Transforming the Classroom into a Community of Researchers

Why not write lab reports in class for the same reason they are written in actual laboratories? Together, we will rethink how lab investigation is reported using the same technology as research scientists.

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What I saw
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What I saw

How it differed

What I changed

•Research groups collaborate and contribute to each other's knowledge and projects

•Lab groups do their own work and try to get the same correct results

•Change lab activities to include many variables, chosen by students, then share results

Making labs inter-collaborative

•Should have many variables

•Answer "what variables affect . . ." or
                "what makes a better . . ."

•No predictable outcome, genuine question

•Measurable, graphable data

•E.C. leads class to constructing a formula, relationship, or principle

Quantitative Physics Formal Lab Reports

This report should explain to other scientists who weren't in class exactly how to set up the experiment and what you found. There are four options for its completion - you must do each option once.

(1) A traditional formal lab write-up is typed and should include:

- Title of the lab and the date it was performed.
- The purpose of the lab - what question were you trying to answer, why did you do it?
- A list of materials used in the lab. Be specific: ~~string, paper~~, . . . 25 cm of nylon string, 2 pieces of construction paper, . . .
- The Procedure. This needs to be a list of numbered steps from which a scientist in another lab could exactly reproduce the experiment.
- Data - numbers and units of measurement. A graph from Excel needs to be in this section. All calculations go in this section.
- Conclusion. This is a summary of what you learned (NOT a summary of what you did!) This should be a paragraph long and should explain what was learned from this lab.

(2) A Power Point or other "slide show"-type presentation should consist of no more and no less than four slides:

- Title page with the author's name and the purpose or question posed in a short phrase or sentence.
- A VERY BRIEF procedure description with either a photograph of the group performing the lab or a computer-drawn diagram of the set-up.
- Results of the experiment including a graph from Excel.
- Conclusion, resources, acknowledgments, etc.

(3) A typed review of an articles or website with information about current scientific research related to the topic of the lab. This will be a written summary report, including:
- At least one source that is no older than six months.
- At least one graph, chart, diagram or picture from one of your sources, with an explanation (IF YOU DON'T UNDERSTAND WHAT IT MEANS, DON'T PUT IT IN THE REPORT).
- A connection in content material and/or purpose to the lab we did in class.

(4) A pass. Yup, you get one freebie. Turn in a note on the day the lab is due, stating that you're using your pass.

Something to keep in mind when you do lab write-ups:
       Be concise, don't use more words than are necessary.
       Call equipment by the same name every time you mention it.
       Graphs and diagrams are GREAT - be sure to label them.
       Don't forget: spelling and presentation count, please proofread
          your labs and edit them.

FORMAL LAB WRITE-UP GRADE SHEET

TYPED REPORT	your score	points possible
Title & Date lab was performed		2
Purpose statement		2
Materials, accurate and specific		3
Procedure, precise and reproducible steps		5
Data, labeled with table and a graph from Excel		8
Conclusion, what you learned, not a summary		5
Presentation: proofread, typed, final draft		5
TOTAL		30

POWER POINT PRESENTATION	your score	points possible
Title page: name, purpose, and title		6
Procedure page: brief, but complete, with diagram/picture		6
Results: results and graph from Excel		6
Conclusion: what you learned, not a summary		6
Presentation: proofread, typed, final draft		6
TOTAL		30

RESEARCH REPORT	your score	points possible
Related to lab topic and is really research		9
Sources listed, one within last 6 months		3
Informative and well-written summary		8
Chart, diagram or picture		5
Presentation: correct spelling, typed, etc.		4
TOTAL		30

PASS	your score	points possible
Note to teacher		30

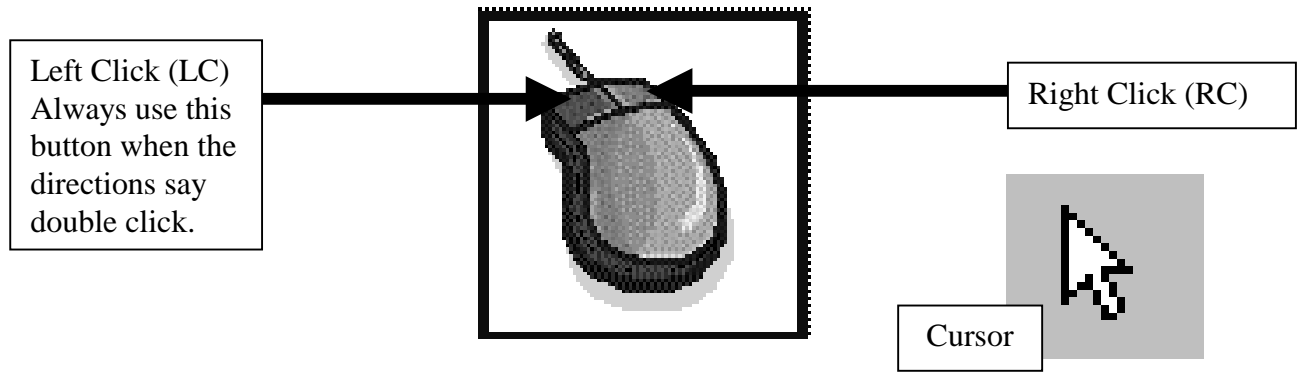# Making a Graph on Microsoft Excel

Microsoft Excel is called a spreadsheet, a series of rows (horizontal) and columns (vertical). The columns are labeled A, B, C, . . . and rows numbered 1, 2, 3, . . . You refer to one of the cells on the sheet by the letter of the column it's in and the number of the row it's in. You need to decide which of your data are the independent variables and which are the dependent variables.

