

Independent Research Project

Research Report

Chemistry I Honors
Mrs. Johannesson

Format

- Use a formal, impersonal writing style. Use third-person and passive voice. Do not say, “I did this...” or “I thought...”.
- Type in Times New Roman or Arial font, 12-point, double-spaced, with 1-inch margins.
- The title of each section should be centered, bold, and in a larger font.
- Continue one section after the other with a few blank lines in between unless otherwise noted in the instructions below. When a new section will start near the bottom of a page, start at the top of the next page instead (page break: “Ctrl+Enter”).
- Enclose all papers in a folder with brads or a 3-ring binder.
- Attach your data notebook in the back pocket of your binder or insert notebook pages in your appendix.

Required Components

Title

- Center your title in the middle of the page.
- If you choose to use a short attention grabber as your title, include a subtitle that clearly explains the subject of your experiment. Examples:
 - *Winter Wonderland: A Mathematical Analysis of Snowflakes.*
 - *Understanding Gender Differences in Achievement Motivation in 6th-12th Grade Students.*
- Center your name, class period, and date at the bottom of the page.

Table of Contents

- Start a new page titled TABLE OF CONTENTS.
- List each section and its page number in the report. This will be one of the last things you write.

Abstract

- Start a new page titled ABSTRACT, maximum of 250 words.
- This is a brief overview of the entire project. It should summarize the following:
 - purpose of the experiment (including your hypothesis)
 - procedure
 - results
 - conclusions
- It MAY include possible research applications and *minimal* reference to previous work.
- Do NOT include acknowledgements or work done by anyone but yourself.

Introduction

- Start a new page titled INTRODUCTION.
- This section describes the purpose of the experiment, pertinent background information, and a review of the literature.
- This section should be the finalized version of your Background Research Paper. Be sure that all of the information in your introduction applies directly to your experiment and that you fully address the independent and dependent variables.
- This section should be 3 to 5 pages in length, not including the works cited which will go in the bibliography at the end of this research notebook.

Hypothesis

- Start a new section titled HYPOTHESIS.
- Restate your hypothesis with an explanation based on your background research.

Materials

- Start a new section titled MATERIALS.
- Write a list of all materials used. Do not write in paragraph form.
- Be specific about the type and quantity of each item. Refer to your “Data Collection” handout for more information.

Methods/Procedures

- Start a new section titled METHODS or PROCEDURES (whichever you prefer).
- This section should be a detailed, step-by-step explanation of your experimental process from beginning to end.
- Your procedure may be in paragraph form or outline form, whichever is more suitable.
- Write in the past-tense, third person, and passive voice. For example, “Each participant was given 5 minutes to memorize the items on the tray – (list the items).” Instead of, “I showed each participant a tray of items and gave them 5 minutes to memorize the items.”
- Have someone else proofread this section to make sure you are providing enough detail. The purpose of this section is to allow others to repeat exactly what you did!

Observations & Data

- Start a new section titled OBSERVATIONS AND DATA.
- In this section, you should describe your observations and display your numerical data in tables, charts, graphs, and/or diagrams. Tables should be referenced in the text of your paper by table number (e.g. Table 1). All other visuals should be referenced by figure number (e.g. Figure 1).
- Data tables and/or graphs should be included for each individual trial as well as one that shows average values. Be sure to include units on all measurements. If you indicate the units in the table heading, you do not need to repeat them after each number. For example, “Height of Plant (cm)”.
- If you have a large amount of data, you should put the bulk of it in the APPENDIX, which should either be placed later in the paper or, if it’s extremely lengthy, under separate cover. If you do this, a summary of the data should remain in the data section of the report for ease of reference by the reader.
- I strongly suggest computer-generated graphs. Microsoft Excel is well-suited for this purpose. I also have a program called Graphical Analysis that you are welcome to use.
- Refer to your “Graphing Guidelines” handout for pointers on how to make a good line graph. A title and axes labels are imperative. Also remember that the independent variable goes on the x-axis, while the dependent variable goes on the y-axis.
- In most cases, a color-coded line graph is the best way to show the results for multiple groups (including the control group) on the same graph. However, other graph formats may be better suited for your results. Try different methods and show them to another person to get feedback on which method portrays your data more clearly. Whatever format you choose, make sure you include a legend to define each group. Use descriptive terms in your legend rather than code letters (e.g. “Blue light” rather than “Group B”).

Discussion of Results

- Start a new section titled DISCUSSION OF RESULTS.
- This section should explain the meaning of your data. Discuss any patterns or discrepancies found in the data. Was there a clear relationship between your independent and dependent variables?
- Compare your results with any found in your background research.
- Address any factors that may have influenced your data, both favorably and unfavorably.

Conclusion

- Start a new section titled CONCLUSION.
- In this section, you should declare whether the hypothesis was accepted or rejected. Substantiate your decision with data from your experiment and consider the limitations of your results. Stand behind your results, but don't try to make them sound more conclusive than they really are.
- Avoid using the word "prove." In all likelihood, your experiment was not extensive enough to prove your hypothesis beyond a doubt. In fact, even professional scientists who run thousands of trials are cautious about using this term.

Future Questions/Application

- Start a new section titled FUTURE QUESTIONS AND APPLICATIONS.
- In this section, you should discuss possible applications of your results as well potential areas for further study.
- Did you develop new questions while performing the experiment?
- How could your experiment be improved or changed if you were to perform it again?
- What were some of the limitations or problems you encountered?

Appendix

- Start a new page titled APPENDIX. List the contents of your appendix on this page.
- Subsequent pages in this section should include photographs (5 or more) with captions, data notebook pages, and supplementary data that was too bulky to include in the body of your report.
- You may also include diagrams of experimental setup and/or observations.

Bibliography

- Start a new page titled BIBLIOGRAPHY.
- This section should be a complete, alphabetical listing by author's last name, of all sources used in preparing the report.
- Follow the guidelines for MLA format or other accepted documentation style.

Acknowledgements

- Start a new section titled ACKNOWLEDGEMENTS.
- This brief section should be included to anyone who assisted you in this project. Thank proofreaders, typists, parents, teachers, or other individuals who gave of their time to assist you.
- Do not include names of family members. For example, "I would like to thank my mother who proofread my paper."
- If you receive substantial assistance from a professional person or scientist, list them by name. For example, "I wish to express my appreciation to Dr. Robert Jones at the University of Texas Health Science Center in San Antonio for his expert guidance and use of his facilities."

Sources:

Baldwin, Roy. "Guidelines for Organizing a Science Research Report."

Northside ISD. "NISD Guide to Independent Student Research."

Alamo Regional Academy of Science Engineering. "Research & Display Components."