Principles of Flight

Lesson Plan: Gyrocopter and the Scientific Method

Grade Level: 7

Subject Area: Science

Time Required: ***Preparation:*** 15-20 minutes
Activity: 1-2 class periods

National Standards Correlation:

Science (grades 5-8)

- Science as Inquiry Standard: Abilities necessary to do scientific inquiry.
- Science as Inquiry Standard: Understanding about scientific inquiry.
- Physical Science Standard: Motions and forces.
- Unifying Concepts and Processes Standard: Evidence, models, and explanation.
- Unifying Concepts and Processes Standard: Change, constancy, and measurement.

Summary: Students will use a self-made gyrocopter and test different variables to correctly identify the steps of the scientific method. After the gyrocopter is constructed, the student will drop it from a chair several times. Students will change the direction of the blades to test one specific variable. The gyrocopter will be dropped again several times. Without realizing that the students are using the scientific approach to experimentation they will begin to understand the steps involved in the scientific method. At the end of the experiment with the blades, the students will then be able to change other variables such as mass, size of gyrocopter, material used to make the gyrocopter, etc.

Objectives: Students will:

- Practice the scientific method
- Learn to record observations after testing a variable in an experiment
- Learn to make a hypothesis
- Identify the difference between dependent and independent variables

Materials: You will need:

- Gyrocopter template
- Pencil
- Paper
- Scissors

Safety Instructions: Use caution when dropping gyrocopters.

Background: A gyrocopter is a model of a helicopter. This simple model will allow students to observe the direction in which the blades will spin, either clockwise or counter-clockwise, as it descends to the ground. This simple model will also help students identify the steps involved in carrying out a scientific experiment.

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Procedure:

A. Warm-up

1. Obtain a template page of gyrocopter.

2. Cut out a strip off of the template page (Figure 1).

3. Follow the outline of directions in Figure 2 for making cuts and folds for your gyrocopter.

B. Activity

1. Ask yourself "Which direction will the blades spin as it descends to the ground?"

2. Carefully stand on a chair and drop your gyrocopter. Notice the direction the blades spin as it falls to the ground. Repeat the drop three more times. Record your observations in the data and observation table (Figure 3).

3. Now refold the blades in the opposite direction as folded in the beginning. Drop the gyrocopter four more trials. Was there a change in the direction of the spin of the blades? Record your observations in the data and observation table.

C. Wrap-up

1. You have just performed a simple experiment. Experiments involve changing something and then finding out if results have changed. You were looking at a variable. There are 2 types of variables, dependent and independent.

2. You also made a prediction about the direction of the spin of the blades. This prediction is called a hypothesis.

3. This experiment was considered a fair test because all variables but one were kept constant.

4. The experiment gave us reliable results because we tested our gyrocopters with repeated trials.

5. Experiment with gyrocopters of different mass, size, and material.

6. Answer the "Questions About Experiments" on the worksheet.

Assessment/ Evaluation:

Students will be evaluated on their observations and their responses to the questions about experimentation.

Resources:

Cothron, H. Julia. Geise, N. Ronald, Rezba, J. Richard. "Come Fly With Us," *Science World*, December 7, 1990.

Hassard, Jack. Increasing Your Student's Science Achievement: Using Outstanding Active Learning, Project Based, On-Line and Performance Assessment Strategies (Grades 6-12), Institute for Educational Development, Medina WA, 1996.

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Name _____

QUESTIONS ABOUT EXPERIMENTS

1. What do we call the variable that you change on purpose?

2. What do we call the variable that responds to the one that you changed?

3. What do we call the part of an experiment that you must keep the same in each trial?

4. What do we call the part of an experiment that is the standard for comparison?

5. What was your hypothesis for the gyrocopter experiment?

6. Why did you repeat this experiment for four trials?

7. What did you learn when other variables were changed?

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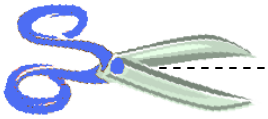
Copy this template to use with the Whirlybird activity. Students can use these strips, as templates, to cut and make Whirlybirds out of different materials. Each Strip is 2.5cm x 21.5cm.



