

Introduction

The process of communicating the results of scientific work is the topic of this Module. You will individually write a *Formal Report* to communicate the results of your experimental work. After this Module has been completed, you will prepare a final draft of your Report which will be turned in for marking by the Instructors.

In the real world, such communication is used for:

- Applying for research grants.
- Reporting to supervisors.
- Communicating to colleagues, either through journal articles or web documents.

The single most important factor in written communications is to write from the viewpoint of your readers. Here, you will assume that your readers are first year Physics students who have not actually done the experimental work that you are reporting. Your goal is to write a report that will inform your readers about the important features of your work and its results.



A common problem with Formal Reports is that students include too much information. You will need to decide what is important and what is not, and include only the important information.



Duration

This Module should take about one hour to complete.

Preparation

This Module requires more preparation than is typical. You should bring to the Practical a first draft of your Formal Report. Bring enough copies for all the members of your Learning Team. Below are some guidelines on writing a good Formal Report.

Since the focus of this activity is the process of scientific communication, the topic of your Formal Report is not very important. Choose any experimental work that you have done.

The Practical

During the Practical, each member of the Learning Team will read the other members' reports. Then the Team will discuss the report and how it may be improved. A good way to do this is:

1. Choose a member of the Learning Team, and individually read his/her Formal Report. As you read,

- you may wish to write notes, comments, corrections etc. on your copy of the Report.
2. After everybody has read the Report, discuss it as a group. What is good about it? How may it be improved?
 3. Choose another member of the Learning Team and read and discuss his/her Formal Report. Repeat until all Format Reports have been read and discussed.

After the Practical, you will write the final draft of your Formal Report, incorporating the suggestions and corrections that you think are appropriate. You should bring this final draft to your next Physics Practical where you will submit it to the Instructors for marking.

About the Formal Report

As already mentioned the Report is a *summary* of experimental work that you have performed. It should be written so that after reading it a first year student who has not done the work you are reporting will understand the important features of your work and results.

The fact that it is a summary means that:

- The report should **not** include derivations of formulae that appear in the textbook or elsewhere. Instead, present the formulae and give references to the source.
- The report should **not** contain detailed descriptions of common apparatus, such as voltmeters, oscilloscopes, etc., that your reader is already familiar with.
- The report **should** contain detailed descriptions of any apparatus that your reader may not be familiar with.
- In general, tables of experimental data should **not** be included. Usually a graph of the data **should** be included if appropriate.

All journals and most companies and other organisations have *Style Guides* which governs the format of reports. For your Formal Report, we will adopt the Style Guide of the American Institute of Physics. Briefly, according to this guide your report should contain the following information in the order given:

1. Title. The first word should be capitalized.
2. Your name.
3. Your contact information. In this case this should include your student number, your Physical Practical group, your email address, and your Instructors' names.
4. An abstract. It should be a concise summary of the significant items in the paper, including your results and conclusions. It should not be more than 500 words, and is typically much shorter.
5. Body of the report. This may be divided into sections.
6. Acknowledgements, if any.
7. References in the order in which they are cited in the body of the report.
8. Tables, if any, each with a caption.
9. A page of the captions of the figures, if any.
10. The figures, one per page.

Newton's Cradle or *Newton's Balls* is a well-known toy and Physics demonstration.

The American Journal of Physics uses the American Institute of Physics Style Guide. You may see a recent article on Newton's Cradle from that journal by clicking on the red button to the right. It is in pdf format, and has a file size of 299k. The article is used by permission.



The paper is just over 8 pages long in typeset form. This is probably about 16 pages of normal hardcopy text not including figures. You may wish to know that the authors of the above paper estimate that they spent about 600 hours doing programming and data analysis, 250 hours of experimentation and 150 hours of theoretical analysis. Thus they spent a total of about 1,000 hours on the work reported in a 16-page "Formal Report." If you condense the information in your report to the same degree, it will end up about **0.1** pages long! This is not possible nor desirable, but does suggest that the text of your report should almost certainly not be more than a couple of pages.

The full Style Guide of the American Institute of Physics is 65 pages long. Just for interest you can see a 2 page summary by clicking on the blue button to the right. It is in pdf format, and has a file size of 337k.



About References

A few more words about references are probably required. You should refer to the reference in the body of your report by means of a numeric superscript, such as this¹.

Then for a journal article, you will specify the reference like this::

1. Stefan Hutzler, Gary Delaney, Denis Weaire, and Finn MacLeod, "Rocking Newton's cradle," American Journal of Physics **72**, 1508 - 1516 (2004).

In the above entry **72** is the volume number in bold face, 1508 - 1516 are the page numbers, and 2004 is the year of publication.

Well-known journals typically have their name abbreviated in a reference: *Am. J. Phys.* instead of *American Journal of Physics*. Of course you are writing for a first year student, for whom journals are unlikely to be well-known. When in doubt, spell out the full name.

The American Journal of Physics numbers their pages consecutively within a volume, so the issue number and month of publication are not required. Scientific American begins each issue from page 1, so referring to an article in such a journal would look like this:

1. John S. Wettlaufer and J. Greg Dash, "Melting below zero," *Scientific American* **282**(2), 56 - 65 (February 2000).

Here we are referring to issue 2 of the journal, which was published in February 2000.

For books, the format is:

1. Raymond A. Serway and John W. Jewett, Jr., *Principles of Physics*, 4th ed.(Thomson Brooks Cole, New York, 2006), 75.

Note that the title is in *italics*, the publisher, location and year are in parentheses, and the page number, if any, comes last.

Help on Writing

Becoming a good writer requires that you do lots of writing. Many Colleges of the University of Toronto have writing centres, which can also help you. You can see a listing of them by clicking on the green button to the right.



Equipment

This module requires no equipment.

This module was written by David M. Harrison in March 2005.
The last revision was on \$Date\$ (y/m/d UTC).