LAB INFORMATION PACKET

PRE-Lab Assignment

USE BLACK OR BLUE PEN IN YOUR LAB NOTEBOOK. NO PENCIL or ERASABLE PEN!
You can use color to annotate, but the majority of the writing needs to be in black or blue pen.
Make a mistake? Cross out with a SINGLE line. NO WHITE OUT – EVER!

GENERAL GUIDELINES

- **Done in your Lab Notebook. Will physically turn in Lab Notebook and/or submit photos digitally.**
- Prelab due prior to the beginning of lab (data tables must be created as part of the prelab, will be filled out later).
- You may not participate in a lab without having it completed.
- The top of your lab handout will tell you which sections need to be completed each time.
- Do NOT do extra sections than what is asked for at the top of your lab handout.
- Sections must be done in the order listed here unless the lab handout says otherwise.
- Sections must be clearly labeled.
- Headers must be filled out at the top of each lab, and you must initial and circle your initials in the bottom right-hand corner of every page. The sticker in the front of your lab notebook shows you how to set up the headers.
- Will sometimes be graded for completion and/or accuracy. Not all completed sections will necessarily be graded every time, one section might be chosen, or all might be chosen for grading.
- Professionalism matters – If I can't read it, if it looks like you did it last minute walking to class, if it looks like you put no thought, effort, care, detail into your work, that will be reflected in your score.
- Must use adequate spacing between sections to keep your work clear and understandable. Do NOT try to save space. You have plenty of pages in your lab notebook. Clearly communicating your work matters more than saving a few pages in your lab notebook. Worst case, I get you a second lab notebook if you run out of space!

PURPOSE/GOAL/QUESTION OF THE EXPERIMENT

a. State the general chemistry principle being studied.
b. State any specific results to be obtained.

HYPOTHESIS

a. Must be done BEFORE the lab starts – we never come up with a hypothesis after we do the lab!
b. Must have the three required parts:
   - If _____ (*If I add fertilizer to the soil…)*
     - What are you physically doing in the lab. Be specific. Include chemicals that are being used. Include named techniques you are using.
   - Then _____ (…*then the tomato plants will grow taller than the plants without fertilizer…)*
     - What results do you expect to see/obtain? If you have been paying attention to the lessons in class this shouldn't be hard to predict! Our labs are demonstrating concepts we are learning!
   - Because _____ (…*because fertilizer has extra nutrients to promote growth than the control soil has.)*
     - Needs to be a scientific explanation. It is showing you understand what we have learned in class and which scientific principle/concept is the explanation for what you are seeing in lab!
c. These do not literally have to use the words if/then/because – you can use more sophisticated or varied verbiage if you would like.

PRE-LAB QUESTIONS/TASKS

a. Complete any listed pre-lab questions.
b. Number all questions.
c. Must show all work for calculations.
d. Do not recopy the question. Paraphrase it into your answers so a reader can infer what the question was.
e. Full sentence answers are not needed, but complete, detailed and Honors level answers are required!
f. Box any final numerical or short phrase like answers.

MATERIALS

a. List all needed chemicals, and equipment in a bullet list.
b. Yes this will match your lab handout – that is ok.
c. Make sure you include relevant concentrations, states of matter, etc.

REAGENTS TABLE

Name	Formula	Molecular Weight (g/mol)	Physical and Chemical Properties	First Aid Measures	Fire Measures	Accidental Release Measures
		SAMPLE – make yours as big as needed!				

a. Any chemicals with a * need to be included.
b. Provide the above info for the state (s, l, g, aq) that is being used in the lab. Sometimes there is different information based on if we are using the solid, liquid, gas form.
c. Note safety/cleanup points (if provided on MSDS – **BE DESCRIPTIVE!**)
d. We don't really use physical MSDS books anymore. This is my "go-to" MSDS site, but if there is a chemical not listed here then just Google "MSDS" and then the chemical name, look for a free site that has it.

SCAN ME

https://www.flinnsci.com/sds/

e. DO NOT squish your information into the table. DO NOT do this at the last minute. **SAFETY MATTERS!**

PROCEDURE

a. Rewrite the procedure in your own words and in FLOW CHART STYLE! A flow chart is a highly visual representation of information. It is not a bunch of sentences with boxes around them…
b. Do not copy directly from lab handout!
c. Full sentences not needed.
d. Do not combine steps. Keep the original numbering system in the lab handout. This is important in case we make changes to the lab, or if you need help you can tell me which step you are on.
e. Included drawings of lab setups when applicable. Label the drawings and equipment names.
f. Add reminders, equations, notes to yourself, etc.
g. The intention is to *think about* the steps by putting it in your own shortened and more visual version.
h. You should be able to do the lab with nothing but your notebook!

