How to Write the Final Paper

In General…

This paper is the final product of our very long Science Fair Project. The purpose of this paper is to share your work with others. In order to communicate effectively, proper usage of the English language and correct spelling are musts. Having teachers or parents proofread your paper helps to eliminate mistakes.

Remember! Scientific writing is not a story. This is NOT a conversation or narrative between the reader and the author, it is a paper that presents what you did in your experiment and what you learned.

As always, make sure you do not use first person (no “I”, “our”, “we”, “my”, etc.) Every part of your paper should be done in third person.

How long is this paper?

There are 10 parts to this paper. I will show you have to each part on the next few pages. The paper should be long enough to include all 10 parts.

How can I help?

I have prepared a list of instructions on how to write this paper. It is in the form of a step-by-step checklist. I know the problems students have had in the past, so I suggest following the steps of my checklist in order! *It will take a few hours to do this paper correctly, so I highly encourage you to start as soon as possible.*

\_\_\_\_\_\_ STEP 1: FINISH YOUR EXPERIMENT!

\_\_\_\_\_\_ Step 2: EXERPIMENTAL DESIGN

 \_\_\_\_ REMOVE your name if it is there.

 \_\_\_\_ Make sure you have it title “Experimental Design”

 \_\_\_\_ Make an appropriate changes since you finished your experiment.

 \_\_\_\_ Add any pictures or sketches that will be smart to include.

 \_\_\_\_ Double space, or 1 ½ space this section.

 \_\_\_\_ Print it out.

Remember, this section should be so detailed that if someone wanted to do your experiment exactly as you did, they could. It is a like a recipe! Yes… all 6 parts of your experimental design MUST be here CLEARLY LABELED. (That is the Statement of Problem, Subjects [INCLUDING control and variable], Measures, Materials, Procedure [step-by-step] & Analysis)

\_\_\_\_\_ STEP 3: FIGURE OUT WHAT IS “DATA” AND WHAT IS “ANALYSIS”

 DATA is any measurement you made. Data is fact.

 ANALYSIS is information you have to calculate (or use a calculator) to figure out.

 Examples:

 “The plant on day 10 was 23 cm high.” DATA

 “The temperature of the water after 1 hour was 10°C.” DATA

 “The average height of the bounce was 7.5 cm.” ANALYSIS

\_\_\_\_\_ STEP 4: TYPE UP YOUR DATA

Once you figure out what the DATA is, here is where you will list the data you recorded during your experiment. It is easiest to read if you make a data table. Be sure you do NOT conclude anything in this section… just give the numbers and/or facts. If you used a calculator to get ANY numbers, that is not data; that will go in the ANALYSIS!

For Example: Let’s pretend you did an experiment with watering 4 plants. 2 plants were fed water, the other 2 were fed vinegar. Like a good student, you have recorded the height of the plant each day. This is what your chart would look like:

|  |
| --- |
| **Plant Height Data** |
| **Date** | **Water Plant 1** | **Water Plant 2** | **Vinegar Plant 1** | **Vinegar Plant 2** |
| 12/1 | 0 cm | 0 cm | 0 cm | 4 cm |
| 12/2 | 0 cm | 6 cm | 15 cm | 6 cm |
| 12/3 | 0 cm | 7 cm | 16 cm | 6 cm |
| 12/4 | 0 cm | 8 cm | 16 cm | Died (0 cm) |
| 12/5 | 1 cm | 8 cm | 17 cm | Died (0 cm) |

* Notice this is all in METRIC! Notice every number have UNITS!
* Notice there are NO CALCULATIONS here! There are all simple facts.

GREAT PROJECTS display graphics after the data table.

 \*You cannot have a graph WITHOUT the data table or title\*

 \_\_\_\_ Double check … if you have graphs, do they have a title?

 \_\_\_\_ Double check… are all the numbers labeled, with METRIC units?

\_\_\_\_\_ STEP 5: TYPE UP YOUR ANALYSIS

In this section, you will do what you said you will do in part VI of your experimental design. If you take ANY averages, it appears here! Each formula you used in your analysis MUST be listed with only one example of how you used that particular formula.

For Example: Let’s look at the data table on the last page. We wanted to know what plant grew better… water plants or vinegar plants. Well, you cannot compare vinegar plants 1 to water plant 1 alone… you must compare ALL THE PALNTS TOGETHER. What we would have to do is take an average and compare average heights. So, one part of our analysis section would look like this:

|  |
| --- |
| **Average Plant Height** |
| Date | Average Height for Water Plants | Average Height for Vinegar Plants |
| 12/1 | 0 cm | 2 cm |
| 12/2 | 3 cm | 10.5 cm |
| 12/3 | 3.5 cm | 11 cm |
| 12/4 | 4 cm | 8 cm (one died) |
| 12/5 | 4.5 cm | 8.5 (one died) |

 Formula used: $Average height= \frac{sum of all heights}{number of plants}$

 Example of average plant height calculation:

 For 12/2 water plants… $Average height= \frac{0cm+6cm}{2}=3 cm$

You used a formula to find the average plant height, so you must show the formula after the table

AND you would “show your work” ONE TIME

* Again, for every formula you used you MUST show one calculation!!!

Great PROJECTS display graphs of the information in their ANALYSIS.

