

LAB/FIELD STUDY PROJECT GUIDELINES

Limnology

Your Lab Project will have three phases. Phase I helps you to lay the preliminary groundwork for your study. Phase II details your study's procedural plan. And, Phase III provides you with the opportunity to organize and analyze your results, as well as draw conclusions regarding your study.

I hope you thoroughly enjoy this opportunity to dig deeply into this scientific study of your choice! I look forward to helping you!

PHASE I

Below are the steps you must tackle in order to successfully complete Phase I. The preliminary work for these steps must be completed in your notebook. Final determinations and understandings should be typed into a Google doc for Steps 3-5. Your document should begin with a title. A full page must be dedicated to your title. The title must contain your independent and dependent variable (see steps/directions below). Also, use the following headers for each section: Background I, Background II, Background III, Problem, and Null Hypothesis. Here is a visual of what Phase I will look like. You may need to use more than three pages.

1	2	3
<p>Lab Title Your Name Course Title Thorp High School Due Date</p>	<p style="text-align: center;">Background I</p> <p>Write your paper here. Write your paper here. Write your paper here. Write your paper here.</p> <p>Write your paper here.</p> <p style="text-align: center;">Background II</p> <p>Write your paper here. Write your paper here. Write your paper here. Write your paper here.</p> <p>Write your paper here.</p> <p style="text-align: center;">Background III</p> <p>Write your paper here. Write your paper here. Write your paper here. Write your paper here.</p> <p>Write your paper here.</p> <p style="text-align: center;">Problem</p> <p>Write your paper here. Write your paper here.</p> <p style="text-align: center;">Null Hypothesis</p> <p>Write your paper here. Write your paper here.</p>	<p>paper here. Write your paper here. Write your paper here.</p> <p style="text-align: center;">Background III</p> <p>Write your paper here. Write your paper here. Write your paper here. Write your paper here.</p> <p>Write your paper here.</p> <p style="text-align: center;">Problem</p> <p>Write your paper here. Write your paper here.</p> <p style="text-align: center;">Null Hypothesis</p> <p>Write your paper here. Write your paper here.</p>

Step 1. Complete the 20/20 Vision Task

Begin by completing the 20/20 Vision Task. For this activity, you will make a table that includes two columns. The left column should have 20 Sensory and Intellectual Observations and the right should have 20 measurable I Wonder Statements.

Step 2. Choose a Topic of Interest

Evaluate your 20/20 Vision Table. Choose your most favorite observation or statement. This observation or statement will serve as the inspiration for your lab/field study.

Step 3. Conduct Background Research

There are three levels of background research you must conduct: Background I, II, and III. For each level, be as thorough as possible.

It is IMPORTANT that you cite any source (e.g., book, online, article, classroom, etc.) you use to help you in your background research. These sources must be reliable and accurate. Use APA format. Your Resources must be listed on the last page of your Google doc (see Phase III later in this guideline document).

- Parenthetical Citation
 - Paraphrased Idea
 - The normal adult resting heart rate ranges from 60 to 100 beats per minute (Laskowski, 2018).
 - According to Laskowski (2018), normal adult resting heart rate ranges from 60 to 100 beats per minute.
 - Direct Quote
 - “The normal resting heart rate for adults ranges from 60 to 100 beats per minute” (Laskowski, 2018, p. 1).
 - According to Laskowski (2018), “normal resting heart rate for adults ranges from 60 to 100 beats per minute” (p. 1).
- Reference List

Please see [Purdue University OWL](#) for citation help with all reference types (e.g., journal articles, books, online content, etc.).

 - Webpage or Online Content
 - Laskowski, E. R. (2018). Heart Rate: What’s Normal? – Mayo Clinic. Retrieved from <https://www.mayoclinic.org/healthy-lifestyle/fitness/expert-answers/heart-rate/faq-20057979>

Background I

- Determine and define key terms and concepts that are related to the topic of your lab study.
- Research your independent variable, or IV, which is the thing you are changing or manipulating. And, research your dependent variable, or DV, which is the thing you are testing or measuring. Discuss both. The IV is the variable that is changed in your experiment to test the effects on the DV. The DV gets its name because it “depends” on the IV. For example, if you are interested in how stress affects heart rate, your IV would be stress and your DV would be the heart rate. In other words, stress (IV) is changed in your experiment in order to test the affects on the heart rate (DV). You can then develop an experiment that directly manipulates stress levels in your subject and measure how those stress levels change heart rate.

Background II

- In this level, you must determine and discuss two other IVs that would affect your DV. These IVs should not be the IV you actually use in your experiment.

Background III

- In this level, you must make a prediction as to whether or not you will have a significant difference in your data. For example, do you think that the changes in stress will cause significant variation in heart rate or not.
- Be sure to give an explanation to support your prediction based on your Background I research.

