Navy Elementary Science Fair March 14th, 2016

Student Information Packet

Student Name: _____

Teacher: _____

IMPORTANT DATES TO REMEMBER:

- February 9, 2016: Information/Q&A Session during school
- March 7, 2016: Official Entry Form Due
- March 13, 2016: Set up project at school
- March 14, 2016: Present your project to a judge during school
    - Science Day at Navy Elementary!
    - Class walk-throughs of student projects
    - Family reception for science fair participants
    - Take home projects

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GENERAL INFORMATION

INTRODUCTION TO THE NAVY SCIENCE FAIR!

Congratulations on signing up to enter the 2016 Navy Science Fair! We are excited to see your ideas get designed, tested and developed. We hope to see many areas of STEAM topics explored in our school and to see what you you choose to explore!

A Navy Science Fair Project can be either a science experiment, an invention designed to solve a problem, or a demonstration or collection of a scientific topic. Each project should be carefully planned out and you should do a good amount of background research to help you work through your project. At the end of your project, you will put together a display board, compile exhibit materials and put together your written report.

This booklet will give you some information about how to prepare for the Science Fair. This information is only meant to help you. It is not the only guide or resource you should use to put together your project.

NOTE TO PARENTS

We are excited to see your child enter the Science Fair! Through this process – from choosing an idea to explore, to testing and putting together a report – your child will gain experience and appreciation of the scientific or engineering design process. The projects they choose will allow them to design experiments, make decisions, form or re-form hypotheses and predictions, test failures or successes, and draw conclusions based on the research they've conducted.

The Science Fair is an opportunity for your child to problem-solve and learn by doing. We hope you will encourage and guide them through the process. But please ***encourage your child to do most, if not all, of the work***. The final project should be a reflection of your child's individual work and effort. **Keep in mind that the main goal of the Science Fair is to encourage creativity and curiosity in your child!**

Navy Elementary Science Fair
March 14, 2016

OFFICIAL ENTRY FORM

All students must submit an official entry form to participate in the 2016 Navy Elementary Science Fair. Each student should submit an entry form even if working in a team.

Entry forms must be submitted between February 29, and March 7, 2016.
Late entries will not be accepted.

STUDENT NAME: _____ GRADE: _____ TEACHER: _____

INDIVIDUAL PROJECT? _____

GROUP PROJECT? _____
(If group project, list members below)

STUDENT NAME: _____ GRADE: _____
STUDENT NAME: _____ GRADE: _____
STUDENT NAME: _____ GRADE: _____

PROJECT TITLE: _____

PROJECT TYPE: (*Check one)* **___ Experiment ___Invention ___Engineering ___Model**

STUDENT AGREEMENT
By submitting this entry form, the students are giving their intention to enter the Navy Elementary Science Fair. You agree to follow all the guidelines and requirements and be ready to present your project to one of the Science Fair judges on March 14, 2016.

PARENT PERMISSION
I approve and give permission for my child to participate in this year's Science Fair.
I have reviewed the FCPS Science Fair Restrictions and acknowledge I am responsible for my child's safety. I understand that my child will be interviewed and judged during the fair, and that scores will be confidential and final.

Student Signature _____ Date: _____

Parent Signature _____ Date: _____

PROJECT CATEGORY IDEAS.

What types of things do you enjoy in science, technology, engineering, art, or math? The library and the interest are good places to get ideas. You can also visit the Navy Science Fair website or http://www.sciencebuddies.org/ for more ideas!

Here are some categories to help you get started. You can choose whatever STEAM category you want to explore. Choose a topic that interests you!

- **Physics:** Do you find yourself wondering why or how things work? Topic examples include matter, electricity, magnetism, sound, light, or energy.

- **Earth and Space**: 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, rocks, fossils or volcanoes, or our sun, stars and planets.

- **Life Science:** Do you like plants, animals or are curious about why humans behave certain ways? (Please talk to your parents or teachers to ensure animals are not harmed. Remember, no animals are allowed at Navy and FCPS has restrictions on use of people in experiments).

- **Chemistry:** Are you interested in how chemicals react? There is chemistry in cooking, or you can make various solutions. Topic examples may include: crystal creations, bubbles, rust, baking soda and vinegar, and other chemical reactions. (Make sure to have parental supervision and use eye protection.)

- **Engineering:** Do you have a problem you want to solve? Do you want to design or create an innovative solution? Examples include: How can I prevent children from getting into kitchen cupboards? Which building design best withstands an earthquake? Can you build a Robot arm out of straws or Legos?

- **Math/Technology:** Are you interested in math, probability, or technology? Topic examples may include: dice probability, statistics of M&M's, or how font style picture formats change the file size. What search terms or search engine finds the best results on a computer? How fast is your computer in solving math problems? Can you write a program to solve a problem?

PERMITTED PROJECT TYPES.

There are four project types you can choose from to enter the Navy Science Fair:

1. Experiment
2. Invention
3. Engineering Design
4. Model

You must decide which type of project you want to do. Make sure to check off your project type on your Official Entry Form.

