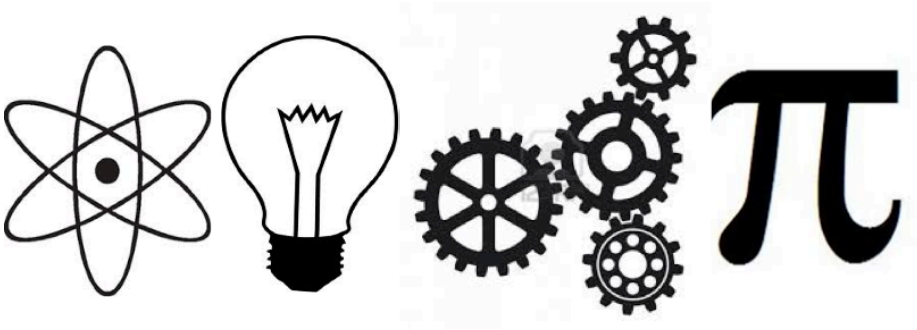
Pasco County Schools

Elementary STEM Fair



Science, **T**echnology, **E**ngineering, and **M**athematics

Providing an opportunity for students to utilize science knowledge and skills as scientists do in the real world.

Research Plan and Investigation Report Forms

Student Name: _____

Teacher: _____

Background Information

Providing students opportunities to make meaningful connections to the real world is critical as we develop the skills, behaviors, and dispositions necessary for college, career, and life readiness. Developing a S.T.E.M (Science, Technology, Engineering, and Mathematics) Fair investigation will provide students the opportunity to use science knowledge and skills just as scientists do in the real world. The STEM Fair will provide opportunities to engage in connecting these college, career, and life skills in many ways such as writing clearly, communicating information effectively, collecting and interpreting data, using evidence to justify their thinking, managing time, and providing opportunities to ask "why" leading to the development of an experiment or designing of a solution/innovation.

The information found in this *Elementary STEM Fair Research Plan and Investigation Report Form* document will provide guidance and support in developing the project. Throughout the document there are explanations and clarifications to help better guide student thinking. Students need to complete *Elementary STEM Fair Research Plan and Investigation Report Forms* and are encouraged to keep a journal with more detailed experiences and observations as they complete their investigation.

Table of Contents

Research Plan

The research plan needs to be completed before beginning the investigation.

Student Name: _____

School: _____

Address: _____

_____

Title of Project: _____

Adult Sponsor: _____

Where will you complete your experiment?

Home: _____ School: _____ Field: _____

Category (see page 4 for clarification):

Physical: _____ Earth/Space: _____ Life: _____

What is the question you are trying to answer or problem you are trying to solve?

Describe the methods, materials, and procedures you intend to use.

List any major sources of information that you are using for research. If you are studying animals, please make sure to reference animal care when appropriate.

Parent/Guardian approval:_____ Date: _____

Teacher approval: _____ Date: _____

Things to Consider When Choosing Your Investigation

What types of things do you enjoy in science? There are three different science categories your idea may fit into:

Physical Science: Do you find yourself wondering why or how things work? If so then you might want to choose Physical Science for your category. Topic examples may include things about matter, electricity, magnetism, sound, light, or energy.

Earth and Space Science: Do you find yourself curious about our Earth or outer space? If so then this may be the category for you. Topic examples may include things about weather, geology (things that make up the Earth such as rocks, fossils or volcanoes), or our Sun, stars and planets. Just a reminder, a model is not an experiment, so be careful when thinking about your investigation.

Life Science: Do you like plants, animals or are curious about why humans behave certain ways? If so then Life Science may be the category your investigation could fall under. (There are special rules anytime you work with animals. Please talk to your teacher to ensure you are following any rules).

Research to Help Support Your Investigation

After choosing your investigation category it is important to complete some research to better understand what your investigation is about. How do you complete research? You need to read! The information you gather while completing your research will assist in developing your hypothesis, designing your experiment or prototype (if applicable), collecting data, drawing conclusions, and communicate like a real scientist. Make sure to include at least the title, author, and date published or accessed.

Books or Articles about my topic:

Internet Websites about my topic:

People I talked to about my topic:

Statement of Question I am Answering or Problem I am Trying to Solve

Once a category has been chosen and research has been conducted begin to think about what type of question you are going to answer OR type of problem you are going to solve.

