**Descent of a Paper Helicopter**

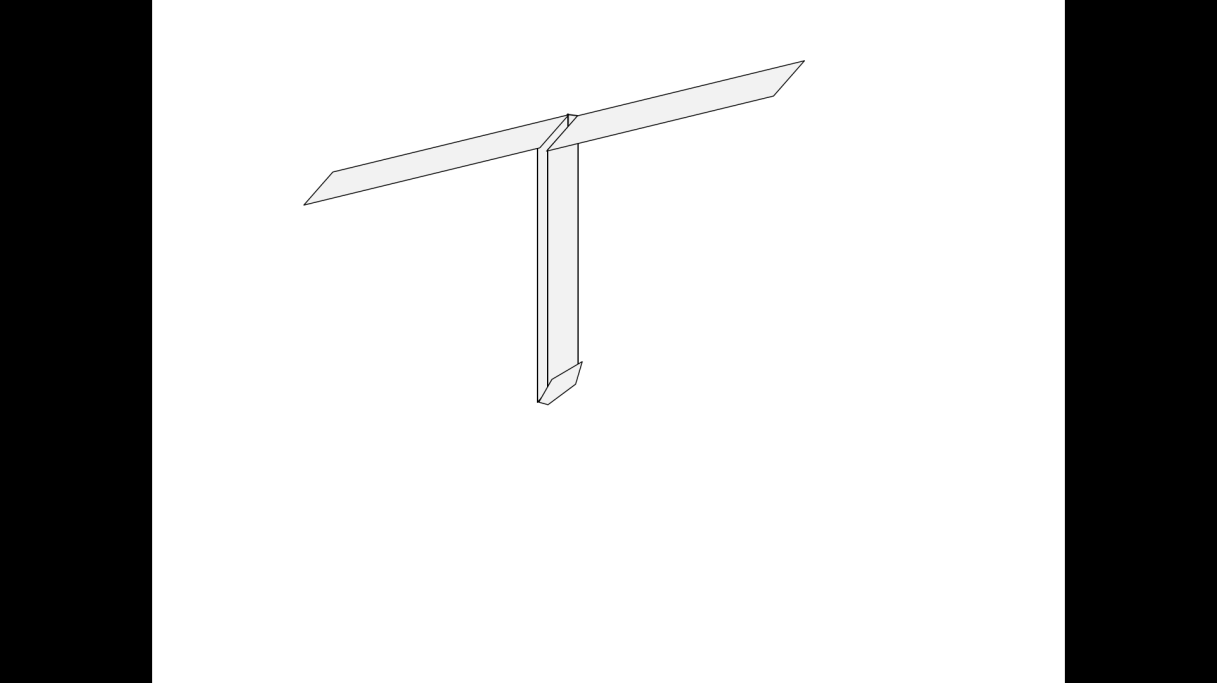
**BACKGROUND:** The scientific method involves the investigation of a question or problem by setting up an experiment to test n hypothesis. A hypothesis is a statement of what a student thinks will happen as a result of the experiment.

**OBJECTIVE:** Students will conduct an their own experiment to determine how their modifications affect the descent of a paper helicopter

**MATERIALS:**

|  |  |  |
| --- | --- | --- |
| * paper helicopter | * scissors | * stopwatch |
| * 2 meter sticks | * chair | * calculator |

**PROCEDURE:**

1. Read through the procedure.
2. Complete the problem, hypothesis, materials, and variables sections of the Lab Report.
3. Prepare the helicopter for flight. Cut on the solid lines. Fold on the dotted lines.
4. Stand on a chair to drop the helicopter from a height of 2 meters (you will have to measure this height first). When you drop the helicopter, start the stopwatch. Stop the stopwatch when the helicopter hits the ground. Record the number of seconds it takes for the helicopter to reach the floor in the data table (the time of descent).
5. Modify your helicopter. Repeat step 4 for the new helicopter.
6. Repeat steps 4 and 5 for wing lengths of 3, 2, and 1.
7. Calculate the average times of descent for each modification.
8. Complete the Observations section of the Lab Report.
9. Graph your data.
10. Write a conclusion using complete sentences.

**1st Page: PROBLEM/QUESTION/THESIS** (what you investigated in your experiment)**:** What modifications will make the helicopter’s descent the longest?

**HYPOTHESIS** (a single sentence explaining how each modification will affect your experiment)**:**

Modification 1:

Modification 2:

Modification 3:

**MATERIALS** (list the materials you will use to perform the experiment)**:**

**VARIABLES:**

a) Independent (what you will be changing):

b) Dependent (what will respond to the change):

c) Constants (what must remain the same):

**Procedure:** (Step by step process of your experiment)**:**

Step 1:

Step 2:

Step 3:

Step 4:

Etc…

**2nd Page: DATA**:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number of Seconds for each Descent** | | | | |
| **Modification** | **Trial 1** | **Trial 2** | **Trial 3** | **Mean of Trials** |
| **1. none** |  |  |  |  |
| **2.** |  |  |  |  |
| **3.** |  |  |  |  |
| **4.** |  |  |  |  |

**Graphing Data:** Graph your averages and your partner’s averages on graph paper and then glue it into your notebook.

**3rd Page: CONCLUSION: *Write down* and then answer the following in complete sentences!**

1. Restate the problem or question.
2. Briefly describe your experiment.
3. Summarize the data from your experiments.
4. Compare your data to your hypothesis: Does your data support your hypothesis? Why or why not?
5. Discuss what you learned.
6. Problems/Improvements: What problems did you have with the lab? If you did this lab again, what would you do differently?

**Follow-Up to Descent of a Paper Helicopter**

1. What other factors influenced the flight of a paper helicopter?

1. Describe an experiment you could do to test one of the factors you listed in #1. Write a problem statement, the variables (independent and dependent), a hypothesis, an outline of a procedure.

Teacher notes:

* 1. Have them cut out (cut along solid lines only) paper helo and show them how to fold it correctly
  2. On odd page copy the lab report format in spiral leaving space for them to answer them
     1. Title
     2. Problem
     3. Hypothesis
     4. Materials
     5. Variables
     6. Procedure
  3. On next odd page (have to skip movie poster) label it results and Conclusion and have them copy the data table from the lab.
  4. Go over the procedure (mainly step 4) and tell them they need to come up with 3 modifications (staples, paperclips, tape, cutting, folding, etc) and if it is not reversible it needs to be tested last.
  5. They need to write their hypothesis incorporating their modifications and also list them in their data table in the modification column.
  6. Tell them to work in pairs (one dropping; one timing). Meter sticks are available to measure the 2 meter drop height.
  7. Warn them not to drop it too close to the wall due to interference and not to bounce meter sticks on the tile.