EXPERIMENT

This type of project is the most common type of science fair project. An experiment is an investigation designed to test the student's hypothesis. Students will identify a problem or purpose, design an experiment to investigate this problem, and record and report the results. The student will draw conclusions based on the results.

INVENTION/ENGINEERING DESIGN

In this project type, students should identify a scientific problem and attempt to address this problem with an invention or model. An invention is the building or creation of a device, machine or other creation designed to address this problem. Use the Engineering Method when designing an invention or model. It is important for you to identify the problem, research and plan your ideas, and develop and test your invention.

DEMONSTRATION

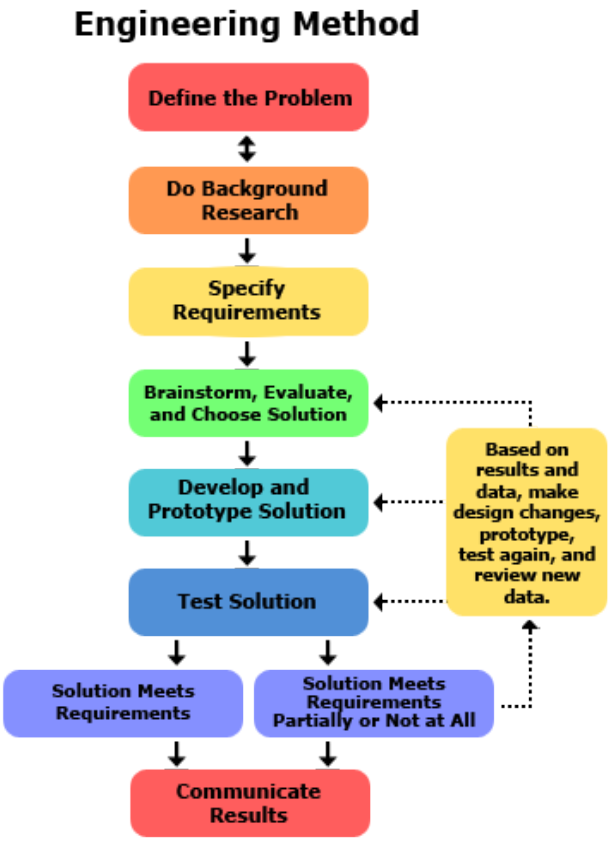
In this type of project, students will demonstrate a particular scientific principle, scientific fact, how something works, or how something is created. A demonstration is a collection, analysis and presentation of data and information to describe the chosen topic. Collections are an assembly of items that show variety and diversity within a certain category. It is important to include many samples to give a good representation of the science area you are showing. Research, observations and predictions will be important! Remember to explore a scientific area in depth and report your findings in an interesting way.

MODEL

In this type of project, students may wish to build and display a scientific or STEAM apparatus or instrument, and describe how it works in detail. The model should be self-contained, meaning that the student could operate the model and any controls, switches or devices. Research and descriptions of how each part is used in our community are important parts of sharing the importance of this apparatus or instrument, as well as a thorough understanding of its function.

Scientific Method Compared to Engineering Process

The Scientific Method	The Engineering Design Process
State your question	Define the problem
Do background research	Do background research
Formulate your hypothesis, identify variables	Specify requirements
Design experiment, establish procedure	Create alternative solutions, choose the best one and develop it
Test your hypothesis by doing an experiment	Build a prototype
Analyze your results and draw conclusions	Test and redesign as necessary
Communicate results	Communicate results
Steps of The Scientific Method	Steps of The Engineering Design Process



SUGGESTED STEPS.

Here are some suggestions on the steps you can take to work on your project. These are only some of the ideas and ways you design your experiment, model, invention or demonstration.

Make sure to record all your information in your logbook. Writing down your research, plans, ideas, steps, successes and failures are all important parts of being a scientist!

STEP 1 – What is the question or problem I want to solve?

Think about what type of question you are going to answer OR type of problem you are going to solve. This is your objective, purpose or problem.

Examples:

- *Science Question I am going to answer: "Which brand of diaper is the most absorbent?" This is a good question that would allow students to go through the scientific process manipulating only one variable: the type of diaper.*
- *Engineering Problem I am going to solve: "How can I prevent children from getting into cabinets where there are chemicals? This problem would allow the student to design a solution and test its effectiveness.*

STEP 2 – Do background research to help support your investigation.

After asking your question or defining the problem, 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 help you in developing your prediction, designing your experiment, collecting data, drawing conclusions, and communicating like a real scientist or engineer. Compile a list of all your research sources for your bibilography that is included in your written report. Make sure to include at least the title, author, and date published or accessed.

STEP 3 – State your Hypothesis or Prediction or Define your Requirements

The purpose of your hypothesis or prediction is to identify what you think will happen based on your background research. The prediction needs to be worded as an "If… then…because" statement explaining the cause and effect relationship that you are learning about. Evidence from your research needs to be used to support and justify your thinking.