	A	B	C	D	E	F	G
1							
2				"D2"			
3							

INSTRUCTIONS FOR ENTERING DATA:

1. Open Excel and you will see an empty worksheet – all the cells are empty.
2. In column A, enter the data from your lab that you want on the horizontal axis, one data point in each cell. Do not include units, just a number. Remember, the horizontal axis is the independent variable.
3. In column B, enter the data from your lab that you want on the vertical axis. This is the dependent variable.
4. Highlight all of these cells and click the chart wizard button at the top of the screen. It looks like a little bar graph with a magic wand on it. (Or you can go to the Insert menu and choose "Chart."
5. Depending on the version of Excel that you're using, you may be asked whether you want the graph to be on the worksheet or on a separate page; this is up to you.
6. The program will then ask you questions about the type of graph to make.
7. Most likely you are plotting a relationship of one variable's dependence on another's. If this is the case, choose XY Scatter as the type of graph and do not connect the dots.
8. In picking the specifics for your graph, don't forget to label the axes with the measurement (time, distance, pressure, etc.) *and* the units (seconds, meters, Pascals).
9. After the graph is done, you may change the size of it by clicking and dragging one of its corners or change other features by right-clicking or selecting it and returning to the Chart Wizard.
10. If you want this graph in a Word Document or Power Point Presentation, select the graph by clicking once on the middle of it, then go to the Edit menu and select Copy.
11. Open your other file and select Paste from the Edit menu. Your graph should appear wherever the cursor is. Save your file right away.

The Basics of PowerPoint

Left Click (LC) Always use this button when the directions say double click.

Right Click (RC)

Cursor

1. Double Click on the Microsoft PowerPoint icon in the middle of the screen.

2. You will now see a window that says:

   AutoContent wizard

   Template

   Blank presentation

   Choose Blank presentation, then press OK

3. Now you will see a window titled New Slide. You will see 12 choices, click on the far lower right corner and then press ok. (You should now have a white empty slide in front of you. ☺)

4. Adding text to a blank slide:

   Choose the text box button at the bottom of the page.

   Next take the cursor to the slide, LC, drag and release.

   Text box appears. Type your topic for today.
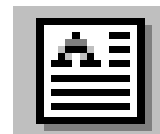
5. Changing text:

   There are several ways to change the size, font, or color if you want to.

   One of the ways is to go to Format at the top of the screen and scroll down to font and LC. Go ahead and pick the size, font and color you want to.

6. Adding WordArt to a slide:

LC on the _____ button. You will see the window entitled WordArt Gallery. Choose a pattern then press ok. You will see Edit WordArt Text window. Type your name.

7. Go to Insert at the top of page, scroll down to New Slide and LC. Choose the blank slide again and press ok. Inset new text, maybe today's date. You can choose either regular text or WordArt.

8. Now put the cursor into the text box on top on one of the letters and RC. Select Custom Animation. Select one option from Entry animation and sound where it says No Effect. Now choose a sound and a way to Introduce text. LC on Preview and then if everything is ok LC on ok.

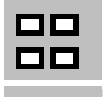**You now have two slides as part of your presentation.**

9. On the lower left slide there are several buttons:
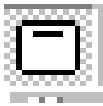
View individual slides Outline view- Overall organization of presentation

Slide Sorter View-Rearrange slides If you make notes for the audience, you use this option

View show

10. Click on the Slide Sorter View. Go to Insert at the top of page, scroll down to New Slide and LC. Choose the blank slide again and press ok. Double click on your new slide 3rd slide-it should now be in full view. Go to Format at the top of the page, scroll down to background and LC. Pull down on the small box under the example, LC on Fill Effects…, and explore Gradient, Texture, and Pattern tabs. Choose a background , press ok, then LC on Apply. If you click Apply to all this will be the background for every slide that you make.

11. Go back to your first slide by going to the Slide Sorter View button on the bottom left, LC, then double click on the first slide. Animate both sets of text similar to the way you did in step 8. While animating the second set of words, choose the

Animation order by clicking on the up and down arrows. You can decide which set of words you want to animate first. Press preview and if you are satisfied with the way it looks press ok.

12. Adding graphics:

Go to Insert at the top of page, scroll down to Picture, LC, and go to Clip Art. Choose which clip art you like, then press ok. You can resize your picture by LC and dragging the white boxes around the picture.

13. Now play around with the other buttons to become familiar with them. When you want to see what your slide show looks like, go to Slide Show at the top of the screen and scroll down to View Show. LC anywhere on the screen to go to the next slide or to see the next animation. In the middle of the presentation if you want to exit, RC, scroll to End Show and LC.

