Experimenting with Paper Parachutes
Integrated Science 1
Redwood High School

Name: ___________________ Per: ____________

■ PART 1

Complete the following research in class:

Define
Free fall:

Source (URL): ______________________________

Air resistance:

Source (URL): ______________________________

Terminal speed/velocity:

Source (URL): ______________________________

■ PART 2

Construct a paper parachute.

› Cut along the dotted lines and fold along the solid lines.
› Cut along the dotted line between sections A and B.
› Fold the section labeled A behind section B.
› Fold section C behind section B.
› Fold section D behind section B as well.
› Complete the parachute by folding blade X in one direction and blade Y in the opposite direction.

Launch your paper parachute.

Think about how to precisely measure flight using a standard measuring tool (when possible, incorporate the metric system).

Think about how to measure the flight subjectively using a scale (ex: 1 = much wobble; 2 = some wobble; 3 = no wobble).

■ PART 3

Consider the provided paper parachute as your control.

Working together, lab groups brainstorm modifications that could be made to the control. Try your modifications.

Good? Bad? Needs more design work?

Settle on a single modification. Develop 3 variations of your single modification.
PART 4
At this point in your experiment you need to record
the progress you have made.  USE A PENCIL  :-) 

Quantitative Dependent Variable w/unit  *measurement using a standard measuring tool (metric if possible)

Qualitative Dependent Variable  *subjective measurement using a rating scale (define each value in your scale)

Independent Variable  *your single modification

Levels of the Independent Variable  *versions, including the control  
  (Control)  

PART 5
Plan to test each level of the Independent Variable 5 times (same as saying 5 trials for each level).
Carefully consider what it will take to launch each trial the exact same way, under the exact same conditions.
These individual conditions are called your constants. Only trials launched with all constants are valid.

Constants *conditions that are provided for each trial

Draft a numbered list of all materials needed
Draft your procedures in two numbered lists.

<table>
<thead>
<tr>
<th>Set Up Procedures</th>
<th>Data Collection Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>(what it takes to set up your materials and equipment)</td>
<td>(after set up, what steps need to be taken to collect data)</td>
</tr>
</tbody>
</table>

PART 6
Draft your Title, Hypothesis, and Introduction Section

Title: Use this format: The Effect Of The “I.V.” On The “D.V.”

Hypothesis: You may use “If I.V. then D.V.” format. If not, be sure that your hypothesis relates the I.V. to the D.V. Either way, the hypothesis must make an educated prediction.

Use the following questions to write the introduction (one paragraph per bullet):

Introduction:

- **WHAT** background information does the reader need to understand and appreciate the experiment (consider IV and DV)? Cite references in the body of the text (base URL, date published -or- accessed). Include each source in the Bibliography.
- **WHY** is this experiment being done? Why is the experiment important; who might be interested in the results?
- **HOW** do you predict the experiment will turn out? Explain the rationale behind the Hypothesis statement. Cite references in the body of the text (base URL, date published -or- accessed) Include each source in the Bibliography.
PART 7 [blank data tables available for you in Google Docs -or- Sheets, Lovelady’s Home Page]

You will need ONE data table for EACH DEPENDENT VARIABLE to house your data.
You must have a final draft data table produced and printed before data collection begins.
Data Tables have a particular design such that things like Dependent Variable (DV),
Independent Variable (IV), Levels of the Independent Variable, Trials,
and The Mean of the Dependent Variable, all have a specific location.

Example:

<table>
<thead>
<tr>
<th>Levels of the IV go here</th>
<th>The IV goes here WITH UNITS (if appropriate)</th>
<th>Mean of DV goes here WITH UNITS</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>The DV goes here WITH UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trials</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

With procedures written, materials in hand, and a 2 proper data tables, you are ready to collect data!

PART 8

Once data collection and calculations (mean) have been completed,
graph your data. ONE graph for EACH data table.

- evaluate the Levels of the Independent Variable
- infinite # of points between levels of the IV = LINE
- no points between levels of the IV = BAR
PART 9

Use the following questions to write the Discussion (one paragraph per bullet):

- **WHAT happened?** Report the data collected for each level of the IV, for each DV. Identify patterns/trends and unexpected results (anomalies) in the data. Discuss data reliability (refer to standard deviation, when available).

- **WHY did you get the results you did?** Compare your findings to other research (in class or literature) and propose explanations for unexpected results. Cite references in the body of the text (base URL, date published -or-accessed), and include each source in the Bibliography as the full URL.

- **HOW could you improve and further the experiment?** Make suggestions for design and/or procedural improvements and make recommendations for further study.

Once your discussion is completed, draft your conclusion, and bibliography.

**Conclusion:** Briefly state major findings of the experiment in reference to the experimental purpose. Was the Hypothesis supported or refuted?

**Bibliography and References Cited:** A list of all URLs used and cited

PART 10

Time to put all your work into a final draft FORMAL LAB REPORT 😊

1. Review and revise Introduction, Discussion, and Conclusion.

2. Review and revise materials and BOTH sets of procedures.

   Create final draft versions of all three.

3. Confirm your two (2) data tables, and your two (2) graphs are printed, and in final draft condition. Data Tables should be printed, but date values are hand written.

4. Staple your report in the following order. Each section listed gets it’s own title.

   - Title: Use the “The effect of IV on the DV” format
   - Hypothesis
   - Introduction
   - Material
   - Procedures
     - Set Up
     - Data Collection
   - Data Tables
   - Graphs
   - Discussion
   - Conclusion
   - Bibliography (MLA – Alphabetical)

Make Sure To Use
The Parachute Lab Write Up Check List Handout

Parachute Lab