

# SCIENTIFIC WRITING: HOW TO WRITE A LABORATORY REPORT

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A laboratory (lab) report is written in order to present and disseminate the methods used in and the results found through scientific experimentation, which usually takes place in a laboratory class or during field work. You're also expected to interpret and discuss your findings, and evaluate the experiment. Below are basic guidelines to follow when organizing and writing such a report.

## ■ Report structure

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In scientific writing, **IMRAD** is the most common organizational structure used: introduction, **m**ethods, **r**esults and **d**iscussion. However, you might also be required to provide an abstract (AIMRAD).

### ▶ Title

Your title should be **concise** (not more than 10 words), **factual and straightforward**. Include **significant keywords** used in your particular field. Don't waste words with add-ons like "An investigation about..." and don't use abbreviations.

### ▶ Abstract

In essence, this is a **summary** of your whole paper. It's usually the shortest part of your report, not being more than one or two short paragraphs or around 200 words (but check with your professor or supervisor first as the length required can vary). It should be a **standalone** piece of work, detailing the background of your research, what you did, what you found out, and what your results mean in the wider context. As it's a condensed account of your whole report, it makes most sense to tackle this part last.

Don't include any references, any information that can't be found in your report, or any tables and/or figures (or references to any).

### ▶ Introduction

This is where you **set the scene** of your study. In this section, you should provide your reader with the **overall background** of your research so that they can appreciate its relevance and place it into the wider context of your field. Aim to answer the following questions:

- What's the problem you're investigating?
- What's already known about the issue you're researching? What has already been published? Are there any gaps in existing knowledge?
- What are the key concepts and terms?
- What's the purpose behind your research? What are your specific hypotheses?
- How do you intend to logically approach the topic you're investigating?

Additional tips to tackling your introduction include the following:

- Move from the general – the problem in regard to your *whole field* of

interest – to the specific – *your* experiment.

- Make clear links between the following elements: the problem and the possible solution; the question you’re asking and your research design; and what’s already known about your research area and your experiment.
- Be selective when choosing what literature to include. Don’t simply list everything you can find.

By ending your introduction with a brief statement regarding how you’ll approach the issue you’ve described, you provide a natural lead into the following section.

### ► (Materials and) methods

You should describe your method(s) in such a way that **others would be able to replicate your research**. This means that you need to include:

- all the materials you used
- how you used them
- where and when the work was carried out (this is more relevant for field work studies)
- all measurements and replications
- a step by step account of the method(s) you used

Make sure you answer all the following questions:

- How did you approach the problem you outlined at the start?
- What did you use (e.g., materials, equipment, subjects, etc.)?
- What steps did you take?

If you followed a specific procedure taken from a report or laboratory book, you can refer your reader to this text as opposed to writing out the method in full. However, if you modified the instructions in any way, these alterations should be described.

If you found any weaknesses in your method(s) and/or materials, don’t leave these out: you should consider how these could have affected your results, and what you could do to rectify them in the future. Instead of undermining your work, acknowledging any flaws will enhance your findings.

### ► Results

In this section, you should provide a summary of your data. However, even if you have a large volume of results, you should only include results that are **most relevant to your research**. Concentrate on significant trends, patterns and differences.

Concise and coherent ways to present your results are through tables and/or figures. More guidance on constructing and organizing these can be found in “**How to create tables and figures**” in this series. You can decide whether it makes most sense to provide your findings in chronological order or by using another form of logical progression.

Be careful not to interpret your results in this section – that’s what you’ll need to do in the following section. However, it’s worth adding here that **you don’t need to have a separate results and discussion section: you can combine the two** by interpreting your findings as you introduce them. In fact, some disciplines expect you to integrate these sections.

### ► Discussion

This is the section in which you **analyze and interpret your results**. Be careful not to simply repeat your findings. As well as discussing your own findings, you should relate them to the wider body of research in which they belong. This allows you to highlight the relevance of your research. You can also include how your experimental design could be improved, and present possible future research based on your outcomes.

To summarize, aim to answer the following questions:

- What is the meaning behind your observations? How can you interpret your data in regard to the focus of your research? Consider any patterns and relationships.
- Based on your findings, do you accept or reject your original hypothesis(es)?
- How do your results relate to those that came before? Do they agree or contradict? Why could this be the case?
- What are the theoretical and/or practical implications of your results? Could your findings be extended to other situations?
- How could you improve the techniques you used?
- Based on any gaps or uncertainties in your findings, could you suggest any future research?

Additional tips to tackling your introduction include the following:

- As with your introduction, start broad – your findings – and become more specific – previous literature and theory, and/or practical implications.
- Even if you managed to collect a large amount of interesting data, stick to your original research question and hypothesis(es).
- For each conclusion you make, give evidence.
- Don't shy away from unexpected results: discuss possible reasons for them.

### ► Reference list

In your reference list, you should include all materials you cited in your report. For further guidance on referencing, have a look at “**How to reference**” in this series.

## ■ General tips

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- First of all, make yourself aware of any **specific guidelines** provided by your module or institute.
- If you're given a **word count**, check what is and what isn't included in it.
- Aim to be as **clear and concise** as possible. Check out “**Tips for writing concisely**” in this series for further guidance on this issue.
- Write in a **formal, academic style**. Therefore, avoid, for instance, slang and clichés. More assistance with this can be found in “**Academic writing style tips**” in this series.
- Also, **avoid using personal pronouns**. This will make your writing appear more objective. This is dealt with in more detail in “**Active versus passive voice**” in this series.

- ▶ Write mainly in the **past tense**. The only exceptions are when providing the background to your research – which can be in the present tense – and possible future research – which will be, unsurprisingly, in the future tense.
- ▶ **Italicize all scientific names** (genus and species).
- ▶ When providing measurements, use the **metric system**.
- ▶ Make sure to use correct **abbreviations**. And spell out abbreviations in full first unless stated otherwise.
- ▶ **Numbers** from one until nine should be spelt out, e.g., five mice, the exception being when they're connected to a measurement, e.g., 5 cm. Spell out all numbers if they're at the beginning of a sentence. If you have a list including numbers both over and under ten, you can use express them all numerically, e.g., 14 sheep, 11 cows and 2 pigs.
- ▶ Once you have your first draft, revise, edit and proofread your work. More assistance with this can be found in "**How to write an academic paper**" in this series.