Step 4. Create a Problem Statement

Research generally starts with a problem. Because of this, you will create a problem statement. It must be stated in a complete sentence, contain both your IV and DV, and start with the words: "The problem is determining _____." For example, "The problem is determining if increasing stress through physical activity will significantly increase heart rate."

Step 5. Write a Null Hypothesis




Because problem statements are simple questions that cannot be tested, you must now create a null hypothesis. The purpose of a null hypothesis is to provide an approximate description of the phenomena you are investigating. It will provide you with a rational statement that can be tested. To follow are some guidelines when creating one.

- The null hypothesis states the exact opposite of what you expect. In other words, it defines the statement that states that there is no actual relationship between your IV and DV.
- It should follow this template: There is no significant difference between _____ and _____ in terms of _____.
 - The first two blanks are your control and experimental groups.
 - The last blank should be what you are measuring.

For example, "There is no significant difference between those not subjected to stress through physical activity and those subjected to stress through physical activity in terms of heart rate."

PHASE I CHECK-LIST*Limnology*

Name: _____

Phase I Tasks	Quality		
	 It's Missing	 Please Revisit	 Good Start
<input type="checkbox"/> Completion of the 20/20 Vision Task			
<input type="checkbox"/> Completion of Thorough Background Research			
<input type="checkbox"/> Creation of a Problem Statement			
<input type="checkbox"/> Creation of a Null Hypothesis			
<input type="checkbox"/> Proper Listing and Citation of Resources			
<input type="checkbox"/> Proper Formatting of Phase I Paper			
<input type="checkbox"/> Proper Spelling and Grammar			

PHASE II

Below are the steps you must tackle in order to successfully complete Phase II. The preliminary work for these steps must be completed in your notebook. Final determinations and understandings should be typed into a Google doc for Steps 6-10. Use the following headers for each section: Procedure I, Procedure II, Results I, and Results II. Here is a visual of what Phase II will look like. You may need to use more than three pages.

4
Procedure I
<u>Independent Variable</u> : Add it here.
<u>Dependent Variable</u> : Add it here.
<u>Control Group</u> : Add it here.
<u>Experimental Group</u> : Add it here.
<u>Constants</u> : Add them here.
<u>Variables</u> : Add them here.
Procedure II
<u>Materials</u> : Add them here.
<u>Procedure</u> :
1. Add here.
2. Add here.

5
3. Add here.
4. Add here.
5. Add here.
a. Add here.
b. Add here.
c. Add here.
6. Add here.
7. Add here.
.
.
.
24. Add here.

6																												
Results I																												
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="5">Table 1. Table Title</th> </tr> <tr> <th>Label</th> <th>Label</th> <th>Label</th> <th>Label</th> <th>Label</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	Table 1. Table Title					Label	Label	Label	Label	Label																		
Table 1. Table Title																												
Label	Label	Label	Label	Label																								
Results II																												
<table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <caption>Data for Figure 1: Resting Heart Rate vs Average Step Count</caption> <thead> <tr> <th>Average Step Count Per Day</th> <th>Low Intensity (bpm)</th> <th>High Intensity (bpm)</th> <th>Medium Intensity (bpm)</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>80</td> <td>80</td> <td>80</td> </tr> <tr> <td>2000</td> <td>78</td> <td>78</td> <td>78</td> </tr> <tr> <td>4000</td> <td>76</td> <td>75</td> <td>75</td> </tr> <tr> <td>6000</td> <td>75</td> <td>74</td> <td>74</td> </tr> <tr> <td>8000</td> <td>75</td> <td>73</td> <td>73</td> </tr> <tr> <td>10000</td> <td>76</td> <td>72</td> <td>72</td> </tr> </tbody> </table>	Average Step Count Per Day	Low Intensity (bpm)	High Intensity (bpm)	Medium Intensity (bpm)	0	80	80	80	2000	78	78	78	4000	76	75	75	6000	75	74	74	8000	75	73	73	10000	76	72	72
Average Step Count Per Day	Low Intensity (bpm)	High Intensity (bpm)	Medium Intensity (bpm)																									
0	80	80	80																									
2000	78	78	78																									
4000	76	75	75																									
6000	75	74	74																									
8000	75	73	73																									
10000	76	72	72																									
Figure 1. Graph Title																												

Step 6. Complete Procedure I

This pre-procedure requirement allows you to make sure that you properly identify what is going to be addressed in your experiment. Be sure to identify each of the following in your notebook. Later you must add them to your formal lab report that you started as a Google doc.

- Independent Variable (IV). This is the thing that you are changing or manipulated in your experiment.
- Dependent Variable (DV). This is the thing you are measuring in your experiment.
- Control Group. This is the group that is not receiving the change. It is what is considered normal.
- Experimental Group. This is the group that is receiving the change. It is not under normal conditions.
- Constants. These are the things that remain the same between your control group and experimental group. You should have several controls in your experiment.
- Variables. These are the things that do not remain the same between your control group and experimental group. You should have very few in your experiment.

