Unit 1: Experimental Design Review

Topics:
- Major Categories of Science
  - Pure vs. Applied Science
- Scientific Method
  - Research question
  - Experiments
  - Variables in an Experiment
    - Independent Variables
    - Dependent Variables
    - Controlled Variables
    - Control Group
  - Theories
  - Scientific Law
  - Inferences vs. Observations
- History of chemistry and Alchemy
- Graphs and Data
  - Data Table
  - Circle Graph
  - Bar Graph
  - Line Graph
- Elements of a good line graph

Vocab:

Science	Observation	Bias
Life Science	Inference	Model
Earth Science	Scientific Method	Alchemy
Physical Science	Qualitative	Transmutation
Pure Science	Quantitative	Scientific Theories
Applied Science	Hypothesis	Scientific Law
Organic Chemistry	Variable	Graph
Biochemistry	Independent Variables	Line (scatter plot)
Inorganic Chemistry	Dependent Variables	graph
Physical Chemistry	Controlled (Constant)	Bar graph
Investigations	^Variables	Circle (Pie chart) graph
^(experiments)	Control Group	

Practice Test:

1) Name and describe the 3 major categories of science and give an example of each:

	Name	Describe	Example
A			
B			
C			

2) Make a diagram and describe the 6 parts of the Scientific Method in order. (Include what happens if the hypothesis is supported or not)

3) Define in your own words observations (qualitative and quantitative) and inferences. Give examples of each.

4) What are variables?

5) What is the difference between a control group and a control variable?

6) Clearly define the difference between a variable and a control variable?

7) Why is the control group important?

8) What is a Peer Review and why is it important?

9) What is the best way to get rid of Bias in an experiment?

10) Where did alchemy get it's start? What are the two "big" things that they were after by studying alchemy?

11) List each type of graph and describe the strengths of each different type of Graph.

12) What are the 4 elements of a "good" line graph?

13) Answer with the following sets of graph below: What is the (i) type of graph, (ii) Independent Variable, and (iii) Dependent Variable in these Graphs:
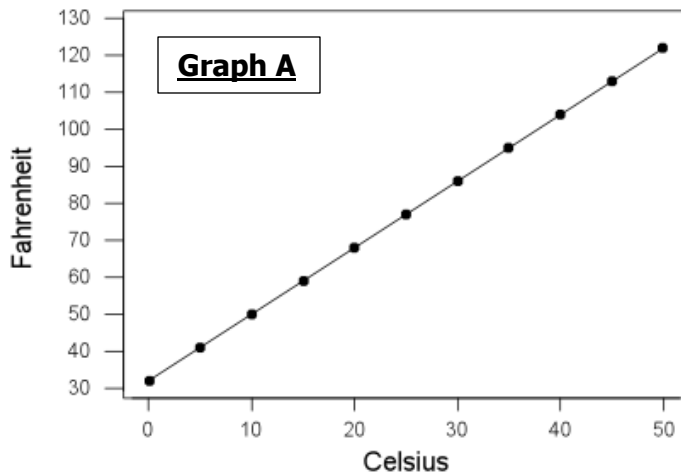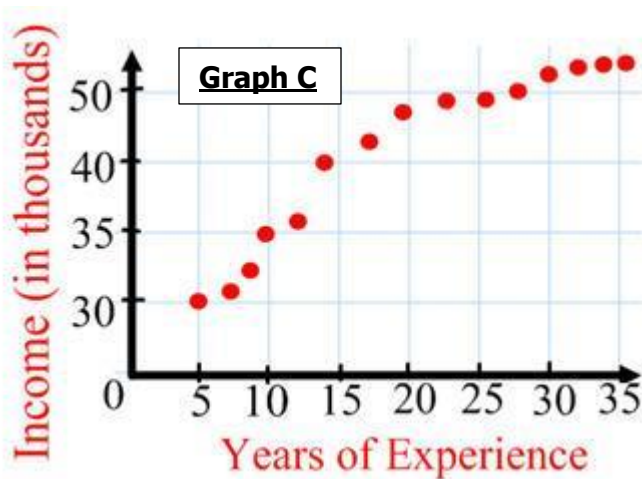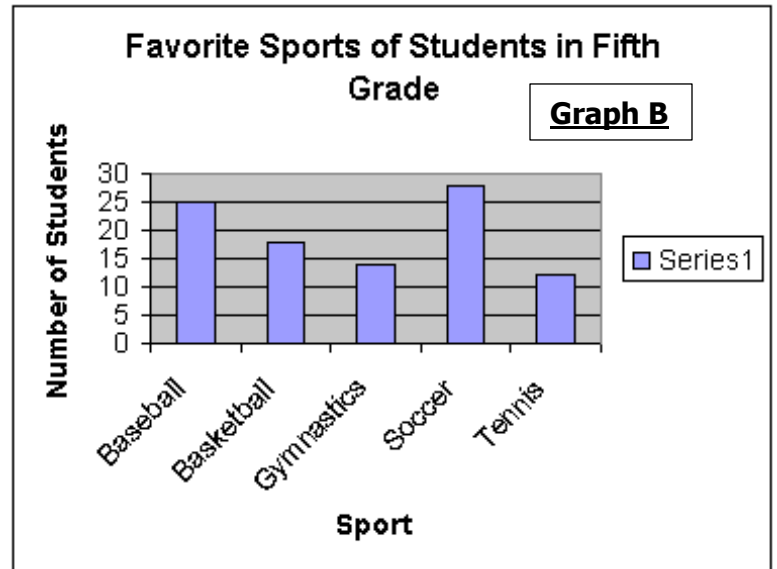

Graph A

i)

ii)

iii)

Graph B

i)

ii)

iii)

Favorite Sports of Students in Fifth Grade

Graph B

Graph C

i)

ii)

iii)

14) Answer with the following sets of graph below: What is the (i) type of graph **that should be used** with this data, (ii) Independent Variable, and (iii) Dependent Variable in these Graphs:

Data Table A

Water Temperatures at Various Depths	
Water Depth (meters)	Temperature (°C)
50	18
75	15
100	12
150	5
200	4

Data Table A

i)

ii)

iii)

Data Table B

i)

ii)

iii)

Data Table B

Months People Shop for Back-To-School Supplies	Percent
June	5%
July	20%
August	64%
September	9%
Other	2%

Source: International Communications Research for Capital One Financial

Data Table C

Favorite Vegetables		
	Boys	Girls
Broccoli	2	5
Carrots	6	7
Corn	10	8
Peas	8	5
Squash	5	6

Data Table C

i)

ii)

iii)

15) Write a "good" research question for each of the 3 data tables in question 14.

A.

B.

C.