STEM Parent Information

What is STEM?

- S – science
- T – technology
- E – engineering
- M – math
- We are encouraging students to select topics to explore that incorporate all of the STEM components

Scientific Method

- Testable Question
- Hypothesis (with research to increase background knowledge)
- Materials
- Procedures
- Experiment – follow the procedure and record data
- Results – gather results and formalize on charts and graphs
- Conclusions – analyze the results and make generalizations about the findings and how they relate to the hypothesis

Components of a Well Designed Investigation

TESTABLE QUESTION

Testable Question:
A question that can be answered through an investigation.

PREDICTION OR HYPOTHESIS

Prediction:
A statement about what may happen in the investigation based on prior knowledge, research, and/or evidence from previous investigations.

Hypothesis:
A testable explanation (*If-then* statement) based on an observation, experience, or scientific reason. It includes the expected cause and effect in a given circumstance or situation.

WELL-DESIGNED PROCEDURE

Variable(s):
The factors in an investigation that could affect the results. The independent variable is the one variable the investigator chooses to change. The dependent variable changes as a result of, or in response to, the change in the independent variable. Controls and control groups are used for comparisons.

Materials:
A list of all materials needed for completing the investigation.

Directions:
A logical set of steps to complete the procedure.

Repeated or Multiple Trials:
Repeating the procedure several times for validity and reliability.

Data Collection:
The results of the investigation, usually recorded as observations, table, graph, chart, diagram, etc.

CONCLUSION

Conclusion (or Summary)

Form a conclusion:

A statement, supported by evidence, identifying the *pattern* (repeating cycle) or *trend* (general drift, tendency, or direction of a set of data) based on an analysis of the data collected during the investigation.

Write a conclusion:

The closing paragraph of a report that addresses the investigative question, critiques the hypothesis, and explains the results. It demonstrates a full and complete understanding and includes the synthesis of information, supporting details, accurate use of terminology, and application of information.

COMMUNICATION AND DISCUSSION

Communicate and Discuss Results:

A presentation of your findings to others for critical analysis (peer review, conference, presentation, etc.), followed by a discussion of your conclusion/summary and supporting evidence. Discussion leads to the identification of more questions, clarifies understanding, and addresses misconceptions.

TAKEN FROM MCPS GRADE 5 SCIENCE CURRICULUM GUIDE

TIPS FOR SUCCESS

KISS

- Keep
- It
- Simple
- Scientists

Sample KISS Questions

- Does the size (or shape) of a magnet affect its strength?
- What brand of popcorn pops the most kernels?
- Does the weight (or design) of a paper airplane affect the distance it will travel?
- What material can you rub a balloon on so that the static electricity lasts the longest?
- How does temperature affect the growth of mold?
- How does friction affect the distance an object will travel?

What Makes a Testable Question?

Let's Talk Variables!

- **Independent Variable –** the factor that will be changed on purpose during the experiment to find out what effect it has on something else.
  - ONLY ONE
- **Dependent Variable -** the factor that is observed and measured to see if it is affected by the change made in the independent variable.
  - ONLY ONE
- **Control Variables –** the factors in the experiment that must be kept exactly the same to make sure that they are not having any effect on the dependent variable.
  - WILL HAVE MORE THAN ONE

Does the design of a paper airplane affect the distance it can travel?

- INDEPENDENT VARIABLE – What are you changing on purpose?
  - Airplane design
- DEPENDENT VARIABLE – What are you recording or measuring?
  - Distance the airplane flies
- CONTROL VARIABLES – What is kept the same?
  - Paper used
  - Airplane thrower
  - Airplane course (must be indoors to avoid additional variables-such as wind)

STEM Projects are due March 30th

Find a Testable QUESTION and identify VARIABLES

RESEARCH and Formulate a HYPOTHESIS

Write out the MATERIALS and PROCEDURES for the Experiment

Carry Out EXPERIMENT
Record data on a CHART and GRAPH RESULTS

Analyze RESULTS and write up CONCLUSIONS

Create a TITLE and CONSTRUCT your BOARD

STEM Reminders

- **Experiments with humans or animals are NOT allowed**
- **Experiments need to have 3 trials – so they must be repeated 3 times**
- **Backboards should be placed in the gym on STEM day – March 30th at 8:45 am**
- **Join us for STEM Night on March 30th – more information coming soon**

Thanks for viewing! Check out the website below for more ideas!

http://www.sciencebuddies.org