Web Evaluation Assignment   due _____

Write your answers in the space provided.

1. Find three web pages about either Brittany Spears, nuclear fusion, or Middle East peace talks (all three sites need to be about the same one). Write down their URLs and tell which one you think is most reliable, accurate and informative. Give evidence that you checked the 4 things from your reference sheet.

2. When you visit the FBI's homepage, there are pictures and names of the criminals on the "Top Ten Most Wanted" list. How do you know this is really the FBI's homepage?

3. What is one of the subjects you can investigate on the yuckiest site on the internet? Who created that page? Why is it there, what is the purpose?

Efficient Web Searching

"Search engine" - a computer program that looks at all web sites and
   matches up words or phrases, rather than looking for content.
  Hotbot,   Lycos,   Infoseek,   Excite,   Altavista

"Search index," "Subject directory" - made by humans who look at
   web pages and evaluate for relevance. Fewer matches found
   but usually more relevant ones.
         Yahoo!   Galaxy msn

"Meta search" or "Metacrawler" - uses many search engines at once.
        Dogpile   Metacrawler iSleuth savvysearch

"Plain English search engines" - a search engine which will accept
   questions or phrases typed in and give a list of related
   questions to which it has the answers.
        Ask Jeeves   The Electric Monk

Each search engine or browser has a "Help" or "Tips" page, so you can always go there to
find specific ways to refine a search. Here are some general tips.

- the first search word you use is considered the most important, so if you are using
  more than one search word, consider the order in which you type them.
- using two search words will often generate a list of sites with one of the words, with
  the other word *and* with both words. That's usually not what you want. To specify,
  you can use (+) and (-) signs, or you can put a phrase in quotation marks.
- the words AND and OR and NEAR (in all capital letters) are examples of what's
  called Boolean operators, named after an old mathematician. Think of it like a Venn
  diagram (remember those?)

ALMOST EVERY SEARCH ENGINE HAS A BUTTON THAT SAYS "ADVANCED
SEARCH." USE IT. IT HAS LOTS OF WAYS TO REFINE YOUR SEARCH AND
GET MORE SPECIFIC, MORE RELEVANT RESULTS.

Evaluating Information from the Internet

What a wonderful resource, because it's accessible to so many people in the world.
HOWEVER, there is a lot of junk out there, so criticize every page you come across.
Here are some questions to answer to see if the page is accurate and reliable enough to
use.

1. Check the URL (the address). Where did this page originate? What is its purpose?
   You can learn a lot from the domain section of the URL, here are the sources:

.edu   education, usually a university or college. Look out,
       though, it could be a college student with a lot of
       time on his or her hands, making bogus web pages
.org   an organization, could be biased, depending on the
       organization's purpose in making the web page
.gov   the US government agency
.com   these are used for commercial purposes, so it could
.net, .cc be an advertisement for a product or it could be a
       personal web page that someone paid for from an
       internet service provider
.uk   some examples (obviously, there are many more) of
.au, .fr other countries' domains. If you want to, you can
       search for only web pages from Australia or France.

Also, the word "members" in the URL usually means that it's a personal web page made by someone who got it free from a provider. A tilde (~) is usually also an indicator of a personal page. Personal doesn't necessarily mean wrong, but it means you should try harder to find the person's credentials because you have no idea who they could be.

2. Who *is* the author? Sometimes this is difficult to find. Just because you didn't find it, doesn't mean it's not valid. See if you can find out the credentials or profession of the person, or at least an email address, mailing address or phone number where you could contact that person if you had to ask a question. How do you know the author is an expert? He or she could be a fifth-grader.
3. Is there anything definitely wrong on the page? One error can give you reason to think that there may be more. Does the author list any sources or links to other pages that agree with the author? Is there anything left out or making you question?
4. Is the information on the page current? Look for a date when it was last updated and perhaps how often it if updated.

Sources I Used
1. Ackermann, Ernest and Karen Hartman, <u>Searching and Researching on the Internet and the World Wide Web</u>, 1998
2. Cooke, Alison, <u>Authoritative Guide to Evaluating Information on the Internet</u>
3. Wolinsky, Art <u>Locating and Evaluating Information on the Internet</u>

Sources Recommended
1. The Internet Public Library, access to full text magazines and newspapers, etc.
2. Guide to Search Engines. http://searchenginewatch.com
3. How to cite sources for a research paper. http://
4. Librarian's Index to the Internet, reliable websites reviewed by librarians. http://lii.org

Internet Searching Assignment due _____

Write the answers to the following in the space provided.

1. Olmstead Falls Middle School has a homepage on the WWW. Find out what is for lunch on Wednesday of this week.

2. Who are the two U.S. senators from Delaware?

3. What colors are in the Guinea Bissau flag?

4. Is Ganymede, a moon of Jupiter, the largest or smallest satellite in the solar system? What size is it?

5. What happens when you pour liquid oxygen all over a barbeque grill and then try to light it? Explain the method you used to find this answer.

6. What planets are visible in the night sky this week?

7. Find any page that has information about The Princess Bride, write down the URL and tell briefly what's on it.