

Subject: Science

Grade: Sixth

Standard: #3 The Physical Setting

Key Concept: The motion (or lack of motion) of objects, such as airplanes and rockets, can be explained by an analysis of the forces acting on the objects.

Generalization: The forces of gravity, lift, thrust, and drag make a plane fly.

Background:

Students have been studying force and motion. They have covered topics such as properties of moving objects, Newton's Laws, action/reaction, inertia, and friction. They are now working with the principles of flight. This lesson uses the book, **Origami Rockets**, by Lew Rozelle, ISBN: 0-312-19944-9. I would suggest that the teacher choose the designs ahead of time, e.g. Basic Floater, Basic Glider, Basic Zoomer, Basic Soarer. The number of groups is dependent on the number of choices. For an extension, you can repeat the activity, but this time choose designs from the more complicated rocket groups. I have chosen four design groups to illustrate the lesson.

Each group will use the design plans to construct the appropriate flying device. Upon completion of the design, the students should test it to be sure it conforms to specifications and expectations. Students should test the model flying forward, backward, by dropping and by tossing, recording the results. Students should gather a variety of data, such as length of time in air, distance flown, etc. Data from groups with the same design may pool their data to create a larger database. Students should identify principles of lift, thrust, and drag.

For more comparisons, you may want to extend the activity by forming new groups so that each basic design is represented in each group. Students should demonstrate their designs for each other and compare and contrast them.

This lesson is tiered in *content* according to *interest*.

Tier I: *Floaters*

Tier II: *Gliders*

Tier III: *Zoomers*

Tier IV: *Soarers*

Assessment:

Teacher observation and student interviews during the activity may be used for formative assessment. You may need to assist some students with the folding. Summative assessment may include entries in a science journal, a completed lab sheet and data, a written lab report that is assessed by a rubric, and/or Venn diagrams that compare and contrast the different designs.

An additional extension would be to have a variety of paper for students to use, allow them to repeat their investigation 2-3 times using different weights of paper each time. Collect data and analyze the results.