DATA TABLE SECTION

a. Setting up data table(s) BEFORE the lab starts is part of your pre-lab. The setup may be checked even though you won't be adding data until during the lab. Finished version checked with Post-Lab.
   - I will sometimes show you an example Data Table in the lab handout, but it is not always a finished table! You must always make sure your table is complete, has all the required parts, etc. You do not need to set your table up the same as my sample table necessarily.
b. Must include sections for QUANTATATIVE and QUALITATIVE data.
c. Make it large – does not have to be an entire page, but it needs to be sufficiently large.
d. Give tables a **descriptive** title. It should specifically mention any rxn(s) that is occurring as part of the title.
   - If I found your data table on the floor, I should know exactly which lab it is for.
   - Bad titles – Data Table, Lab Data, Temperatures taken, Taking temperatures of my reaction
   - Better titles – Effect of Concentration on Absorbance, pH of Common Household Substances, Temperature Change for the Reaction of $MgCl2 + 2Na(OH) \rightarrow Mg(OH)_2 + 2NaCl$
e. Must have labels and units in the headers of the columns/rows.
f. Data collection should reflect the significant figures that are appropriate for each piece of equipment you are using. Remember that our equipment is inherently limited in precision!
   - Always record data with the appropriate sig figs for **that** device! Some devices/equipment have more/less sig figs than others.
   - Final calculations will be limited by the smallest number of sig figs from the equipment. We worry about that when doing the calculations, not when recording our data.
g. Qualitative observations must be descriptive and detailed. It is not sufficient to say "it changed colors," or "it reacted." Qualitative data is as important as quantitative data!

This pre-lab assignment can change at teacher's discretion

ALWAYS read the top of the lab handout, the assignment instructions posted on Schoology and listen to your teacher's instructions!
Those supersede what is on this handout – this is a generic set of guidelines and expectations.
If in doubt – ASK! Ahead of the due date!

POST-Lab Assignment

USE BLACK OR BLUE PEN IN YOUR LAB NOTEBOOK. NO PENCIL or ERASABLE PEN!
You can use color to annotate, but the majority of the writing needs to be in black or blue pen.
Make a mistake? Cross out with a SINGLE line. NO WHITE OUT – EVER!

- **Will physically turn in your Lab Notebook and Two Pager handout and/or will submit photos of work digitally.**
- **Filling out data tables during lab, Calculations Section and Discussion Questions will be done in your Lab Notebook.**
- **The rest of the sections will be done on your "Post-Lab Two Pager" handout.**
- The top of your lab handout will tell you which sections need to be completed each time.
- Do NOT do extra sections than what is asked for at the top of your lab handout.
- Not all sections on the Two Pager will be relevant to each lab. One of the things you are being assessed on is whether you can accurately determine which sections are relevant to the lab!
    - If a section is not relevant you can leave it blank, put a slash or x through it, or write NA for "not applicable."
- Will sometimes be graded for completion and/or accuracy. Not all completed sections will necessarily be graded every time, one section might be chosen, or all might be chosen for grading.
- Professionalism matters – If I can't read it, if it looks like you did it last minute walking to class, if it looks like you put no thought, effort, care, detail into your work, that will be reflected in your score.
- You must use adequate spacing and handwriting size to keep your work clear and understandable. Do NOT try to save space. You can always staple on an extra piece of binder paper to the back of your Post-Lab Two Pager. Clearly communicating your work matters more than saving a few pieces of paper.
    - If you run out of space for a section and finish it on binder paper, make sure to tell me that on your Post-Lab Two Pager so I don't mark you down before seeing your binder paper!

POST-LAB NOTEBOOK WORK

DATA TABLES

a. You started your data tables in your prelab and then filled them out during the lab.
b. They get turned in with Post-Lab Notebook Work.
c. Will be looking for:
    - Descriptive title, all data recorded, labels and units where needed, data recorded with appropriate sig figs based on the equipment being used, detailed and descriptive qualitative observations, any notes if something went wrong during the lab, etc

CALCULATIONS

a. Not all labs will have calculations. However, if there are ANY calculations happening you need to show them.
b. Must show ANY calculation or manipulation of numbers done during and/or after the lab. If it is not a direct measurement there should be evidence of it in the calculation section.
c. Sometimes the results of calculations are also put into your data tables. You still need to show the calculations here!
d. Even "simple" calculations need to be shown. Includes adding, subtracting, metric conversions, averaging trials, etc.
e. If the lab handout listed specific calculations in a numbered list then make sure to number the calculations in your lab notebook to match the lab handout.
f. Make sure to give a short label of what you are calculation I know what the calculation is.
g. The "flow of work" must be clear – if I can't follow what you are doing, if it is just random numbers scribbled on the page then I can't/won't grade it. Professionalism and clearly communicating thoughts matters even for calculations!
h. Make sure you include units EVERYWHERE!