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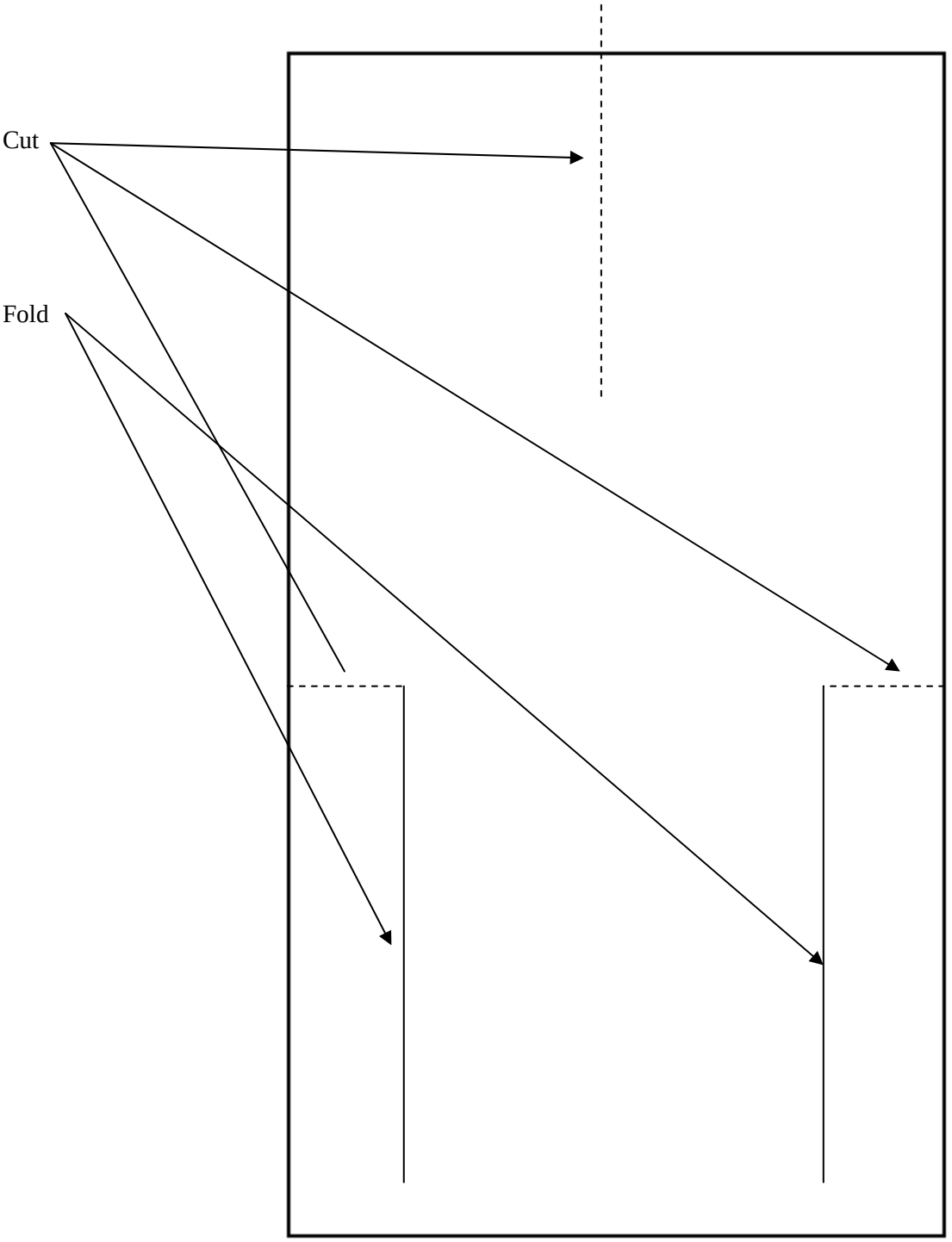

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Whirlybird Observations and Data

	One blade forward/One blade backward	Opposite fold of blades
	Direction of Spin	Direction of Spin
TRIAL 1		
TRIAL 2		
TRIAL 3		
TRIAL 4		

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