**Stream Ecology Research Project**

**Guidelines and Rubric**

**Directions:** You will work with a partner or two to complete a research project which will investigate important concepts of stream ecology. You will utilize the information learned from the PowerPoint presentation and your own research to design, implement, analyze, and present your research project. Follow the guidelines below to successfully carry out your research, and be sure to include all aspects described in the rubric.

**Objective:** To utilize a learned understanding of stream ecology and macroinvertebrate biology to investigate the effects of habitat preference, possibly due to available nutrients and dissolved oxygen, on macroinvertebrate species diversity and abundance in Hereford High School’s stream.

**Materials available:** (you may choose to use any or all of these materials for your project)

- Leaves from trees surrounding our stream- (Ash, Beech, or Sycamore)
- Mesh bags (for leaf litter bags) – LaMotte 5882-LPB
- Fishing line (to attach mesh bags to rocks in the stream)
- Flashcards or Key to identify macroinvertebrates
  - LaMotte 5882-SA1 (best) or LaMotte 5946
  - Family Level Key to Stream Invertebrates of Maryland and Surrounding Areas
- Petri Dishes or Ice cube trays (for separating invertebrates)
- Medium-large sized plastic bins for separating crayfish and amphibians
- Large bucket (for initial removal of the mesh bag from the stream)
- Magnifying glasses or MacroLens (LaMotte 5508) (for identifying invertebrates)
- 80% Ethanol (for preserving invertebrate specimens for further investigation in the lab)
- Stereomicroscope
- Live-Insect Forceps
- Metal/mesh strainer
Procedure:

You will design your own procedure below, and identify and list your variables, but use the below checklist to be sure to:

   ____ Use the class’ objective to develop your research question
   ____ Your hypothesis should address your research question
   ____ Your procedure should yield results which address your hypothesis
   ____ Your conclusion should address your hypothesis

**Keep in mind we are evaluating habitat preference, which means some groups should choose different habitat types of the stream (pools, riffles, runs) to place their mesh bags, but different groups may use various types of leaves. Also, remember the mesh bags must remain in the stream for at least 3 weeks to collect macroinvertebrates, but they should be checked periodically.

Research Question:

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

Hypothesis:

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
Procedure:

1) _____________________________________________________________

2) _____________________________________________________________

3) _____________________________________________________________

4) _____________________________________________________________

5) _____________________________________________________________

6) _____________________________________________________________

7) _____________________________________________________________

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10) _____________________________________________________________

11) _____________________________________________________________

12) _____________________________________________________________

13) _____________________________________________________________

14) _____________________________________________________________

15) _____________________________________________________________
**Experiment Design – Variables Identification:**

Independent Variable - 

Dependent Variable(s) - 

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Constants - 

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**Results – Data Analysis:**

_____ Create a data table(s) and graph(s) to represent your data using Microsoft Excel

_____ Prepare concise handouts to share your data with all other groups

_____ Consolidate all groups’ data to address your hypothesis (independently or with your group)

_____ Summarize the results from the entire class
**Conclusion - Discussion:** (you may work with your group members during class to brainstorm and discuss the criteria listed below, but your Discussion should be independently written and included in your paper)

- Explain how these results address your hypothesis (which should address your research question, which should address the class’ objective)
- Make inferences about how these results indicate habitat preference
  - How the preferred habitat(s) relate to available nutrients and dissolved oxygen
  - How do the results relate to other aspects of stream ecology, ecology, science, humans impact on streams, or invertebrates impacts on humans
- Discuss any problems encountered during this experiment, and recommendations for future repeats of similar experiments
- Discuss and suggest future studies to further investigate stream ecology and macroinvertebrates
  - Consider other variables which may be interesting to investigate, such as food type, seasonal differences, and other aspects of habitat preference

**Lab Report Paper:**

You will have one week following completion of data analysis to write your final paper. Use the General Guidelines for Writing Biology Lab Reports to ensure you successfully include everything which should be in your paper.
Scoring Rubric - Stream Ecology Research Project

____ Macroinvertebrate and Stream Ecology Webquest Worksheet (25 points)

____ Guidelines Packet Completion (50 total points)
   ____ Research Question (10 points)
   ____ Hypothesis (10 points)
   ____ Procedure (10 points)
   ____ Experimental Design (10 points)
   ____ Results/Data Analysis Checklist and Sharing Data (5 points)
   ____ Conclusion/Discussion Checklist (5 points)

____ Lab Report Paper (75 total points)
   ____ Title (5 points)
   ____ Abstract (10 points)
   ____ Introduction (10 points)
   ____ Materials and Method (10 points)
   ____ Results (15 points)
   ____ Discussion (15 points)
   ____ Acknowledgements (5 points)
   ____ References (5 points)

____ Total points earned (150 possible points) = ____%