



Principles of Flight



Lesson Plan: Paper Glider Measurement

Grade Level: 5-6

Subject Area: Math

Time Required: *Preparation:* 1 hour
Activity: 2-3 hours

**National Standards
Correlation:**

Math (grade 3-5)

- Measurement Standard: Apply appropriate techniques, tools, and formulas to determine measurements.
- Data Analysis and Probability Standard: Understand and apply basic concepts of probability.
- Data Analysis and Probability Standard: Select and use appropriate statistic methods to analyze data.
- Representation Standard: Use representation to model and interpret physical, social, and mathematical phenomena.

Math (grades 6-8)

- Measurement Standard: Apply appropriate techniques, tools, and formulas to determine measurements.
- Data Analysis and Probability Standard: Understand and apply basic concepts of probability.
- Data Analysis and Probability Standard: Select and use appropriate statistic methods to analyze data.
- Representation Standard: Create and use representations to organize, record, and communicate mathematical ideas.

Summary:

Students (working in groups of four) will construct four different paper gliders. After constructing the gliders, the students will estimate the distance they think the gliders will fly. Students will fly the gliders and calculate average distance flown. Next, the students will modify the weight of the gliders using paper clips, and again fly the four gliders and calculate average distances flown. They will record the distances flown and make a double bar graph, comparing the two flights of each glider.

Objectives:

Students will:

- Follow directions to construct four different paper gliders
- Predict how far the gliders will fly
- Measure actual distances flown by each glider
- Calculate average distance flown by each glider
- Make a double bar graph

Materials:

Each group of four students will need:

- Paper
- One set of four glider patterns (refer to Resources/References)
- Pencils
- Measuring tape with metric units and/or meter sticks
- Paper clips



Safety Instructions: Do not fly paper gliders directly at another person because the pointed tip could cause injury. Use caution when flying the paper airplanes. Create a single direction flight zone. Be sure that students stop flying their airplanes when other students are retrieving airplanes that have already landed.

Procedure:

A. Warm-up

1. Give a brief lesson on the history of gliders.
2. Review how to correctly measure distance using a metric tape measure/meter stick.
3. Review how to calculate mathematical average.
4. Review how to complete a bar graph.
5. Find four different paper glider patterns to copy and give to each group of students.

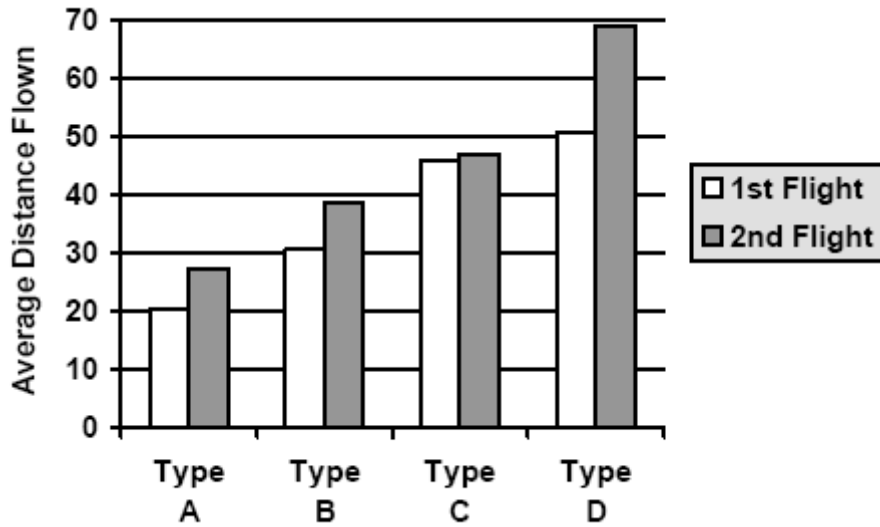
B. Activity

1. Divide class into groups of four students. Give each group a set of glider patterns. Each group will construct a set of four different gliders.
2. Fly the paper gliders in a large open indoor area (such as the gymnasium). Instruct the students to make several practice flights before they start to record data so as to get the feel of how to throw a paper glider properly.
3. Each team will estimate how far they think each of the gliders will fly. Record estimation.
4. Now fly each glider five times. Measure distances flown. Record.
5. Calculate the average distance flown by each of the four gliders. Record.
6. Give each group some paper clips and allow them to modify the gliders by adding mass (paper clips) to the gliders.
7. Fly the modified gliders five times each. Measure distances flown. Record.
8. Calculate the average distance flown by each of the four modified gliders. Record.

C. Wrap-up

1. Each group will make a double bar graph (example shown on next page) to represent the average distance flown by each glider during the first flight and the second (modified) flight.
2. Share graphs with the class and discuss results.





**Assessment/
Evaluation:**

Students will be assessed on their ability to follow directions, measure accurately, calculate averages correctly, make bar graphs, and work cooperatively as a team.

Extensions:

1. Decorate gliders using crayons, markers, or colored pencils. Research World War II aircraft and decorate gliders to represent one of the planes.
2. Repeat the lesson using standard units when recording flight distances.
3. Research significant historical figures and events related to gliders. Write a report.
4. Write an editorial of the first manned glider flight.

**Resources/
References:**

Compton’s Interactive Encyclopedia. Compton’s NewMedia Inc., 1993.

Lopez, Donald S. *Aviation, A Smithsonian Guide*. New York: Macmillan Company, 1995.

The World Book Encyclopedia, Vol. 8, pp. 228-232, 1988.

