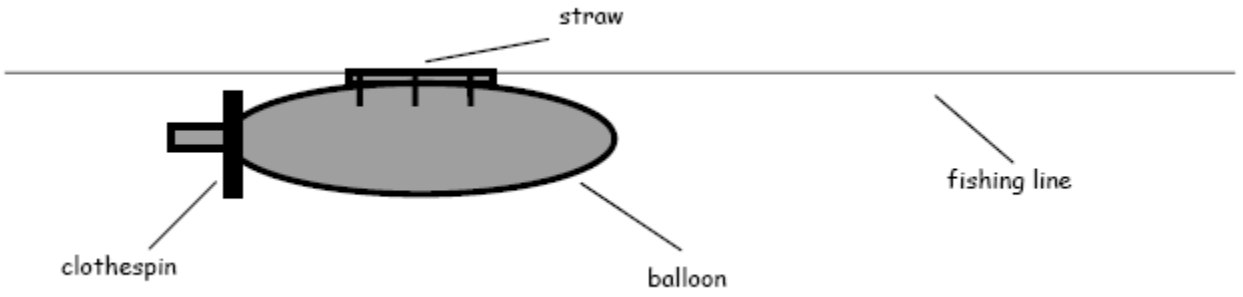
Procedure:

A. Warm-up

1. Review Newton's Third Law of Motion. "For every action, there is an equal but opposite reaction."
2. Blow up a balloon and release it. What happened? How can the balloon be directed in a straight line?
3. Demonstrate attaching the balloon to its fishing line track, and releasing it.
4. Determine location and set-up of the balloon tracks.

B. Activity

1. Give materials to each team and allow each student to blow up a balloon. Students should write their names on the balloons with a marker. Gently release the air from the balloon.
2. For each balloon track, take a straw and push one end of the fishing line or string through the straw.
3. Stretch the fishing line or string across the room horizontally (about waist high) and secure it tightly. Very Important - The line must be as tight as possible for the balloon to fly properly.
4. Inflate balloons, one at a time. Twist the neck and use a pinch clothespin to secure the end.
5. Use two pieces of tape to secure the balloon to the straw on the fishing line. Make certain that the clothespin end is pointing towards the end of the track.
6. Gently move the balloon along the fishing line track to one end.
7. Release the clothespin and observe the results.
8. Students may time the duration of the flight and/or measure the distance.



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C. Wrap-up

1. Repeat the activity using different size balloons. Record observations and compare results.

2. If the students recorded time and distance, create a graph or determine the averages for the team or class.

Resources/ References:

Hetzel, June and Brenda. Wyma. *Flight.* Cypress CA: Creative Teaching Press, Inc., 1995.

Hixon, B. K. *Bernoulli's Book.* Salt Lake City: The Wild Goose Company, 1991.

Taylor, Barbara. *Up, Up and Away! The Science of Flight.* New York: Random House, 1992.

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