Examples:

- *Science 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.
- *Engineering problem I am trying to solve:* ***If*** *I create a cabinet lock,* ***then*** *kids won't get into dangerous chemicals,* ***because*** *cabinets will be secured with my invention.*

HELPFUL INFORMATION FOR OLDER STUDENTS (4^{th} – 6^{th} Grade):

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 measured variable that will show an effect in your investigation.
- Constants: These are all the things that will be kept the same throughout your investigation to make sure your project works.

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.
- Constant: temperature of the water, location in the diaper in which water is poured

Problem I am trying to solve: **If** I create a cabinet lock, **then** kids won't get into dangerous chemicals **because** the cabinets will be secure with my invention.

- Independent variable: Invention prototypes
- Dependent variable: Time it takes to open secure cabinet.
- Constant: cabinet door

The **Independent (or manipulated) Variable** that I will change will be:

The **Dependent (or measured) Variable** that will show the effect will be:

The **Constant (or controlled) Variable** in my investigation are:

STEP 4 – Gather your materials and supplies you need to test or try your project

What types of materials will be used to conduct your investigation? Make a list of all your supplies. Younger students might even be interested in drawing pictures!

STEP 5 – Design a Procedure to Test Your Hypothesis or Prediction

What steps will I use to carry out my investigation? This is where you list your steps in how you will conduct your experiment or design. It is very important that the steps in developing/designing your investigation are recorded precisely so another student can replicate the investigation. Are there safety concerns? In designing a solution, create alternatives and choose the best one to develop.

STEP 6 –Do the Experiment! Record your data and results

Test your Prediction by doing the experiment OR Build a Prototype

Do the experiment! This is like a recipe – Create step-by-step instructions for what you will do to test your prediction. It should be so thorough that even a person, who knows nothing about science, could duplicate the experiment.

Analyze your results and draw Conclusions OR Test and redesign as necessary

Make sure to collect some data (information) to help either prove or disprove your hypothesis or prediction. When you are collecting data please 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 show what you have discovered. Be sure to record your data in your logbook, and organize it into charts, tables, and graphs.

STEP 7 – Communication your conclusion and results

Was your hypothesis or prediction right or wrong? 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 your 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?

SIX-WEEK PLANNING GUIDE.

You can use this sheet to help you plan your project.

WEEK 1 PLAN:

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WEEK 2 PLAN:

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WEEK 3 PLAN:

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WEEK 4 PLAN:

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WEEK 5 PLAN:

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WEEK 6 PLAN:

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WEEKEND OF SCIENCE FAIR (March 12, March 13):

_____

_____

MARCH 13: Go to school to set up your project. Time TBD.
MARCH 14: Give your presentation to a Judge!

TRI-FOLD BOARD SUGGESTIONS.

Science Experiment Tri-Fold Suggestion

Question Research Hypothesis/ Prediction	**Title** By: Student Name Grade, Teacher Materials/Variables Tables and Graphs (Pictures)	Experiment Procedure Results/Conclusion

Engineering Design Tri-Fold Suggestion

Define Problem Research Specify Requirements	**Title** By: Student Name Grade, Teacher Create/Diagram Build Prototype (Pictures)	 Test/Redesign Results/Conclusion

IMPORTANT DISPLAY INFORMATION:

Each project will be given a table assignment when students come to set up their Project Display Boards. <u>All exhibit materials must fit on the table in the space right in front of the Display Board.</u> There will be no access to electricity or additional space available to any student. If your project required access to electricity or the materials used are bigger than that space, then you should consider taking pictures of your experiment or design and setting out those pictures. No exceptions will be made.

PRESENTATION INFORMATION.

Each student participant will present his or her project to a Science Fair Judge on the morning of March 14th, 2016. Judges are comprised of Navy science teachers, scientists and engineers in our community, and parent volunteers with a STEM background. You should be ready to give a brief overview of your project to the Judge. Then you will be asked a few questions by the Judge!

Navy classes will walk through to view all the projects displayed after judging is over. Families are invited to view all projects during our Family Reception which will be held towards the end of the school day.

Here are examples of questions you might be asked by a Judge:

- How did you get the idea for your project?
- What were you trying to find out or solve when you did your experiment?
- Was there anything that surprised you after you did your experiment?
- Explain how you did your experiment.
- What did you like best about doing your science project?
- If you did the same project again next year what would you change or do differently?
- Were the results of the experiment how you guessed they would be? If not, what surprised you the most?

Additional Rules for Navy Elementary School:

(please also refer to FCPS Restrictions on Science Fair Projects)

- No flames, explosives or flammable materials
- No open liquid containers, dry ice, dangerous chemicals
- No mold, fungi, or microbial cultures allowed that involve the growth of bacteria
- No hazardous or controlled substances (tobacco, ethyl alcohol, drugs or sharp objects)
- No projects involving: eating, drinking, exercise, inhaling, injection, etc.
- No animals - No live or preserved vertebrate or invertebrate animals or parts.
- No projects that cause potential injury or harm to vertebrate or invertebrates. (Animals must be observed in their natural habitat with no interaction between the student and animal.)

Questions?

Please contact Melissa Ahn or Patricia Kruep with any questions, Navyelemsciencefair@gmail.com.