Writing the Scientific Research Paper

Writing a scientific research paper will follow the same basic guidelines as writing any research paper. An English teacher is a great resource that can provide pointers as you write the paper. The following outline will help organize the paper.

General Rules
[1]

1. Always use 3rd person.
2. The paper is written in your own words and not cut and pasted from the internet.
3. Have a topic sentence at the beginning of each paragraph. The topic sentence sets the stage for what follows. It states the main idea of the paragraph.
4. Be clear and concise. Do not use flowery words and transition words like however, or moreover. Have meaningful elaborations.
5. Always read what you wrote out loud. Make sure someone else proof reads it.
6. The parts of the scientific paper will include-
    - Introduction
    - Materials and Methods
    - Results
    - Analysis and Conclusion
    - Works cited
    - Possible Abstract and Appendixes

    Label each section by putting it in the middle of the page. Do not bold or underline it. You may skip a space between the heading and the body of the paragraph.
7. Be sure and quote research resources and use citations. Ask your teacher how many they would like you to include. The general rule is at least 3. Citations help give the readers of your paper confidence that you did a thorough job.
8. This outline can be used as the outline for the paper you are writing. Your paper should not look like an outline in final draft.
9. Make sure you use footnotes if you use direct quotes. Always credit your source.
10. The logbook will be the most useful resource in writing this paper.
11. When writing a scientific research paper, it is better to use the word "supports" instead of proves. It is rare one experiment can prove something.

Parts of a Scientific Research Paper

Introduction

The introduction should read like a paper that can stand on its own. This will consist of several paragraphs. The parts of your logbook that will be most useful here will be rationale, research, problem, hypothesis and variables.

1 To do a footnote go to the insert tab and look for footnote. Click on this and you will get this appearing automatically at the bottom of

1. First Paragraph:
    A. The topic sentence should reflect what the entire project was about since it introduces your paper. The others will relate to the paragraph. Ex: *Microbial soil enhancers have been used to increase production of fruits and vegetables which will help gardeners increase their crop yield*.
    B. Describe the problem.
    C. What are the real-world connections? Why do this?
    D. End with a version of your hypothesis.

2. Second Paragraph:
    A. This will be based on the background research about your problem.
    B. What thing are you studying? *Ex: microbial soil enhancers*
    C. What will you be testing it on? *Ex: jalapeno plants*
    D. What special care do the above need? *Ex: plant care for* jalapenos
    E. Are there common things that need to be avoided? *Ex: overwatering plants*
    F. This is where you can get in some citations from the background research that you did.

3. Third Paragraph
    A. This paragraph discusses the independent variable.
    B. Why did you choose this subject to test?
    C. How will this be manipulated?
    D. Are there any special things to avoid?
    E. This and the 4th paragraph may will be a good spot to add citations from research.

4. Fourth Paragraph
    A. This paragraph discusses the dependent variable.
    B. What did you decide to observe and measure?
    C. How do these relate to the independent variable?

5. Fifth Paragraph
    A. This is the last paragraph in the introduction.
    B. What are the different ways you could have experimented on and tested your subject?
    C. Why did you choose the method you did for conducting the experimentation?
    D. Why is the type of data you choose to use the best for this experiment?
    E. This is another good place to have citations from research on the other methods available.

Materials and Methods

This section will be based off 3 sections of your logbook-hypothesis, materials and procedure.

1. The hypothesis should be a part of this section of your paper. You can start by saying what you were trying to test and then include your hypothesis as written in your research plan.
2. Your procedure should come next. Do not number and list the steps but put them in paragraph form.
    A. Use past tense for this section.
    B. You do not have to list all of your materials, just include them in the description of your procedure. You just need what you actually used in the experiment.
    C. This section can have photos that you refer to. Make sure you label and number the photos so when writing about them the one being referred to is clearly identified. The photos should be labeled using the word Figure. *Ex: Figure one shows the peppers from the control*.

Results

This section of the paper will tell the reader what happened in your experiment. This includes the data and any statistical analysis you did. This will be based on the information from the data and observation section of your logbook.