Example(s):

- *Question I am going to answer:* "Which brand of diaper is the most absorbent?" This is a good question which would allow students to go through the scientific process manipulating only one variable; the type of diaper.
- *Problem I am going to solve:* "I am constantly losing things out of my pant pockets. How can I create a pant pocket that keeps items inside?" This problem would allow the student to design a solution and test its effectiveness.

My question I am going to answer or problem I am going to solve:

_____

Hypothesis

The purpose of creating your hypothesis is to identify what you think will happen based on research that was collected. The hypothesis needs to be worded as an "If… then…because" statement explaining the cause and effect relationship that is being investigated. Evidence from your research needs to be used to support and justify your thinking.

Example(s):

- *Question I am going to answer:* **If** I put 30mL of water in the Huggies diaper **then** it will absorb the most water **because** Huggies diapers have an extra layer of polyfiber material.
- *Problem I am trying to solve:* **If** I create a magnetic pocket casing, **then** I will lose less items out of my pockets **because** magnets provide a tight seal due to their characteristics.

If _____

then _____

because _____.

Testing My Hypothesis

Now that you used some research to develop your hypothesis it is time to begin your investigation to help answer your question or solve your problem. The next few pages will help giude you in setting up and conducting your investigation.

Materials: What types of materials will be used to conduct your investigation? Make a list of them here using either words or pictures.

Variables: *A variable is a fancy word for things that you will be changing or keeping the same throughout your investigation. There are 3 types of variables:*

- *Independent: This is the variable that will be changed in your investigation.*
- *Dependent: This is the variable that will show an effect in your investigation.*
- *Constants: These are all the things that will be kept the same throighout you investigation to make sure it is valid.*

Example(s):

*Question I am going to answer: **If** I put 30mL of water in the Huggies diaper **then** it will absorb the most water **because** huggies diapers have an extra layer of polyfiber material.*

- *Independent variable: The different brands of diapers that are being tested (Huggies, Pampers, Luvs)*
- *Dependent variable: The amount of water absorbed (measured using mL) by each brand of diaper.*
- *Constants: temperature of the water, location in the diaper in which water is poured*

*Problem I am trying to solve: **If** I create a magnetic pocket casing, **then** I will lose fewer items out of my pockets **because** magnets provide a tight seal due to their characteristics.*

- *Independent variable: The different types of materials tested to create the pocket casing.*
- *Dependent variable: The number of shakes the pant pocket can withstand before losing its contents.*
- *Constants: same pair of pants and sized pocket, same items placed in the pocket casing*

The **Independent Variable** that I will change in my investigation will be:

The **Dependent Variable** that will show an effect on my investigation will be:

The **Constants** in my investigation are:

Procedure (Designing of My Investigation): What steps will I use to carry out my investigation? It is very important that the steps in developing/designing your investigation are recorded precisely so another student can replicate the investigation.

If I am *answering a question* do I need to draw a picture of how I will set up my experiment? If I am *solving a problem,* a labeled diagram of the proposed solution needs to be sketched here.

Data and Results

When conducting your investigation it is important to collect some data (information) to help either prove or disprove your hypothesis. When you are collecting data please make sure to be as precise as possible in using labels, dates, and even pictures. Once you finish collecting your data it is important to record your data/results into a table and then organize it into a chart or graph to easily communicate your findings. Please use additional pages or a journal to record your data and organize it into charts, tables, and graphs.

Data and Results collected over time:

Organizing my Data and Results into Charts, Tables, and Graphs:

Conclusion

During your investigation you have learned many new things including whether or not you were able to prove or disprove your hypothesis. Your conclusion should be a summary of your results and state whether or not your investigation supported your hypothesis. Use the questions below to help guide you in sharing what you learned.

- Did you results support your hypothesis? Identify and explain the types of data you used to prove or disprove your hypothesis.
- What did you learn from the trials you conducted in your investigation?
- What types of problems did you encounter throughout your investigation?
- If you conducted this investigation again, what would you do differently?
- How does your investigation make connections to real life?

Abstract

The abstract is the part in your project log in which you summarize the entire investigation. Remember to include things such as your questions you were trying to answer or problem your were trying to solve, hypothesis, procedure, data/results, and conclusions based on evidence collected.

Student Name:_____

Project Title: _____

School: _____

Acknowledgements

Who helped you with your project?

Backboard Suggestion

The following is a suggested layout for your backboard. You need to make sure that the abstract is in the lower left hand side of the board.

Problem/Need	**Title**	Data and Results
Hypothesis		Tables and Graphs
Materials/Equipment	Procedure	
Abstract	Labeled Diagrams or Pictures of Investigation or data as it's being collected	Conclusion