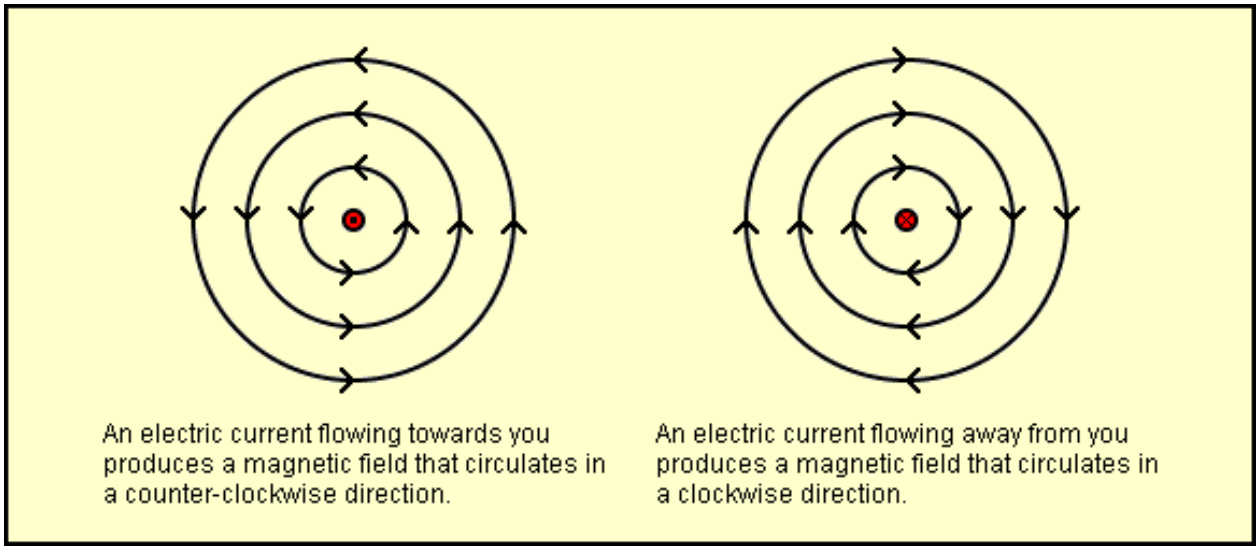
CCSA E&M workshop **name: _____**

the electromagnet experiment date: _____

Background information (from http://education.jlab.org/qa/electromagnet_is.html)

An electromagnet is a magnet that runs on electricity. Unlike a permanent magnet, the strength of an electromagnet can easily be changed by changing the amount of electric current that flows through it. The poles of an electromagnet can even be reversed by reversing the flow of electricity.

An electromagnet works because an electric current produces a magnetic field. The magnetic field produced by an electric current forms circles around the electric current, as shown in the diagram below:



day 1 objectives:

1) note 3-4 properties of the various bolts
2) use those properties to compare the different bolts, which we will be using during our next experiment
3) complete pre-lab questions
4) start your procedure

day 2 objectives:

1) finish your procedure
2) carry-out the experiment
3) record your data in a data table

day 3 objectives:

1) complete the post-lab analysis and questions
2) turn-in all notes, including all completed worksheets
3) and make sure your name is on everything!

day 1: pre-lab questions

property comparison table *(see property 1 for an example)*

bolts	**property 1:** materials	**property 2:**	**property 3:**	**property 4:**
1	brass			
2	stainless steel			
3	zinc-coated			

1) Summarize the differences and similarities between the 3 different bolts.

_____

_____

_____

_____

2) State the experimental question (in your own words). Use the background info. as a guide.

_____

_____

_____

3) State, **and** justify your hypothesis, and be sure to cite some properties (from #1) to support your hypothesis.

_____

_____

_____

_____

4) Describe your variables.

a) independent: _____

_____

b) dependent: _____

_____

c) controlled variable(s): _____

_____

_____

<u>Your procedure</u>

Write your proposed procedure, using the following materials (below). Also, be sure to mention what data you will be collecting and how.

1) brass bolt 2) stainless steel bolt 3) zinc-coated bolt 4) washers	5) paperclips 6) copper wire 7) D-cell batteries 8) battery holder

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Your procedure (continued...)

Draw a diagram of what the experiment will look like

the electromagnet experiment **name: _____**

<u>day 2: conduct your experiment</u>

Record your data in the table provided below.

bolt materials →	**brass**	**stainless steel**	**zinc-coated**
trial 1			
trial 2			
trial 3			
average			

day 2 observations: note any observations during your experiment (e.g., things that went wrong, things that could affect your data, etc.)

