

Science Writing Checklist

Overview: You will be using your findings from your investigation to prepare a research poster, scientific paper, or digital presentation (as determined by your instructor). Regardless of the format, your work should include all of the following items. Use this page as a checklist to make sure everything needed is included.

Title: this section needs to include...

- The study subject (the topic/question you studied).
- The independent variable and the dependent variable(s).
- The final results.
- Your names, class, hour, and school.

Introduction: this section needs to include...

- The research question (*We wondered if...*).
- The hypothesis (*We hypothesized that...*).
- The rationale, or reason for your hypothesis (*We thought this would be the case because...*).
- Summary of methods (*To test this hypothesis, we...*).

Background Information: this section needs to include...

- Concepts, facts, and terminology from other sources related to your experiment so that the average reader can understand your work.
- All facts must be followed with parenthetical citation for the source of the information (Author, Year).

Methods & Materials: this section needs to include...

- A materials list of all items used in the investigation.
- A cook-book recipe-style description of how you conducted this experiment.

Results: this section needs to include...

- A written summary of your results, data, and observations.
- A graph/chart/table with...
 - A legend explaining all symbols or abbreviations.
 - Labeled x-axis and y-axis.
 - A caption with a description of all important patterns and trends in the data.

Discussion: this section needs to include...

- The original research question and hypothesis.
- An explanation of whether the data support or reject your hypothesis (or if more data is needed).
- A summary of why you think the data supports/refutes/does not address the validity of your hypothesis.
- A discussion of the validity of your findings (*i.e.*, what might limit the ability of your data to address your research question; how might this experiment be improved?).
- The relevance of this investigation and its data (*e.g.*, how might this provide insights to questions and provide potential solutions to problems? Why was this work valuable?)

Bibliography: this section needs to include...

- All sources used must be listed alphabetically. Each should include: 1) Author's name (last name, first name); 2) Year of publication; 3) *Title of document*; and 4) Publication source or website.
- *E.g.*, Badger, Bucky; Wolverine, Wally. (2022). *Antibiotic Mechanisms*. www.nih.gov/antibiotics

Presentation Checklist

Overview: You will be presenting your findings as a group to conclude this project. For your presentation, you will need to break up roles below among the people in your group. If you have less than four people, some individuals may need to do multiple sections. Be sure to address all of the following as you present. You can have speaking notes. However, avoid speaking directly from notes if possible when presenting.

Partner 1: Introduction

1. Begin by stating the research question, hypothesis, and rationale.
2. Next, summarize background information that your audience will need to understand in order to comprehend and appreciate your work. For example, if you are discussing antibiotic resistance, you should provide information on how antibiotics work and why some bacteria are becoming resistant to these treatments.

Partner 2: Methods

1. Begin with a summary of the methods you used to test your hypothesis (*To test this hypothesis, we...*)
2. Then state all the materials used to conduct your experiment (*We used the following materials...*)
3. Address sample size, trial numbers, and constants; explain how these affected your work's validity.

Partner 3: Results

1. Begin with a graph of your data. Summarize the patterns and trends in the data. Be sure to explain how the x-axis and y-axis are labeled to support your audience's understanding.
2. Next, state the significance of these results and how they relate to your research question and hypothesis (do they support it? do they refute it?).
3. Conclude by addressing other observations made during the experiment that might not be reflected in this data.

Partner 4: Conclusion

1. Begin by restating the research question and hypothesis.
2. Next, explain whether your team has decided that your hypothesis is correct or incorrect based on your data (or if you are unable to determine this at this moment). Justify this stance with evidence/reasoning.
3. Third, state the confidence you have in your results. Is this enough to answer your research question once and for all? Are your methods able to provide data that fully supports valid conclusions?
4. Conclude by stating what would should happen next in order to answer your question. Is more research needed? Should it be the same kind of research and/or should other questions be explored that might have arisen during your work? What are the next steps for addressing your research question?

Questions: You should prepare for follow-up questions from your instructor. Potential examples include:

1. How do some antibiotics affect DNA, RNA, proteins, and/or cell division as part of their mechanism?
2. In our experiment, bacterial growth was impaired using disks soaked in *neomycin*, which inactivates bacterial ribosomes. How would this stop or slow the growth and reproduction of bacteria?
3. How does antibiotic resistance relate to the following? A) mutations; B) natural selection; C) evolution.
4. How do new traits emerge in organisms? How these traits become more prevalent in species? How does this relate to the problem of antibiotic resistance? Is this an example of natural selection and evolution?
5. How does your work reflect core principles of scientific investigations? How could it be improved?