

Formal Lab Report
due by 5:00pm Mar. 11
in Drop Box # 44

Overview and Motivation

We hope that as part of your PHY151/152 education, you learn how to:

- take careful measurements with errors
- propagate errors when computing results based on measurements
- report your findings carefully and convincingly in a clear, readable report in English that informs the reader of your findings and conclusions.

Topic

You were given a conductive sheet of PASCO's PK-9025 Conductive Paper. The resistance between points on the paper is proportional to the distance between the points, and is approximately $5000 \Omega \text{ per cm}^{[1]}$. Upon the paper an electrode shape was drawn with a silver conductive ink pen. The resistance along a line of silver ink is proportional to the length of the line, and is between 4 and $8 \Omega \text{ per cm}$, depending on the thickness of the ink^[2]. Since the silver ink is so much more conductive than the paper, it acts as an effective conductor, and the surface of any shape is an equipotential. The paper surrounding silver shapes acts as an effective insulator, upon which you can probe a static electric field. You set up a DC voltage across the two parts of the electrode, and used a multimeter to measure the electric potential at various points on the conductive paper. Describe the electrode you were given, and discuss the electric potential map around your electrode, and the electric field at various interesting points on the conductive paper.

Please list the names of the partners you worked with to make your measurements. Each partner must choose a different electrode pattern upon which to base the formal report.

Report Format

Your report should include a title, and should clearly specify under the title your name, student number, Course Name, and your Laboratory P-Section (or list "Pilot" if you are in the Practicals Pilot). Below this you should list your lab partners. You should divide the main part of the report into 3-5 sections. Your mark will be based on four main parts of your report:

1. **Introduction/Overview** This introduces the lab, the theory behind electric potential and how it should be related to electric field near a conductor. What were your goals, and what was the shape of your electrode? You may include an abstract, but this is not required.
2. **Procedure** Please detail exactly what you did, what measuring devices you used, problems you encountered or innovations you may have devised to perform your measurements. In particular, how did you estimate the errors of your measurements of electric potential and position? You may wish to include a short table, summary or sample of your original measurements.

3. **Analysis** Describe any mathematical procedures you used to go from the raw original measurements to the final results and errors. You should relate your calculations back to the theory you introduced in the introduction.
4. **Conclusions.** What were your interesting results? Put your results into context based on what you presented in the introduction.

The Formal Report 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.

Due Date, Procedures for Turning in Report.

The Measurement Project is due by 5:00 PM on Tuesday, March 11, 2014. It must be submitted into drop-box #44 (Ellen Dyer) 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 3 pages long, corresponding to about 900 words.

The absolute maximum word limit for your report is 1200 words (including title, abstract, table and figure captions), and the absolute maximum number of pages, including figures, tables, appendices, etc is five (5) letter-sized page sides **total**. Marks will be deducted if either of these length limits is exceeded.

Note on “Originality”

While your Procedure may include work you do with your lab partners (who should be listed in the title of your report), your Formal Report 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> .

References

1. PASCO’s Field mapper paper manual, available online at:
http://www.pasco.com/file_downloads/product_manuals/Field-Mapper-Kit-Manual-2-PK-9023.pdf
2. PASCO’s Silver Conductive ink manual, available online at:
http://www.pasco.com/file_downloads/product_manuals/Special-Conductive-Ink-Pen-Manual-PK-9031B.pdf