

Lab #1

Introduction

I. LAB SAFETY

A. What and where is the **MSDS notebook**?

1. It's the notebook kept over by the sink
2. Material Safety Data Sheets provide information about the safe handling of the chemicals used in lab
 - i. Health hazards
 - ii. First aid measures
 - iii. Accidental release procedures
 - iv. Fire fighting methods
 - v. Protective equipment required during use of the chemical
 - vi. Safe handling and storage
 - vii. Ecological information
 - viii. Disposal information
3. Remember: assume any chemical is dangerous if you aren't sure to the contrary!
4. A good Internet search site for MSDS sheets if you're interested: <http://hazard.com/msds/index.php>



B. Safety issues

1. Protective equipment will be provided when needed
2. Dispose of dangerous waste properly (example - broken glass: don't put it in the regular trash can)
3. Eyewash and shower location (note their location)
4. First aid kit and fire extinguisher (in stockroom)
5. Clean-up your messes before leaving lab
6. Treat the microscopes gently and carefully
7. No eating or drinking in lab
8. Always ask the lab instructor or assistant about procedures if you are unsure

- C. If you're injured in any way during lab, tell your lab instructor immediately
- D. In the very unlikely event that the lab or building needs to be evacuated
1. Follow your lab instructor's instructions quickly and calmly.
 2. Assemble outside at the foot of the bridge over Mitchell Street if the building is being evacuated.

II. Exercises 1 & 2 – SCIENTIFIC METHOD

A. Components of the “method”

1. **Observations**
2. **Questions**
3. **Hypotheses**
 - i. proposed explanations for questions
 - ii. can be proved false, but can't be proved true
4. **Predictions**
 - i. A tentative answer to a question
 - ii. Results we expect if our hypothesis is true
 - iii. “Null” hypothesis vs. the experimental hypothesis
 - a. Null hypothesis predicts
 - i. No differences between groups
 - ii. Nothing unusual happened
 - iii. No effect from the change in variables
 - b. The opposite of the hypothesis of the experiment
5. **Experimentation** – two groups are treated the same except
 - i. Determining the variables
 - a. Independent variables – the variable that is being experimentally tested
 - b. Control variables – variables that could affect the outcome of the experiment and must be kept constant
 - c. Dependent variables – the variables that will be measured or observed
 - d. Typically only one independent variable is adjusted at a time, otherwise interpreting the results becomes difficult

- ii. Designing the procedure
 - a. Treatment levels are often based on previous research and observations and are administered to the treatment group
 - b. Developing proper controls
 - i. Control groups receive no treatment or standard levels of treatment
 - c. Replication is used to ensure that results are repeatable and correct

6. Conclusions

III. Exercise 4 - Presenting and analyzing experimental results

A. Tables and figures help interpret the results and enhance the clarity of their presentation

1. Tables

- i. Titles and captions occur above the tables
- ii. Useful when there is too much data to graph
- iii. Should only contain information that is important to the results

2. Figures

- i. Titles and captions occur below the figure
- ii. Presents results in an easily interpreted visual medium
- iii. Independent variable usually on the x-axis
- iv. Dependent variable usually on the y-axis
- v. Line graphs, bar graphs, pie charts, surface plots, etc

IV. INTERPRETING RESULTS

A. Often occurs as the experiment is occurring

B. Most easily performed using your graphs and tables after the experiment is over

V. COMMUNICATING RESULTS

A. Report writing (to be covered in future labs)

IN LAB TODAY WE WILL:

- I. Discuss lab safety
- II. Discuss the scientific method
- III. Briefly discuss analyzing, interpreting and communicating results

IV. Perform an experiment to solidify what we have learned about the scientific method

a. Exercise 3 (pg 11) Designing and Experiment

i. Cardiovascular fitness

1. dependent variable?

a. Pulse rate

b. Recovery time

2. independent variable?

a. Athletic training, smoking, overweight

3. controlled variable?

a. Height, age, gender

4. control group?

a. Absence of the independent variable being tested

5. treatment group?

a. Depends on the independent variable being tested

6. replication?

a. # of student tested