POST LAB DISCUSSION QUESTIONS

a. Number all questions.
b. Do <u>not</u> recopy the question. Paraphrase into your answers so a reader can infer what the question was.
c. Complete sentences not needed unless asked for. Complete thoughts and answers ARE needed!
d. If it involves a calculation make sure to show all work, use units, sig figs, label and/or describe what you are doing etc.
e. Answer with the level of thought and detail expected of your level of chemistry!

The Post-Lab Notebook Work should be done before you do your Two Pager.
It will help prepare you for the things that you will need to put on your Two Pager.

POST LAB TWO PAGER SECTIONS

LAB TITLE

a. I am fine if you use the same lab title that is on your lab handout.
b. If you make your own lab title it should still be specific.

TOPIC

a. Make sure you are telling me the topic not the chapter or subtopic.
   - Chapter = big broad category (*Thermochemistry)*
   - Topic = the concept the lab is covering (*Calorimetry)*
   - Subtopic = too specific, a fact or part of the topic (*Specific heat)*

KEY VOCAB TERMS

a. This should be a bullet list of all the key terms related to the topic, not just words you haven't heard before!
b. Just list them, you do not need to define them.

KEY EQUATIONS

a. This is where you tell me equations that will be relevant to the lab, not showing how you do your calculations.
b. Make sure you label the equation so people know what it is for. Example – Density D = m/V

KEY CONCEPTS EXPLAINED

a. Written in complete sentences.
b. This is sometimes called a "Background Paragraph."
c. It should be a summary of the topic the lab is about.
d. It should read like a very dense little textbook paragraph.
e. If I asked you to tell me everything you have learned about "Intermolecular Forces" you should pack it full of detail and specifics! I will be looking for specific key points.
f. You are NOT telling me the procedure of the lab. You should connect it to the lab at the end of your paragraph.

IMPORTANT OR UNIQUE LAB EQUIPMENT, SET UP, or NAMED LAB TECHNIQUES

a. You are NOT listing your materials section. You are NOT telling me the procedure.
b. You are showing me any special/new/unique equipment that is important to the lab, and describing any special techniques that will be used in the lab.
c. Label drawings, explain how special equipment works, how you do the named lab techniques etc
d. Examples – If you are using a digital balance to weigh an object before and after you do something to that object you would draw a picture of the balance and explain that you will be "weighing by difference"

SIG FIGS RELATED TO LAB EQUIPMENT

a. Report how many sig figs the each piece of lab equipment had and which one limited the sig figs in your calculations.
b. Example – Digital Balance = 5 SF, Graduated Cylinder = 4 SF, limited by graduated cylinder
c. Your calculations should reflect the appropriate number of sig figs based on the equipment used in lab.

YOUR EXPERIMENTAL RESULTS

a. List the final results you obtained.
   - You are NOT listing all your data or individual trials – we average trials together, we don't report every single one.
b. Include all relevant results. Often students will be testing multiple things and only report one of the results.
c. Clearly label what your results are and have units on them. Do NOT just put a number in the box.
d. Your experimental results may not always be numerical. That is fine! Depends on the lab.

ACCEPTED VALUE/RESULTS

a. What value/result should you have gotten? What is considered the "correct" answer?
b. This will either be given to you in the lab handout, during class, or you will look it up online.
c. It is fine if you didn't get this! Your experimental results don't always match the accepted ones - labs aren't perfect!

PERCENT ERROR AND/OR PERCENT YIELD CALCULATIONS

a. Sometimes we calculate Percent Errors, or Percent Yields, or describe in words what the error was, etc.
b. If it is a calculation (percent error, percent yield, etc) then make sure to show the calculation.
c. If it is not a calculation make sure you are being detailed in your written description.

POSSIBLE LAB ERRORS

a. This is one of the hardest and most important sections. Take it seriously!
b. Number the errors so that you can refer to them easily in the next box.
c. I will be looking for very specific key errors that are "big deals" to the lab. Yes, you have figure out what those are!
d. Do not ever say "human error" – that isn't a "thing!" Obviously we are humans, not aliens or cats.
e. ONLY say errors that did or may have reasonably happened. If you didn't knock over your beaker, or mix up your test tubes, of have Godzilla come break your scale, don't list those as error! Don't list all sorts of crazy things!
f. You are listing errors that are built into the way we did the lab or things that truly happened. Example – We did not maintain a constant temperature during the reaction, we did not specify how long to let the reaction stir for, we did not use real filter paper when filtering our product we just used coffee filters, etc.
g. If you list a source of error you should be able to brainstorm a way to fix it! Example – change lab procedure to specify how long to stir the rxn for, use better filter paper to trap more particles, etc. I can, and will ask you for your ideas!
h. If you really did make an error that is ok – as long as you tell me about it. If you forgot to heat your reaction like the procedure said then list that. But make sure you can tell me what affect that might have had on your final results. Example – reaction mixture was not heated, you should be able to tell me that means you will make less product if I ask you. AND you should be more careful next time!
    - If an error you make ever impacts your data to the point that it is useless - you will either get data from another group or use sample data that I provide. Talk to me and we will decide which is best based on which lab it is.

