Principles of Flight

Lesson Plan: Wings That Spin

Grade Level: K-1

Subject Area: Science

Time Required: ***Preparation:*** 20 minutes
Activity: 60-90 minutes

National Standards Correlation: ***Science (grades K-4)***

- Science as Inquiry Standard: Abilities necessary to do scientific inquiry.
- Physical Science Standard: Properties of objects and materials.
- Unifying Concepts and Processes Standard: Evidence, models, and explanation.
- Earth and Space Standard: Objects in the sky.

Objectives: Students will:

- Build a paper blimp and a gyrocopter
- Successfully fly the blimp and gyrocopter
- Make observations
- Change variables and record data
- Discuss data

Background: The idea of a rotating wing, rather than a fixed wing, was the basis of Leonardo da Vinci's concept of a helicopter. The idea is straight from nature. Watch a maple seed as it drops from a tree – it spins! When inventors first tried to use rotating wings to fly, there were several problems. In a spinning aircraft, the pilot would also rotate. When plans were made for the pilot to sit on a platform and use muscle power to turn the wings, the platform would rotate in the opposite direction to the wings. The first successful rotating wing was the autogiro, and later the helicopter as developed by Igor Sikorsky. In addition to illustrating the effect of gravity on a flying object, this activity will also show how changing certain variables can affect flight.

Materials: You will need:

- A piece of paper (1" x 8½") for each flying blimp
- A piece of paper (1½" x 8½") for each gyrocopter
- Scissors
- Paper clips (for added weight)
- Blimp and gyrocopter patterns

Safety Instructions: Use common sense precautions.

Procedure: ***A. Warm-up***

1. Give a short lesson on the four forces of flight, and explain how airplanes and helicopters fly.

2. Review the organization and recording of data.

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B. Activity I

1. Construct the paper blimp by using the master pattern sheet (see "Patterns" section). Cut on the solid black lines. Bend the paper (but do not crease it) so the two cuts fit into each other.

2. To fly the paper blimp, hold it high above your head and drop it. As it falls it will start spinning and look like a blimp. Spinning makes it stable in the air.

3. Determine if the blimp spins clockwise or counter-clockwise.

C. Activity II

1. Construct the paper gyrocopter using the master pattern sheet. Cut on the solid black lines. Fold on the dotted line at "A" so the fold does not cover the name. Fold on the dotted line at "B" so the fold does not cover the name. Fold on the dotted line at "C" so the fold does not cover the name. Now, fold on the dotted line at "D" so the fold does not cover the name and fold on the dotted line at "E" so the fold covers the name.

2. Bring the two "wings" up so they are perpendicular to the ABC section.

3. To fly the paper gyrocopter, hold it over your head and drop it. It will glide to the floor spinning.

4. Determine if the paper gyrocopter spins clockwise or counter-clockwise.

5. Now fold "D" so it covers the name and "E" so it does not cover the name.

6. Determine if it spins clockwise or counter-clockwise.

7. Add a paper clip near the fold at "C."

8. Write and record data and observations.

C. Wrap-up

Share the data and discuss the variables.

Assessment/ Evaluation:

Students should be evaluated on accuracy of observations and collection and organization of accurate data.

Extensions:

1. Undo the paper blimp and re-attach, bending in the opposite direction of the initial trial (the blimp will spin in the opposite direction, just as the gyrocopter).

2. Drop the gyrocopters from various heights and observe.

Resources/ References:

Francis, Neil. *Super Flyers.* Reading, Massachusetts: Addison-Wesley Publishing Company, Inc., 1988.

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GYROCOPTER PATTERN Cut on solid lines, fold on dotted lines

A

C GYROCOPTER made by_____ D

B E

A D

C GYROCOPTER made by_____

B E

A D

C GYROCOPTER made by_____

B E

A D

C GYROCOPTER made by_____

B E

A D

C GYROCOPTER made by_____

B E

A D

C GYROCOPTER made by_____

B E