

# **Guidelines for Independent Investigation**

## **Directions:**

1. Design an experiment that is unique, do-able and may be used for a science fair. Ask an interesting science related question that you have always been curious about. Make sure it fits the model explained below. Make sure it is not something we are going to be doing in class later. Check with teacher and complete the proposal before starting.
2. Your final product must be clearly written in ink or typed.
3. Use the assessment for further guideline and mark distribution.
4. Include a research journal describing the process. Date each entry in your journal. You should have at least five to eight entries if not many more.

## **Experiment Report Model**

### **Title**

Write the name of the investigation

### **Research Question**

Communicate what variables or relationship between variables will be investigated

### **Manipulated variable**

Write the manipulated variable (usually not more than two) and its operational definition.

### **Responding variable**

Write the responding variable and its operational definition

### **Controlled variables**

Identify all factors that must be controlled to limit sources of error

### **Hypothesis/ hypotheses**

Communicate your prediction about how the manipulated variable will affect the responding variable (Write it as an “IF.....then” statement.)

### **Plan or procedure**

Communicate a step-by-step process for completing the experiment. Include materials, time tables, and any other information that is important to the investigation. The plan should be detailed enough for another investigator to duplicate the experiment.

### **Observations, Data tables, Graphs**

Include qualitative observations.

### **Conclusion(s)**

Write factual summaries about what happened and respond to your hypothesis.

### **Inference(s) about conclusion(s)**

Interpret, explain, and discuss the relationship between variables. What knowledge was gained and what does it mean?

**Sources of error**

Discuss limitations in measurement of the equipment. Do not include human errors that could be fixed.

**Recommendation(s)**

What subsequent actions could or should be taken. Also, suggest methods for improving the experimental techniques.

**Experiment Proposal**

Title: \_\_\_\_\_  
Research Question: \_\_\_\_\_  
Manipulated variable: \_\_\_\_\_  
Responding variable: \_\_\_\_\_  
Controlled variables: \_\_\_\_\_  
Hypothesis: \_\_\_\_\_  
Plan or procedure: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Data Collection Plan: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

How many trials will be used in your experiment? \_\_\_\_\_  
How will you control all variables except the manipulated and responding variables?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

What special equipment will you need?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Teacher's approval: \_\_\_\_\_

## Independent investigation Experiment

Criteria	Comments	Rating
1. Proposal made sense, was detailed, clear and comprehensive		
2. Hypothesis and research question are interesting, relate to science, are unique and comprehensive		
3. Methods and procedure are clearly explained, are inclusive, repeatable and sequenced.		
4. Variables are controlled. Manipulating and responding variables are clear and make sense.		
5. Data collection method makes sense. Collected enough data. Repeated several trials. Data is displayed in clearly labelled data charts and graphs where possible.		
6. Data is interpreted effectively, correctly.		
7. Inferences are based on collected data, make sense and are accurate.		
8. Conclusion is based on observation and other research, is accurate, makes sense, and relates to science concepts and calculations		
9. Sources of error are detailed. Proposed useful recommendations		
10. Project - organized and presented information clearly and effectively. Demonstrates clear understanding of science concepts.		

**10 – at an excellent level, 8- at a very good level, 6- at a satisfactory level, 4-5 minimally acceptable level, 2 and 0 - unsatisfactory level**

Comments: \_\_\_\_\_

\_\_\_\_\_