MATHEMATICAL IMPACT OF LAB ERRORS ON RESULTS

a. One of the other hardest and most important sections! Take it seriously!
b. For each error you listed in your Lab Error box you need to tell me what the impact on your results were.
    - Example: If Error #1 was that some of your solid product slipped under the filter paper then your Mathematical Impact box would say: Error #1 = Final yield of product will be lower than accepted.

WAY TO EXTEND OR IMPROVE THIS LAB

a. Think of a way to improve the lab procedure to help address one or more of your sources of error, or a way to extend the lab to test another substance/variable/aspect to further your learning.
b. Be specific! You can't just say something like "do another trial, "test a different compound" or "use better equipment."
c. Make sure to explain how/why this would be a good change or addition.

EXAMPLE TEST QUESTION ON THIS TOPIC

a. Brainstorm a question related to the lab topic that you think I might put on a quiz or a test.
b. You may NOT copy the question from a worksheet or the internet. Copying results in a zero. Do not try to play games and "paraphrase" it by changing one word…that counts as plagiarizing too! Actually think of your own question.
c. Write the Q out exactly as it would be on a quiz or test – if it needs data then make up fake numbers and include them.
d. Make sure your question shows sufficient depth and complexity so that I can tell that you have learned what is important from this chapter! Do NOT just say something like "tell me everything you know about intermolecular forces." Do NOT say something specific to the lab like "what was the molar mass of the unknown in the lab?"

SOLVED EXAMPLE TEST QUESTION ON THIS TOPIC

a. Show all your work and solve the question you came up with. If it is not a math question that is ok, but give a through and detailed answer with key terms/phrases etc.

The Post-Lab assignments can change at teacher's discretion

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Those supersede what is on this handout – this is a generic set of guidelines and expectations.
If in doubt – ASK! Ahead of the due date!

Make-up Lab Sheet for Missed Lab Assignment

You can print copies of this on the "Labs" tab of the class website. You have one day longer than you were gone to complete this assignment. Gone one day, then you get two days to complete. Gone two days, then you get three days. If you were present for the lab but did not participate then it is due the next day.

Name:
Period:
Seat #:

Write the name of the missed lab here: _____

Write the date that the lab was originally performed here: _____

Instructions: Interview at least three (3) students who were present for the lab activity and have them verbally answer the questions listed below. Take notes while discussing the lab and staple them to this paper. Please have your interviewees provide their names and signatures in the table below. Turn this paper into the absent basket. Also collect lab data from another student, record in your lab notebook as if you had been present for the lab. Finish the rest of the Post-Lab work as if you had been here.

Interviewee Name (Printed)	Their Period/Teacher	Signature

Now, YOU answer the following questions on this sheet:

1. What was the main idea that this lab activity was trying to demonstrate?

2. How did the lab activity demonstrate this idea (i.e., what did people do to find out the main idea?)

3. How does the information from questions 1 and 2 relate to what we are currently studying?

4. Identify at least one applicable (or use) for the information presented in the lab; that is, how could the information relate to you own personal use, an industrial use, or a societal application?

5. Write two test questions that would be fair to ask about this lab on a unit test or a quiz.

Dougherty Valley HS Chemistry
Post Lab Two Pager

Use binder paper if you need more space!

Worksheet #____B

Name: **Period:** **Seat#:**

Lab Title	**Topic**
Purpose/Question/Problem/Goal/Hypothesis	
Key Vocab Terms	**Key Equations**
Key Concept Explained	
Important or Unique Lab Equipment, Set Up, or Named Lab Techniques	**Sig Figs Related to Lab Equipment**
Your Experimental Results	**Accepted Value/Results**

Error Calculations/Reporting	
Possible Lab Errors	**Impact of Lab Errors on Results**
Way to Extend or Improve this Lab	
Example Test Question on this Topic	**Solved Example Test Question on this Topic**

Things to Turn In

- **Prelab –** Done in lab notebook, photos turned in on Schoology before the lab.
- **Post Lab –** Turned in after the lab. Photos turned in on Schoology. Due dates will be told to you in class.
  - **Page 1 –** Data Tables – Done in lab notebook.
  - **Page 2 –** Calculation Section – Done in lab notebook.
  - **Page 3 –** Post Lab Questions – Questions on lab sheet, answers done in lab notebook.
- **Post Lab Two Pager –** Done on this template, photos turned in on Schoology. Only do sections that are relevant to the lab.
- **Post Lab Quiz –** If done, will be on a pop lab quiz, or questions may appear on other pop quizzes, chapter quizzes or tests/finals.