_____

_____

_____

_____

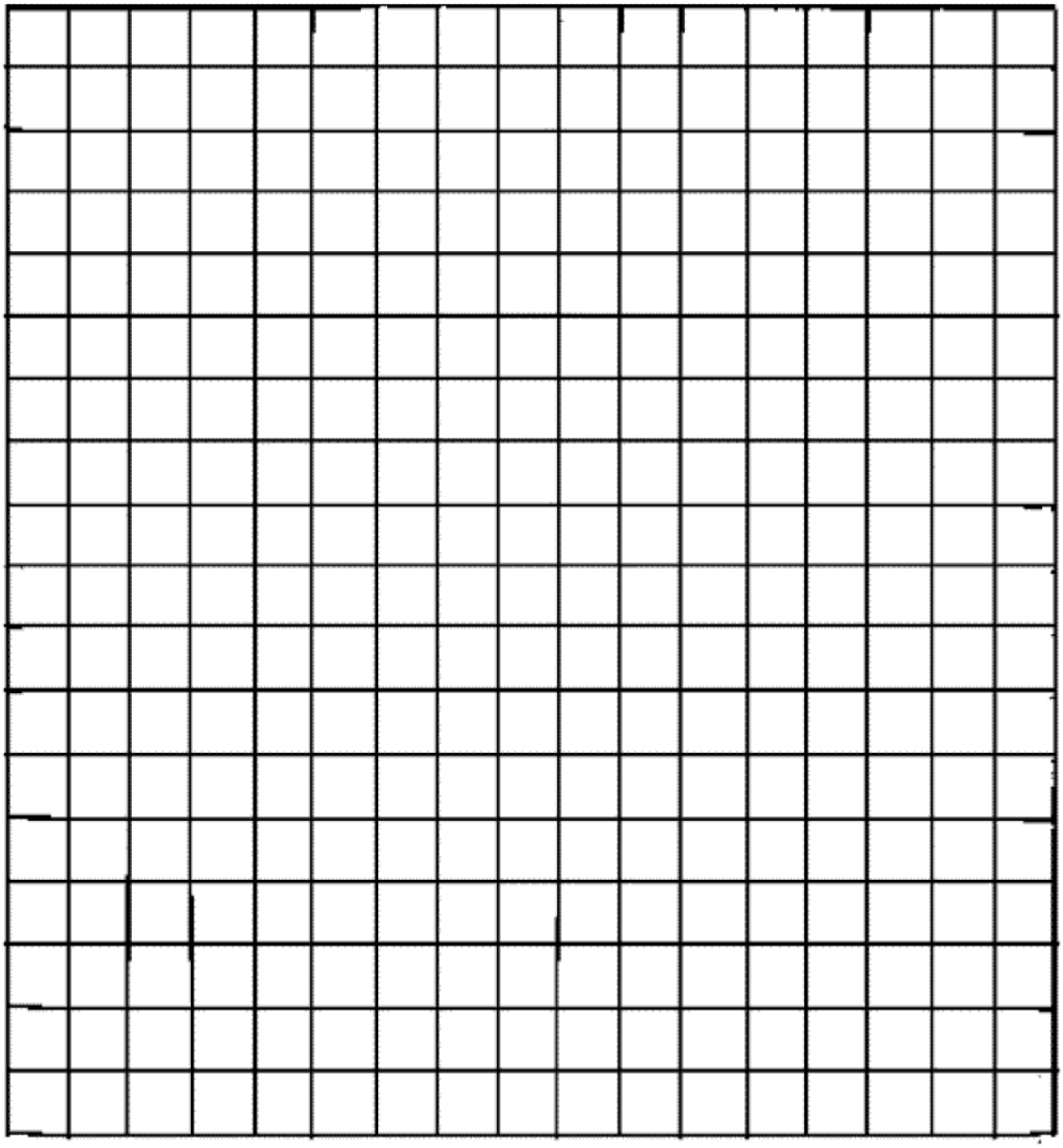
_____

5) Combine your data with that of your peers and record this in the table (below).

bolt materials →	**brass**	**stainless steel**	**zinc-coated**	
your findings				
group ___				
group ___				
group ___				
group ___				
group ___				
group ___				
averages				

day 3: summarize & analyze your results

6) Produce a bar graph to illustrate the class' results.



7) Using words and numbers summarize the class' results:

_____

_____

_____

_____

_____

8) Does the class data support or reject your hypothesis? Explain why, or why not.

_____

_____

_____

_____

9) Answer the experimental question (from #2 on pg. 2)

_____

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_____

10) Do you think that the class' findings are <u>valid</u>? Explain why, or why not.

_____

_____

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_____

_____

_____

11) Describe specifically what things are could have done differently to improve the experiment. Be sure to also explain how your proposed changes would actually improve the experiment.

12) Describe a “real-world” application of our experiment.