**[Investigation Design Diagram](http://www.longwood.edu/cleanva/images/sec6.designexperiment.pdf) Title and date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Planning Draft** **Names of investigators: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| **Problem, or research question:** Written as a question.**The effect of …………**  *E.g. The effect of the* ***concentration of an acid solution*** *on* ***the pH of a solution.*** **Hypothesis:**A short statement, making a prediction about how one variable affects another variable, that is the relationship between the variables… As the independent variable **increases** the dependent **variable \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**   *E.g. As the concentration of an acid solution* ***increases*** *the pH of the solution* ***increases.*** **Variables and how they will be measured****Independent variable**: state the values of the variables to be measured and which value will be **the control value.** *E.g. concentration of an acid solution*  *0.1M, 0.2M, 0.4M, 0.5M*  *the control will be 0.1M* **Dependent variable**: State how it will be measured, and theunits it will be measured in *E.g. Use a pH meter, or Universal indicator and colour chart to record the pH value* **Controlled variables**. (Note how you kept these the same.) *E.g.*   1. *The type of acid, ethanoic acid, CH3COOH* 2. *The volumes of acid used, 5mL* 3. *Clean test tube/dimple tray, with distilled water after each test.* 4. *The number of drops of indicator used* | **Problem:****Hypothesis:****Variables and how they will be measured****Independent variable:** **Dependent variable** **Controlled variables.** |

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| **Materials:** List of materials written with quantities of apparatus and quantities and units of chemical so that the laboratory technicians know exactly what it is you are doing.*E.g. 1 dimple tray, ….* *1 dropper bottle each of CH3COOH in the following concentrations, 0.1M, 0.2M, 0.4M, 0.5M*  **Safety considerations:**  Consider how to behave in a responsible manner and the safety equipment needed.  *E.g. Wear safety glasses*  *Wash affected area if splashes occur* **Method:** Listed in steps so that anyone else couldrepeat your experiment exactly.*Set up apparatus and reagents*  1. *Accurately measure out 5mL of…* 2. *Perform…* 3. *Return apparatus….* 4. *Clean up…*  **Diagram:** Use a ruler and pencil. | **Materials:****Safety considerations:****Method:****Diagram:** |

**Investigation Conducting and Evaluation Title and date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Results and Conclusion Draft**  **Names of investigators: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| **Results**:  Refer to the *Table* in the text of the **Report.** ***Table 1*: TITLE**  |  |  |  |  |  | | --- | --- | --- | --- | --- | | Independent variable  (units) | Dependent variable (units) | | | | | Trial  1 | Trial 2 | Trial  3 | Average | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  |   Do as many trials as is practicable. **Graph:** What type of graph will you draw and why?Plot the **average** results against the independent variable Dependent variable  (units)  Independent variable  (units)   ***Figure 1:* TITLE – relates the two variables** | **Results**: ***Table 1*: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  | | | | | Trial  1 | Trial 2 | Trial  3 | Average | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  |   **Sketch of Graph** |

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| **Conclusion**:  Refer to the graph, *Figure* ? and   * Describe what your results show. * Describe any patterns or trends (relationships) in the data. * Discuss proportionality of the data. * Explain, using science ideas why the relationship was observed.   Consider how this concept could be applied.  Consider further research to extend this topic.  **Evaluation of investigation design:**   * State whether the hypothesis was supported or   not.   * Describe the difficulties you had in measuring the variables accurately. * How reliable were your results?   + - * + Explain why three trials were performed.         + Explain why averages were calculated.         + Explain if the sample sizes were large enough.         + Describe and explain any significant difference between the results.         + Describe what was done to control the other variables. * Use scientific language and concepts to describe what was learned from this investigation.  **Bibliography** | **Conclusion**:  **Evaluation of the method:** |

# NOTE: This is a draft planning document written to the students who are investigating. Write the final report in the past tense, third person and passive voice.