1. This section will be written in past tense.
2. Do not try to explain or infer about any of the data here-just describe it.
3. Do not use dates when describing data instead use “day 1” and “day 2”. The only exception would be the start and stop dates of the project.
4. How did you prepare the data for analyses? *Ex: A 4-point rating scale was developed to describe the quality of the jalapeno peppers*.
5. Make sure your topic sentence makes it clear what data you are presenting in the paragraph. *Ex: The quantitative data included how many peppers each plant produced over the testing period*.
6. Data patterns and trends should be described but make sure not to infer why. If there are any outliers in the data be sure and identify those.
7. What statistical analysis was used? *Ex: The mean of the number of peppers produce per flat was taken*.
8. Insert a data table or graph in this section. These are key elements in your paper.
    A. Make sure it is labeled as “table 1” or “graph 1” and that they are numbered in order.
    B. Tables, graphs and figures are all numbered independent of each other. If you have figure 1 in the Materials and Methods section do not start with graph 2 but use graph 1.
    C. The label of the table, graph or figure should be used in the title of it when inserted and then in the text where they are referred to.
    D. If the table or figure is too large include it in the appendix.
    E. Make sure you are clear what you are referring to when a reference is made in the table. This should be short and concise and not explain every point in the table. *Ex: The quality of the peppers was best in Flat 4 as seen in table 3.*

Analysis and Conclusion

This section explains the data you collected and talked about in the Results section. This section will be several paragraphs long. This is where you interpret your data, make inferences and draw conclusions based on your results. Finally, you will sum up your project.

First Paragraph-introductory

1. This is where you state if your hypothesis was proven or supported by the data.
2. State to what degree the hypothesis was supported such as: strongly or weakly
3. Generally, you are still using 3rd person in this section but check with your teacher to see what they want.
4. You will explain why your hypothesis was or was not supported. Each explanation will make up a new paragraph where you go into more detail. Do not add explanations or elaborations here. Try to put your strongest reasons first. You can go back and rearrange this paragraph and the following paragraphs to align and flow better once you have written them. *Ex: The hypothesis was supported by the data. The 30% microbial soil enhancer used on the jalapeno peppers resulted in more pepper production and a better-quality pepper and plant health. This would be 3 paragraphs. One paragraph will be about pepper production, another pepper quality and the final one on plant health.*

Middle Paragraphs-One for each explanation used when hypothesis was evaluated.

1. The number of paragraphs will depend on the number of explanations you give. *Ex: if you used health of plants, number of peppers and quality of peppers to judge if the soil enhancer worked then each should be explained in its own paragraph.*
2. If there were any irregular results or outliers, then they should be included in the paragraph.
3. All trends and patterns should be noted in the paragraphs. Why did this happen should be addressed.
4. You can refer to data tables used in the results section. Make sure you use the number and title of the data table. *Ex. Table 1-Quality of Peppers shows….*
5. Compare your results to past research that you document or cited.
6. Did your procedure affect the results in some way?
7. All your inferences should be based on the data and scientific fact, not your opinion, or feelings.

Limitations Paragraph-what things could have limited the project.

1. Did you have trouble with your constant or controlled variables?
2. Were the number of subjects or trials sufficient to get valid results?
3. Did something unexpected happen that could have influenced results?

Connection Paragraph- This should connect to the introduction part of the paper.

1. What did you say would happen and did it?
2. What could be some extensions and further areas of study?
3. Did you have a valid application of the real-world connection you stated in the introduction?
4. What new questions arose from this study?

Last Paragraph-This summarizes your Analysis and Conclusion section

1. The topic sentence should show how t strong the correlation was between the independent and dependent variable. *Ex. Based on the results of adding microbial soil enhancer to the jalapeno pepper plants the number and quality of peppers along with the health of the plant was positively influenced.*
2. How were the final conclusions made?
3. Did your data support the relationship between the variables?
4. What final things can you sum up about the data and variables?
5. What final statement do you want to make about the project?