 \* You can NEVER have a graph WITHOUT an analysis table or a title.

 \_\_\_\_ Double check… if you have graphs, do they have titles?

\_\_\_\_\_ STEP 6: PROBLEM & HYPOTHESIS

 \_\_\_\_ There should be no name of this section.

\_\_\_\_ Revise your problem is you need to, but you MAY NOT MAKE ANY CHANGES TO YOUR HYPOTHESIS!!!! **\*No “I” in your hypothesis!**

**\_\_\_\_** Make sure “Problem” and “Hypothesis” are clearly labeled ON THEIR OWN PAGE.

\_\_\_\_ Print it out.

­­\_\_\_\_\_ STEP 7: REVIEW OF LITERATURE

 \_\_\_\_ REMOVE your name if it is on there.

 \_\_\_\_ Make sure it has the title ”Review of Literature.”

 \_\_\_\_ Add any pictures or sketches.

 \_\_\_\_ Double space, or 1 ½ space this section.

 \_\_\_\_ Print it out.

GREAT PROJECTS add new information that is relevant to your experiment if you find some. Sometimes during an experiment, you develop questions that can be researched to find the answer. A good project (according to a judge) contains information that is relevant to your experiment. Don’t forget, if you add information to the Review of Literature... you MUST add the source to your Works Cited as well!

\_\_\_\_\_\_ STEP 8: WORKS CITED

 \_\_\_\_ REMOVE your name if it in on there.

 \_\_\_\_ Make sure it has the title “Works Cited.”

 \_\_\_\_ Double check that is properly formatted:

 Is it double spaced?

 Is it in alphabetical order?

 Is it indented properly?

 Is it in MLA format?

 \_\_\_\_ Print it out.

\_\_\_\_\_ STEP 9: THINK ABOUT YOUR CONCLUSIONS

Here you finally come to the most important part of your research. You must think of what you have done and explain what you have learned. You’ve spent a lot of time on this project, so don’t get lazy now… be proud of your work.. do a good job on this section!!! Prove your actually learned something new!

\_\_\_\_ BEFORE you think of any conclusion… Re-read your Review of Literature!! The more you can incorporate what you learned into this paper, the better it will be.

\_\_\_\_ AFTER you read, come up with answers to the following questions:

1. What does the data and analysis show you?
2. What does the data and analysis mean (in simple, 4th grader language)
3. How does the data support OR reject your hypothesis? It is OK to have an incorrect hypothesis.
4. WHY do you think the hypothesis was right or wrong?
5. Explain how you KNOW the data supports OR rejects your hypothesis.
6. WHY did your experiment turn out the way it did? **MOST IMPORTANT**!
7. What has been learned from the experiment?
8. What are some further suggestions for future study?
9. If you had to do it again, what would you do to improve the project?

\_\_\_\_\_ STEP 10: TYPE YOUR CONLCUSION

Once you can summarize your report and explain your conclusions, you need to turn it into something readable. Take your conclusions, and turn it into types paragraphs with complete sentences, not a list of questions and answers. Do not repeat yourself. It’s all right if one sentence answers more than one question. Keep in mind, the best projects can go back into their paper and support their conclusions with data! When you are done typing the paper, print it and have someone proofread it.

EVERY STATEMENT YOU MAKE needs to be followed by “why” it is this way!

\_\_\_\_ Put the title “Conclusions” at the top

\_\_\_\_ Double or 1 ½ space this paper.

\_\_\_\_ Make sure you did not repeat yourself.

\_\_\_\_ Make sure your answered at least 9 questions (from STEP 9) and then some.

\_\_\_\_\_ STEP 11: PUT THE SECTIONS IN THIS ORDER:

1. Review of Literature
2. Problem & Hypothesis
3. Experimental Design
4. Data
5. Analysis
6. Conclusions
7. Works Cited

\_\_\_\_\_ STEP 12: NUMBER YOUR PAGES, STARTING WITH PAGE 1 (Review of Literature)

\_\_\_\_\_ STEP 13: MAKE A TABLE OF CONTENTS

 \_\_\_\_ Create a Table of Contents for the sections and pages in STEP 12

 \_\_\_\_ DO NOT include the “Table of Contents” in the Table of Contents

\_\_\_\_ Make sure it is at least double-spaced and has the title “Table of Contents” at the top.

 \_\_\_\_ Print it, and put it before the Review of Literature.

\_\_\_\_\_ STEP 14: TYPE AN ABSTACT

This will end up being the first thing you read in your paper, but this should be written LAST! Why? The abstract summarizes your whole paper in one paragraph (about five to eight sentences). Therefore, it is easier to write this at the end. The paragraphs should include:

1. What did you study?
2. Why did you study it?
3. HOW did you study it (no more than one or two sentences)
4. What did you find out?

BE CAREFUL! Be thorough, but do not give a lot of details! Just be quick and to the point. Don’t even think about adding tables, illustrations, equations, or footnotes! Remember, only one paragraph!

 \_\_\_\_ Make sure your abstract is **single-spaced**

 \_\_\_\_ After you print it out, place the abstract BEFORE the Table of Contents.

\_\_\_\_\_ STEP 15: MAKE A TITLE PAGE

 Obviously the title page will go on TOP of the abstract

 The title page MUST have 3 things:

1. A title
2. Your name
3. A picture