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## Lab Reports

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Scientific papers, especially lab reports, are generally very structured, concise, and written in third person. Writers and Writing Assistants can use this handout as a guide for discussing the effectiveness and completeness of a lab report. They should always compare this handout to the guidelines or grading rubric provided by the lab instructor. This handout is not intended to be a set of rules, but a resource of popular guidelines.

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### Style

- Use concise, formal language.
- Use past tense to describe the experiment.
- Unless directed otherwise by the professor, avoid the use of first-person pronouns (e.g., I, we, my, ours). Focus on the object, problem, or apparatus being studied, not the researcher.

### Suggested Order for Writing

- This varies, but professionals who prepare research reports tend to draft the different sections in the following order: Results, Materials and Methods, Introduction, Discussion, References (Literature Cited), Abstract.
  - For “cookbook” (educational) labs or when the data require very little interpretation or analysis, students may prefer to begin with the Introduction and write straight through to the Discussion/Conclusion.
  - An abstract, if required, should always be written last.
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### Organization

#### Title

- The Effect of \_\_\_\_\_ on \_\_\_\_\_. This is basic format, but you can deviate depending on the experiment type.
- Lab partner name.

#### Abstract

- Major points of each section.
  - Introduction (what is being studied and why?)
  - Materials/Methods (perform study)

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  - Introduction (what is being studied and why?)
  - Materials/Methods (perform study)
  - Results (findings)
  - Discussion (how findings relate to hypothesis, meaning of results, why results are important)
- It is short (250 words)
- It is written last

### **Introduction**

- Background information
  - Relevant theory and facts—think textbook readings, articles, lecture notes, etc.
  - Justification of the study – this is often found in the lab manual or textbook readings
  - Citations
- Central research question
  - Outline the question(s)
  - Explain why it is important or interesting in the field (check lecture notes, textbooks, and articles for help with this)
- Hypothesis and predictions
  - Provide your hypothesis clearly
  - Provide the rationale for why you believe this (use scientific knowledge to support this)
  - Alternative or null hypothesis may also be considered
- Style
  - Active or passive voice? Check with instructor.
  - Third person—avoiding pronouns may be necessary; check with instructor
  - Past tense

### **Methods**

- Briefly describe the experimental approaches/procedures
  - Clear and concise instructions
    - Should be able to replicate the experiment based on the methods
  - Explanation of how variables were controlled
  - Number of replications (n=?)
- Analytical approaches
  - Statistical measurements (explanation of tests)
  - Identify and describe any equations or software used
- Style
  - Chronological
  - Paragraph form
  - Past tense



## Results

- Explain what happened in words summarized and with figures and tables
- Reference each table/figure in the text and in the order in which they appear
- Describe important trends and key pieces of information gained
  - Highlight the most important parts that will appear no later in the discussion section
  - Statistics and statistical analyses are important here
- Were the results significant? ( $p > .05$ )
  - If the results are unclear, do not try to imply something that cannot be supported by the data
- NO interpretations—just report the facts
- Negative or “odd” results? Make sure you identify why you are leaving certain data out of the results or address why it was omitted in the discussion section
- Figures and tables
  - Figures
    - Use appropriate graphs to identify and show trends
    - Units and labeled axis
    - Easy to read and clear
    - Error bars, p-values, etc. included when appropriate
  - Legend
    - Address all aspects of the graph (e.g., error bars, DNA markers, etc.)
    - Should be able to stand on its own without the report
  - Tables
    - Column and row headings with units included
    - Only include important data (not raw) unless otherwise assigned. Check the assignment
  - Organization
    - First include all the text, then all the figures/tables come at the end
    - Organize figures/tables in chronological order

## Discussion

- Interpretation of the results
  - Does the experiment support your hypothesis? Avoid phrases like “this proved my hypothesis”
- Expected or unexpected results? Why/why not?
- Cover all the trends and important data points you mentioned in the results—address any negative or odd results here
- Accuracy and replicability of the results
- Discussion of errors/limitations (if appropriate)
  - Anticipate readers’ questions/concerns/criticisms and try to address these if possible
  - Here is where you could include other follow up research or studies
- Implications of your results
  - Larger context of literature and “the big picture”: “why should you care?”



- Larger context of literature and “the big picture”: ”why should you care?”
- Citations
  - If necessary to support any ideas that you reference
  - To discuss how your study relates to other existing studies or larger concepts
- Conclusion sentence
  - How does your experiment relate to others?
  - Why is your data important?
  - How can it be applied to the rest of the world?

### **Citations**

- Check assignment for proper citation format
- Check to make sure all citations are accounted for

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### **Final Advice**

- The word “data” is plural and so requires a plural verb. (“The data show...” not “The data shows...”).
- The words “significant” and “correlation” should be reserved to those instances when a statistical analysis has been performed. Be alert for other specialized vocabulary.
- Avoid using the word “you.” You are reporting your experiment, not giving directions.
- Use acronyms only after presenting the full term with the acronym in parentheses. For example: mannitol salt agar (MSA).
- Use a space between numbers and units (e.g., 12 mg).
- Limit use of jargon or lesser-known abbreviations. Use clear definitions of technical terms and use the simplest terms when possible (e.g., say “goldfish” instead of *Carrassius Auratus*).
- Each section should be able to stand alone.
- Sections should be written in paragraph form with topic sentences and helpful transitions.

