# COMMUNITY COLLEGE OF PHILADELPHIA PHILADELPHIA, PENNSYSLVANIA

Experiment Number: <u>EM-1</u>

Title: \_\_\_\_\_Electric Field Mapping\_\_\_\_\_

Performed by: <u>Albert Alpha</u>

Partners:

\_\_Robert Beta\_\_ George Gamma

Physics Course:Physics	241
Lab Section No:002	
Lab Day/Hour: <u>Monday 1</u>	2:40 PM
Lab Instructor:Dr. Cat	tell
Date Performed:9/14/	15
Date Due: <u>9/21/</u>	15

### Purpose

Type the purpose here using your own words.

### Procedure

The Welch Electric Field Mapping apparatus was used to map the electric field between two electrodes. The apparatus consists of a rectangular wooden board with a voltage divider consisting of a set of ten resistors connected in series along one side of the board. The electrodes are painted on a sheet of conducting paper that is placed under two clamps on the board, where each clamp is connected to one side of the voltage divider. Each clamp also makes electrical contact with one electrode on the conducting paper. An AC voltage source is then connected across the clamps. One side of a pair of headphones was then connected to a point between a pair of resistors on the voltage divider; this connection set the reference potential. The other side of the headphones was connected to a probe that was placed in contact with the conducting paper. The hum of the AC voltage could be heard in the headphones if the probe was not at the reference potential. The probe was moved around the region between the two electrodes until a number of points were found where the hum disappeared (or became as faint as possible). All these points were at the same reference potential and defined an equipotential line (or curve) on the paper. Several such lines were found by changing the location of the reference potential on the voltage divider. These data were then transferred to graph paper where the electric field lines were drawn in such a way that they intersected the experimentally-determined equipotential lines at right angles. We were then able to verify the shape of the electric field between the two electrodes.

(Note: The above is a sample paragraph only. Use your own words when writing the procedure. However, the following sentence may be copied directly.)

The detailed procedure that was followed can be found in *Physics Laboratory Instructions*, Volume II, Community College of Philadelphia, John Wiley & Sons, 2008.

(Note: Any deviations to the procedure should be explained here. Explain what the deviations were and why you made them. Alternatively, you may briefly describe or summarize each of the steps you took. These may be summaries of the steps described in the laboratory manual, but do not copy them from the lab manual. Again, any deviations from the procedure given in the lab manual should be explained. Use your own words.)

(Note that the above two sections must be typed.)

### Data Sheet

0 Potential		+1 Potential		+ Pote	2 ntial	+ Pote	-3 ential	+4 Potential		
X	у	x	у	X	у	x	У	X	у	
cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	
8.5	6.0									
Sketch of electrode at +5 potential with pertinent dimensions and coordinates: $0.50 \text{ cm}$ (8.0 cm, 10.0 cm)										

(Note: Look for important instructions on the data sheet. Students lose points for leaving out the sketch shown above.)

Sketch is an example only. Data may not be valid for your apparatus.

Dago	2
Page	2

-1 Potential		-2 Potential			Pote	3 ntial	-4 Potential		
Х	У	Х	У		X	У	Х	У	
cm	cm	cm	cm		cm	cm	cm	cm	

Sketch of electrode at -5 potential with pertinent dimensions and coordinates:

(Note: Print data neatly. If you make a mistake draw a SINGLE LINE through the error and print the correct value above it. Have the laboratory instructor initial your data sheet before you leave the lab.)

# Graphs and Diagrams

(If any. See the next page.)



Star and

TADE

Any additional graphs would follow here. There are no more graphs for Experiment EM-1.

## Calculations

(Note: Calculations may be printed neatly by hand in ink. State which part of the experiment the calculation relates to and what you are calculating. Numbers must agree with what you have recorded on your data sheet. Answers should have the proper number of significant figures and include units If you wish to type this section you must use an equation editor to enter formulas. Your instructor can show you how to do this.)

(There are no calculations associated with Experiment EM-1.)

### **Answers to Questions**

1. What problem might occur if one should use a *large* test charge instead of a *small* test charge to measure an electric field?

Type your answer here.

2. Why are the electric field lines normal to the equipotential lines at points of intersection? (Use your owns words.)

Type your answer here.

(Note: This section must be typed. Formulas, diagrams and special symbols must be created on a computer. Your instructor can show you how to do this.)

### **Analysis and Discussion**

All paragraphs must be typed and double spaced. (Special symbols and formulas must be typed on the computer.) Discuss the accuracy of results obtained. Identify several possible sources of error. Discuss the experimental results in relation to accepted principles; were these theories verified by the experiment?

Besides the sources of error give a general discussion of the experiment. Was the purpose of the experiment achieved? Discuss parts of the experiment (if any) that were problematic or that you had difficulty with. Do you have any suggestions to improve the experiment, such as a modified procedure or different equipment? Also describe parts of the experiment (if any) that you liked or that you thought went better than you expected.

You may share advice with your classmates but the lab report you turn in must be your own work. Do not copy from someone else or let someone else copy from you.

#### LORD POLONIUS:

Neither a borrower nor a lender be;

For loan oft loses both itself and friend,

And borrowing dulls the edge of husbandry. -from Shakespeare's Hamlet