

# Ten Steps to Writing a Report

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- o Recognize that you have a result.  
At some point in your research you must recognize that you have sufficient results to warrant a report. Your report must have a "reason for being." Although experience is needed to make this decision, be aware that such a decision is necessary before you begin writing your report.
- o State your main result.  
You will write your report "inside-out." First, write out your main result as precisely as you possibly can. Keep honing it until the result and its proof are perfect. This result will be the foundation upon which the rest of your report will be built. Since any errors or ambiguities here will propagate throughout the report, be sure that your main result is absolutely correct. Everything else in the report will flow from this "high potential energy" result. Try to make your development of your main result as self contained if possible without relying on results from other sources.
- o Work out the principal consequences.  
Next, write out the principal consequences of your main result. Work out special cases of your main result in as much detail as possible. Remember that your readers may only be interested in special cases. Many reports were ignored because readers could not relate to the setting in the report. Therefore, try to connect your main result to as much related and specialized work as possible. Revise your main result if that is suggested when you work out these consequences.
- o Assemble your reference list.  
Collect together the references that you will cite. These references will provide a frame of reference for your report. They will show the reader that your work was influenced by such-and such school of thought, a particular applications area, or philosophical point of view. Be sure that you research the literature thoroughly, including both conferences and journals, foreign, domestic, English, foreign language, etc. Don't assume that work of "obscure" authors is less worthy of citation than the work of "famous" researchers.
- o Collect notation.  
Make conscious, careful decisions about the notation you choose to use. Decide if you will use traditional notation or opt for your own variations for good reasons even though your reader will not recognize things as readily.
- o Collect background material.  
State all of the background material you will need. Be precise in your definitions and lemmas. Give accessible references for this background material. Be specific in your citations, such as "Theorem 12.3 on page 723 of [19]."
- o Produce numerical results.  
Illustrate your results with numerical results that clearly illustrate your contribution. Your numerical results should be as transparent as possible. Choose examples that are as simple as necessary to demonstrate your results. Redo examples by prior researchers to compare your results.
- o Write the introduction.  
Only after all of the above steps are completed should you begin to write your introduction. Think extensively about what you want to say before you write it. First outline your thoughts into a story line that reflects the order of ideas as you would describe them to someone in a presentation. Better yet, imagine you are explaining to your colleague what your report is about. Be sure that in the Introduction you clearly state the contribution of the report. For example, have a sentence like "The purpose of this report is to go beyond earlier work by ..."
- o Write the conclusion. Repeat a few points from the introduction in the conclusion section and then add some additional perspective on the work. For example, you may comment on the potential applications of the work, possible shortcomings, and directions for future work.
- o Write the abstract.  
Last of all, write the abstract. Compress the introduction into a few key sentences. Imagine that you are a researcher in China who only has the abstract of your report. Could you figure out what is in your report and what its contribution is? Or imagine you have 30 seconds to describe your report to a busy person.