

Your Lab Demo: _____ **Your Lab Demo's drop Box:** _____.

Overview and Motivation

We hope that as part of the PHY151 labs, you have been taught how to:

- take careful measurements
- report all measurements with a \pm error
- propagate errors when computing results based on measurements
- compute the average and standard deviation of multiple measurements of the same quantity
- distinguish between accuracy and precision
- report your findings carefully and convincingly

These are skills that will last you the rest of your life as you continue in any scientific discipline in which measurements are important.

Another important skill is writing. You should be able to write a clear, readable report in English that informs the reader of your findings and conclusions. To this end, we are assigning this Measurement Project, due Tuesday, November 5. Your report should be about 2 pages long.

Topics

Please answer ONE of the following four general questions:

1. How tall is the tower portion of McLennan Physical Laboratories? [or another prominent Toronto building of your choice]
2. What is the coefficient of static friction between your shoes and a surface of your choice?
3. How fast do cars drive on St. George St.? [or another similar street of your choice]
4. How fast do human fingernails grow?

As part of your Motivation section, you should re-state the question so that it is more specific. Make sure that your final answer matches the question *you* are asking. If you would like to answer a question that is very different from any of the above four, please first obtain permission from either Jason Harlow or Brian Wilson, the Laboratory Coordinators.

Report Format

Your report should include a title, which clearly indicates which of the 4 questions you answered. You should include your name, student number, Course Name, your Laboratory P-Section and demonstrator name under the title. You should also list any “collaborators”, or friends who may have worked with you on taking the measurements. You should divide the main part of the report into 3-5 sections. Here are some possible suggested sections:

1. **Abstract** This should be one or two sentences at the very beginning summarizing the main conclusions of the report, including the final numerical result.
2. **Motivation** What is the question you are trying to answer exactly?
3. **Procedure** Please detail exactly what you did, what measuring devices you used, any relevant environmental conditions, problems you encountered or innovations you may have devised to perform your measurements. You may wish to include a short table, summary or sample of your original measurements.
4. **Analysis** Describe any mathematical procedures you used to go from the raw original measurements to the final results and errors.

5. Conclusions

The Measurement Project will, in part, be marked on writing style and on the organization and presentation of the material. Good English structure, spelling and grammar are expected, and graphs and diagrams should be clearly labelled.

Resources

The technologists for PHY151 are Phil Scolieri, Larry Avramidis and Lilian Leung. They all share an office in MP127. With their permission you may borrow metre sticks, stopwatches, measuring tape, Vernier callipers, thermometers, and the like from the Resource Centre in MP126. They can also make a digital scale available to you. If MP126 is not open you can knock on the door of MP127 during regular business hours M-F 9-12, 1-5.

Due Date, Procedures for Turning in Report.

The Measurement Project is due by 5:00 PM on Tuesday, November 5, 2013. It must be submitted into your Laboratory Demonstrator's drop-box in the basement of MP, downstairs from the bust of Newton. Your name, Student Number, Laboratory Section and demonstrator name must appear clearly on the front of your Measurement Project.

Late Measurement Projects will be penalized at the rate of 10% per business day of lateness. A fractional number of days will always be rounded *up* to the nearest integer, and the penalty will be applied as a percentage of the unpenalized mark. Measurement Projects with a lateness of more than 10 days will receive a zero.

Length Limit

The typed report should be approximately 2 pages long, corresponding to about 600 words.

The absolute maximum word limit for your report is 800 words (including title, abstract, table and figure captions), and the absolute maximum number of pages, including figures, tables, etc is three (3) letter-sized page sides **total**. Marks will be deducted if either of these length limits is exceeded.

Poster Option

The most common way to prepare the report is by using a word-processing program (such as Word) with a 12-pt Times New Roman font, into which you may insert figures, tables, etc. As an alternative, you may instead submit your Measurement Project as a poster. The poster should be 28" tall and 36" wide, and should not have any text on it smaller than 24-pt. There are several good programs for making posters, including Powerpoint, Macromedia Freehand, Adobe Illustrator, Adobe Photoshop and Adobe PageMaker.

You should NOT submit a poster in paper format. Instead, please attach the PDF file in an email to Jason Harlow at jharlow@physics.utoronto.ca by the deadline. You will receive an email confirmation that your report has been received. The very best posters submitted will be printed by the graphics department in Physics, and, with the author's permission, posted in the hall on the first floor of the North Wing of McLennan. Posters should include all the necessary information about your measurements and analysis, but should also be eye-catching, colourful and succinct.

Note on "Originality"

While your Procedure may include work you do with your friends (who should be listed as collaborators in your report), your Measurement Project should be primarily your individual work. You must perform the analysis and write the entire report yourself. For information on "how not to plagiarize", please see <http://www.writing.utoronto.ca/advice/using-sources/how-not-to-plagiarize> .