Step 7. Design Your Lab/Field Study Procedure

Plan your procedure in your notebook first. Before you begin your lab/field study, your procedure must be approved by me.

Step 8. Conduct Your Experiment and Report Your Procedure II

As you follow your procedure to conduct your experiment, make any additions or changes to the procedure outlined in your notebook. Once your experiment is complete and you have collected your data, you should type your final procedure into your final lab/field study report. Again, make sure that you record a complete description of what you actually did in your experiment. You must discuss materials used, procedures followed, and any safety precautions you took. This section of your final lab/field study report should be written in a way so that any person could repeat your experiment. Relevant pictures of your lab set up should also be included.

Step 9. Compile and Report Your Results I

This is the section where you will organize the data you collected into a table. Make sure that your table includes the following parts:

- a title that contains both the IV and the DV located at the top of the table and
- columns and/or rows that are properly labeled with units when necessary.




Step 10. Compile and Report Your Results II

In this section, you will graph your evidence. The correct type of graph should be based on your data collected. The parts of a proper graph should include:

- a title with both the IV and DV located at the bottom of the graph,
- the IV on the x-axis and labeled with proper units,
- the DV on the y-axis and labeled with proper units, and
- a key or legend.

PHASE II CHECK-LIST*Limnology*

Name: _____

Phase II Tasks	Quality		
	 It's Missing	 Please Revisit	 Good Start
<input type="checkbox"/> Completion of Procedure I			
<input type="checkbox"/> Procedure Approved by Instructor			
<input type="checkbox"/> Completion of Procedure II			
<input type="checkbox"/> Completion of Results I			
<input type="checkbox"/> Completion of Results II			
<input type="checkbox"/> Proper Formatting of Phase II Paper			
<input type="checkbox"/> Proper Spelling and Grammar			

PHASE III

Below are the steps you must tackle in order to successfully complete Phase III. The preliminary work for these steps must be completed in your notebook. Final determinations and understandings should be typed into a Google doc for Steps 11-14. Use the following headers for each section: Analysis, Conclusion I, Conclusion II, and Conclusion III. Here is a visual of what Phase III will look like. You may need to use more than two pages. Also, please do not forget to include your resources on the final page of your report.

7
Analysis
Write your paper here. Write your paper here. Write your paper here.
Write your paper here.
Write your paper here. Write your paper here. Write your paper here.
Write your paper here.
Conclusion I
Write your paper here.
Conclusion II
Write your paper here. Write your paper here. Write your paper here.

8
Write your paper here. Write your paper here.
Write your paper here. Write your paper here. Write your paper here. Write your paper here.
Conclusion III
Write your paper here. Write your paper here. Write your paper here. Write your paper here.

9
Resources
Author Last Name and First Initial(s). (Date). Resource Title. Etc.
Author Last Name and First Initial(s). (Date). Resource Title. Etc.

Step 11. Complete Your Analysis

In this section, you will state ten facts about your data. You must also include three errors that did or could have occurred while collecting your data.

Step 12. Complete Conclusion I

Write a one-sentence statement that tells whether or not you agree or disagree with your null hypothesis.

Step 13. Complete Conclusion II

Now, write an explanation as to whether or not your conclusion agrees or disagrees with what is known in science. Reasoning should be supported by the research you collected as part of your experiment. Also, make sure your explanation is based on what you know and have researched about your IV and DV.

Step 14. Complete Conclusion III

Finally, state three things you would do differently if you were to do your experiment over again. You may not use the following: need more time, collect more data, or make it easier.

LAB/FIELD STUDY PROJECT PACING GUIDE

DATE

GOAL

JANUARY

Monday, 1/28/2019 *No School, Weather*

FEBRUARY

Monday, 2/4 *No School, Weather*

Monday, 2/11 **Complete PHASE 1 STEP 1**

Monday, 2/18 **Complete PHASE 1 STEP 2, Start STEP 3**

Monday, 2/25 *No School, Weather*

MARCH

Monday, 3/4 *No School, Spring Break*

Monday, 3/11 **Complete PHASE 1 STEPS 3-5**

Monday, 3/18 **Complete PHASE 2 STEPS 6-7**

Friday, 3/22 Instructor Review, Graded

Monday, 3/25 **Start PHASE 2 STEP 8**

APRIL

Monday, 4/1 **Start PHASE 2 STEP 8**

Monday, 4/8 **Complete PHASE 2 STEP 8 and Start PHASE 2 STEPS 9-10**

Thursday, 4/18 **Complete Rest of PHASE 2 STEPS 9-10**

Monday, 4/22 **Complete Rest of PHASE 2 STEPS 9-10**

Monday, 4/29 **Work On PHASE 3**

Friday, 5/3 First Peer/Instructor Review of PHASE 1 & 2, Graded

Monday, 5/6 **Work On PHASE 3**

MAY

Monday, 5/13 **SUBMIT FINAL PROJECT**