

STEM Fair - What Type of Project?

Name: _____ Date: _____

What is your Big Idea or Topic? *Something you have always wanted to know or test in science*

What do you already know about this topic? *List the any and every bit of information you are sure about regarding your Topic.*

What more would you like to know about this topic? *Choose something in this list to test in your Project*

STEM Fair – Experiment (Planning Phase)

Name: _____ Date: _____

Let's expand on the planning and write information down into a different format.

Initial Question: *What are you going to do?*

Variables: *What variable are you going to test and what variable are you going to measure?*

Independent	Dependent

Controls: *List all the variables that need to be kept constant or monitored to ensure a fair test and to minimize any effects on the experiment.*

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Testable Question: *Rephrase your initial question into a testable form, using your independent and dependent variables.*

Hypothesis: *Write a tentative statement that proposes a possible explanation to your question*

Experimental Design: *Design a plan that will fairly test your question in a safe manner*

Materials Needed: *List the materials needed to perform your experiment*

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Procedure: *What steps will you take to test your hypothesis? – Remember to:*

- *Test a single question*
- *Design it so it minimizes bias*
- *Incorporates multiple trials*
- *And can be repeated by someone else*

STEM Fair – Experiment (Doing Phase)

Recording observations and collecting relevant data: *If your dependent variable requires you to record number with units then focus on recording all relevant quantitative data as precise as possible. If your dependent variables pertains to observations then record your relevant quantitative data as detailed as possible.*

STEM Fair – Experiment (Analyzing Phase)

Display of relevant data: *Students need to be able to take quantitative data and display it in an appropriate graph based on the dependent variable. If the experiment involves the collection of observations, they need to be sorted in an organizer such as a Venn diagram.*

Analysis of Data: *Interpreting data is a critical-thinking process used by scientific researchers to review the data gathered in the course of an investigation.*

Trends and Patterns: *Students should be able to describe the **relationship** the pattern/trend indicates.*

Discrepancies in data: *A Discrepancy is a value or observation that deviates from the standard or norm. Discrepant data do not fall within the observed pattern.*

Sources of error: *Students are expected to suggest a reasonable explanation(s) noting possible sources of error. Just because there is error in your project does not mean that you did anything wrong, this section is simply an area to account for things you had no control over while performing your experiment.*

Conclusions: *to make simple conclusion means that students are able to make a statement based upon logic and the evidence collected in the experiment. Your conclusion:*

- *will be framed around the initial question that was tested. As the student analyzes the data it is important to ask the question: Did the change (independent variable) made cause the effect that was measured (dependent variable)?*
- *must either confirm, deny, or acknowledge uncertainty about the relationship between the two variables. The prediction/hypothesis may be supported or refuted based on the data.*
- *If the data support your hypothesis - but you believe it is not because of the independent variable- this distinction will need to be made. Students must either confirm or deny a relationship between the two variables and then describe the statistical data that support your final conclusion.*
- *may comment on whether the investigation was a fair test and suggest improvements to experimental design.*

Applications of Learning: *Depending on the experiment student should reflect on:*

- *evaluating sources of information*
- *evaluating the fairness of an experimental design*
- *evaluating the usefulness of a constructed design*
- *applying conclusions reached to real world scenarios*
- *extending those initial ideas by creating new questions to test*
- *evaluating their own/other's thinking and explanation in terms of plausibility and scientific evidence*