



# 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.



# TIPS FOR SUCCESS

## KISS

- **K**keep
- **I**t
- **S**imple
- **S**cientists



# 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 APRIL 7<sup>TH</sup>

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 – April 7<sup>th</sup> at 8:45 am**
- **Join us for STEM Night on April 7th – more information coming soon**





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



<http://www.sciencebuddies.org>