**Family Learning Alliance**

**STEM Fair**

**March 26, 2022**

**Brainstorm Some Ideas!**

**Research your ideas!** This can be done at home. Start a ‘science fair notebook’ and make notes in it. You may want to bring this notebook to the science fair later, to show visitors and judges.

**Choose one idea:** After researching all your ideas, choose one that is most interesting for you and write it here:

**Create a hypothesis**: A hypothesis is a tentative, testable answer to a scientific question. Some call it ‘an educated guess’ as to what your experiment will reveal. Most hypotheses are written as "if...then" statements. For example someone performing experiments on plant growth might write this hypothesis:  "**If** I give a plant an unlimited amount of sunlight, **then** the plant will grow to its largest possible size." Write your hypothesis here:

**Design a possible experiment for your chosen idea**

Describe your experiment:

What question will this experiment answer?

**Before doing your experiment….**

What materials will you need?

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Make a drawing/diagram of how you will set up your experiment:

**When you are ready:**

Run your experiment.

Record data from your experiment. Use your notebook to write notes, observations and data!

**Create a Final Report:**

The final report must include

* Abstract.
* Question, variables, and hypothesis.
* Background research
* Materials list.
* Experimental procedure.
* Data analysis and discussion (including data table and graph(s)).
* Conclusions.
* Ideas for future research
* Bibliography.

**Rubric for Judging: (Middle and High School)**

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| **Asking Questions and/or Defining Problems**Research question, problem, or phenomena is identified, testable, focused and clearly written. \_\_\_\_\_/8The problem, question or phenomena identification demonstrates original thought/innovation. \_\_\_\_\_/6Additional questions are generated during or after the investigation. \_\_\_\_\_/6 |  |
| **Developing and Using Models to Demonstrate Understanding**For Science: Uses models (pictures, physical scale models, diagrams representing forces, descriptions) to demonstrate phenomena. The model helps to explain the phenomena. \_\_\_\_\_/20ORFor Engineering: Science understanding is communicated through a physical, mental, analogy, graphical/mathematical modeling process to explain conceptual understanding. The models help to  “Explain the science” \_\_\_\_\_/20 |  |
| **Planning and Carrying out Investigations**Hypothesis or predictions are justified with an explanation based on past knowledge or research.  \_\_\_\_\_/10Procedure can be easily repeated by someone else and achieve similar results. \_\_\_\_\_/10The investigation is repeated enough times and/or the sample size is large enough to collect accurate data.  \_\_\_\_\_/10Variables are clearly defined and the outcomes are measurable. (variables could include independent, dependent, controlled, constants.  \_\_\_\_\_/10 |
| **Analyzing and Interpreting Data**Data is presented in a summative form that reveals patterns and relationships. \_\_\_\_\_/10The data presented is relevant to the investigation.  \_\_\_\_\_/10There is sufficient data to support conclusions or to support a valid claim\_\_\_\_\_/10 The data was analyzed and interpreted correctly. \_\_\_\_\_/10  |
| **Using Mathematical and Computational Thinking**Mathematical tools (averages, correlation coefficients, slope, line of fit, % difference, standard deviation) are used to interpret data.  \_\_\_\_\_/20 |
| **Constructing Explanations and Designing Solutions**For Science: Conclusion relates back to the original question, claim or phenomena. \_\_\_\_/6 Provided explanations show why and or how their data supports or justifies the conclusion. \_\_\_\_\_/6Student can develop their own explanation of why the phenomena occurs.  \_\_\_\_\_/8 ORFor Engineering: The design solution fits the original need or intent.  \_\_\_\_\_/10Student provides an explanation as to why their design solution best fits their problem.  \_\_\_\_\_/10 |
| **Engaging in Argument from Evidence**Student is able to answer questions in support of their conclusion based on evidence. (data) \_\_\_\_\_/10Connections to the real world, or similar phenomena are identified.   \_\_\_\_\_/10 |
| **Obtaining, evaluating and communication information**Information regarding the science behind the phenomenon or problem is obtained from outside sources such as internet, science magazines, experts etc. \_\_\_\_\_/4Project board and/or abstract includes all the necessary information to adequately present the entire project. \_\_\_\_\_/4Students are able to communicate clearly the steps they used in their investigation. \_\_\_\_\_/4Students communicate in a way that is understandable to the listener which includes speaking clearly, loudly, making eye contact, and covering all pertinent information. \_\_\_\_\_/4 Project board is easy to read, font is large enough, follows a start to finish flow, no handwriting. \_\_\_\_\_/4 |

Total Point \_\_\_\_\_\_\_ / 200

**Rubric for Judging: (Elementary)**

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| **Asking Questions and/or Defining Problems**Research question or problem is identified, testable, focused and clearly written. \_\_\_\_\_/8The problem or question is original and comes from the student’s curiosity. \_\_\_\_\_/6Additional questions are generated during or after the investigation. \_\_\_\_\_/6 |  |
| **Developing and Using Models to Demonstrate Understanding**Uses models (pictures, physical scale models, diagrams representing forces, descriptions) to demonstrate the research. \_\_\_\_\_/20 |  |
| **Planning and Carrying out Investigations**Hypothesis or predictions are justified with an explanation based on past knowledge or research.  \_\_\_\_\_/10Procedure can be easily repeated by someone else and achieve similar results. \_\_\_\_\_/10The investigation is repeated enough times and/or the sample size is large enough to collect accurate data (The recommendation is 3).  \_\_\_\_\_/10 Variables are clearly defined and the outcomes are measurable. (variables could include independent, dependent, controlled, constants.)  \_\_\_\_\_/10 |
| **Analyzing and Interpreting Data**Data is presented in a way that shows the pattern (Graph, table, Structured List) \_\_\_\_\_/10The data presented is relevant to the investigation.  \_\_\_\_\_/10There is sufficient data to support conclusions or to support a valid claim\_\_\_\_\_/10 The data was analyzed and interpreted correctly. \_\_\_\_\_/10  |
| **Using Mathematical and Computational Thinking**Data is interpreted using mathematical language.  \_\_\_\_\_/20 |
| **Constructing Explanations and Designing Solutions**For Science: Conclusion relates back to the original question, claim or problem. \_\_\_\_/6 Provided explanations show why and or how their data supports or justifies the conclusion. \_\_\_\_\_/6Student can develop their own explanation \_\_\_\_\_/8 ORFor Engineering: The design solution fits the original need or intent.  \_\_\_\_\_/10Student provides an explanation as to why their design solution best fits their problem. \_\_\_\_\_/10 |
| **Engaging in Argument from Evidence**Student is able to answer questions in support of their conclusion based on evidence. (data) \_\_\_\_\_/10Connections to the real world are identified.   \_\_\_\_\_/10 |
| **Obtaining, evaluating and communication information**Information regarding the science behind the question or problem is obtained from outside sources such as internet, science magazines, experts etc. \_\_\_\_\_/4Project board and/or abstract includes all the necessary information to adequately present the entire project. \_\_\_\_\_/4Students are able to communicate clearly the steps they used in their investigation. \_\_\_\_\_/4Students communicate in a way that is understandable to the listener which includes speaking clearly, loudly, making eye contact, and covering all pertinent information. \_\_\_\_\_/4 Project board is easy to read, font is large enough, follows a start to finish flow, no handwriting. \_\_\_\_\_/4 |

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