**Scientific Investigation:** A multifaceted and organized scientific study of the natural world that involves making observations; asking questions; gathering information through planned study in the field, laboratory, or research setting; and using tools to gather data that is analyzed to find patterns and is subsequently communicated.

**Purpose or question:** identify the question(s) that is to be answered by this scientific investigation or the purpose of the scientific investigation.

**Hypothesis:** a tentative, explanation for what you observe. This explanation must be testable. This usually takes the form of a statement that indicates a causal or correlational relationship between variables.

**Experimental design:** how you will go about testing your hypothesis. Most often, the main purpose of your design is to test the effect of the manipulated variable on the responding variable.

**Variable:** Any changed or changing factor used to test a hypothesis or prediction in an investigation that could affect the result.

**Responding (dependent) variable:** the variable you are measuring (what you count or record in your data table).

**Manipulated (changed/independent) variable:** the variable that you vary (manipulate) during the experiment. It is the variable that you think will affect the responding (dependent) variable.

**Treatments:** appropriate levels (values) that you assign to the independent variable.

**Control:** a treatment where the manipulated variable is held at an established level or eliminated. The control or controlled treatment serves as a standard that allows the investigator to decide whether the predicted effect is really due to the manipulated variable.

**Controlled variable(s):** all manipulated variables other than the one being studied that are to be held constant. **Not** to be confused with the control (controlled treatment).

**Procedure (method):** the stepwise method, or sequence of steps, to be performed in the experiment. It should be recorded in a laboratory notebook before initiating the experiment, and any exception or modification should be noted during the experiment. The procedures may be designed from research published in scientific journals, through collaboration with colleagues in the lab, or by the means of one’s own novel and creative ideas. The process of outlining the procedure includes determining control treatments, levels of treatments and number of replications.

**Trials:** Repetitions of data collection protocols in an investigation**.** Synonym: replicates.

**Prediction:** the expected outcome of your experiment. In other words, this is your “educated guess”. Your prediction must be based on your hypothesis to be valid. This is set up in an “if 🡪 then” format.

**Student directed investigation for biology**

**therefore…**

**and/but…**

**then…**

**and…….**

**If……**

**Purpose or Question Investigated**

**ControllED Variable(s)**

 **(identify at least 3)**

**Hypothesis**

**Responding Variable**

**Manipulated Variable**

**Procedure and materials**

**On the back of this page**

**Levels of Treatment? Control?**

**Experimental design**

 **Predicted Result of Experiment**

**Observed Result of Experiment**

**Conclusion and Discussion**

**# of Replicates?**

 = pre lab flowchart

Student Directed Investigation Plan-

1 copy per student (stamped) and 1 copy submitted to teacher

Name of investigation team members:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Per:\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

If four people (max) are in your research group how will you increase the scale this investigation to accommodate a larger group so all will participate directly and equally?

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List of Materials needed (be specific):

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Procedure:

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What are some of the biological concepts and processes you will need to know to conduct this investigation?

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What are some of the challenges you foresee for carrying out this investigation?

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List of Materials needed (be specific):

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What safety concerns are there for this investigation and what precautions will be taken to ensure that the investigation will be carried out safely by all members?

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Animals involved in an investigation need to be treated humanely. If using live animals what precautions will be carried out to insure that the animal subjects will be treated humanely?

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Group member’s signature

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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 Teacher's stamp for project review\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Student directed investigation in biology- Semester 1

Introduction:

This student directed investigation provides an opportunity for you, the investigator to plan, develop, carry out and present a scientific investigation of your choosing. The investigation must be appropriate and safe for consideration. The investigation needs to relate to the field of biology. The weight of this project is equivalent to that of a major exam (approximately 100 points). A timeline is attached for this project is attached.

Directions: You will produce a 3 part project. (Your project must be submitted in the order featured below with a cover page containing your projects title, topic, group member's names and period number).

Part 1

Part 1 is a scientific report that demonstrates s research skills and a thorough knowledge of information that surrounds your group's topic. This essay is a succinct, salient and complete summery of what you have learned.

Format: This report must be at least 500 words but NO MORE THAN 2 type written pages. Pages beyond 2 will not be read. These pages must be 1.5 spacing, size 12 "times new roman" font.

Part 2

Part 2 is an annotated bibliography. You must include a MINIMUM of 5 sources. At least 2 sources must be a. peer reviewed scientific journal article. Wikipedia may not be used.

Format: The annotated bibliography must be 1.5 spacing, size 12 "times new roman" font using MLA formatting.

Part 3

Part 3 is a self directed lab exploring your topic. You will produce a full FDQ lab report (all sections NO OMITS). You must create a minimum of 3 quality interpretations questions that demonstrate a solid understanding of your lab results. Be sure to explain all of the critical information revealed by your research and the relevant inferences.

The investigation team size is three or less. You may only have a larger group if you can justify the necessity of it as it pertains to your experiment

NOTE: Up to 5% extra credit is available for original and creatively displayed work (this extra credit is for higher level work only and all the science and lab technique must already be at a quality level to receive extra credit)