

Factors affecting the flight time of a paper airplane

Criterion B

8) Background Information

- Give us an overview of this experiment, how you chose your IV and DV

I chose my IV because I knew what an IV is, and while reading the experiment I knew that the thing I chose was the IV, and I did the same for the DV. *linked to this investigation*

4) Research Question?

- Include the independent, dependent (and main control) variables in the question.
- Use the correct format.

How does changing the mass/weight of a paper airplane affect the time it stays in flight.

5) Hypothesis?

- "I think that if I increase the IV, then the DV will increase/decrease because ... "
- In what way will the DV change? Linear, get faster/slower...? Why?
- Use scientific principles and language here to explain your prediction.

I think that if I add mass to the plane, the time in the air will decrease, because I think the plane will be heavier and it will fall.

1) Independent variable?

- What variable are you going to change?
- How are you going to measure it, what are its units?

The independent variable in this investigation is the mass/weight of the plane, that will be changed by adding clips to the plane.

2) Dependent variable?

- What is going to change because you changed the independent variable?
- How are you going to measure it, what are its units?

The dependent variable is the time it stays in flight.

How measured?

3) Control variables?

- What things must you keep the same in all experiments to make sure that the only thing that changes in each experiment is the independent variable?
- How are you going to measure them?

Variable	How will you keep it the same/measure it?
A.C	If I want to keep it the same, I will have to switch it off the whole time, or keep it on the same temperature.
Window	If the window is open different amounts of air will come and this affects the plane
Type of paper / the plane	If I change the paper/plane, the mass might change and that affects the result.
Throw	If you throw the plane at different strengths, the results will be affected and the results will be completely different
Surroundings	If there is anything in the way the plane can hit it and fall.

6) Apparatus list

- Everything you need - including size (eg 100ml beaker)

1. Paper
2. Stopwatch
3. paperclips (12)

7) Method

- A numbered list of instructions that anyone could follow.
- Draw a diagram/put in photos to help.
- Tell people what to measure, how to measure it and how many times to repeat each step.
- Remember 5 different values for the independent variable with repeats to get an average for each value

- Get a paper.
- Get a stopwatch.
- Get paperclips
- Make the plane *Number of repeats*
- Throw the plane and record the time it is in the air.
- Throw the plane 6 more times adding 2 clips each time, and record the time each time you throw.
- Add all the data to the table.

Safety considerations

- What materials or steps do we need to take care with? Be specific to this investigation.

- When you throw the plane make sure you don't hit anyone.
- Be aware of paper cuts.
- Move everything out of the way so you don't trip.

Title?

Mass (Number of paperclips)	Time of flight (s)			
	Reading 1	Reading 2	Reading 3	Average
0	1.19	1.47	1.16	1.273
2	1.41	1.37	1.81	1.53
4	2.07	1.06	2.49	1.873
6	0.78	0.66	1.03	0.823
8	1.62	1.28	2.25	1.716
10	0.62	0.66	1.37	0.883
12	0.69	1.09	0.91	0.916

Graph: electronic copy

Criterion C

9) Results (can be done in excel)

- Draw a table with ALL the results below (including units in the heading, and a title)
- Add another table to make averages (including units in the heading, and a title)
- Add comments with any relevant observations/descriptions after the table.
- Draw a graph of the results (x axis is the independent variable) add labels to the axes (with units) add a trendline and a title.

10) Conclusion

- Describe the shape of the graph.
- Make a simple statement to give the relationship between the IV and DV (as the IV increases, the DV....)
- Can you make a more complicated observation (how does the DV increase or decrease - linear, curve...?)?
Can you use maths (as the IV doubles, the DV doubles, for example)?
- Is this what your hypothesis predicted? Completely? Why/why not?
- Try to explain your results using scientific language and ideas from the unit you are studying.

I think my graph is very random, because it goes up, down, back up and down again, so the data increases and decreases repetitively.

~~I think~~ The number of paper does affect the time the plane stays in the air but in different ways, because when we added a certain amount of clips the plane stayed in the air ~~for~~ longer, that was because it closed the plane and it could glide through the air better; but then when we added more than that amount that helped it glide it was too much and it lasted less in the air.

My hypothesis was partially correct because I said the DV would decrease, it did but it also increased. *(link to graph (evidence))*

11) Evaluation

- Does the data/graph look reliable? (Are your individual results close to the averages/line on the graph?)
- Refer to your graph in your explanation.
- Did your investigation give you the right/enough data to answer your research question?
- Complete the table below.

Weaknesses Which parts of your investigation made the results not perfect? Why?	Suggested improvement Give specific suggestions for each weakness in the other column and explain why they will improve the investigation
Paper clips	<p>The paper clips would fall off when we put them, we could improve that by pushing the clips to the end of the plane</p> <p style="color:red;">✓</p>
Walls and floor	<p>When we threw the plane it would hit the floor or walls, and that affected our results, we could improve that by throwing it in an open space.</p> <p style="color:red;">✓</p>
Paper plane damaged	<p>When we threw the plane it would get damaged when it hit the wall, so we could use a stronger material to improve this.</p> <p style="color:red;">✓</p>
Time	<p>When we started the stopwatch and stopped it, it was not at the same time, we could improve that by counting down and starting once the person says go.</p> <p style="color:red;">✓</p>
People	<p>There were people in the way when we threw the plane and it would hit the people, to change that we could move the people before throwing.</p> <p style="color:red;">✓</p>