Free Horizon Montessori – Science and Engineering Fair
Lower Elementary Project Planning Packet

The FHM Science and Engineering Fair is *optional*, but *encouraged*, for our Primary and Lower Elementary students. This should be a fun project! Success is when your student asks their own question, completes their project with a smile, and knows more than when they started. Enjoy this time of discovery and fun for you and your child!

Choosing a Topic.

Younger students tend to gravitate towards understanding "what" something is or "why" something happens. Ask questions to help the student focus on their interest. Focus on topics about which they do not already know the answer. The subject does not need to be overly complicated. The topic should be something the student can figure out for themselves. It is important that the student uses their own words and it is a subject they are excited about. This will help tremendously when they do their presentation.

The following list is intended to help determine the type of project they want to do.

COLLECTION (S) – You will collect and organize something of interest, answering questions related to observations (the things you see, hear, feel) made while exploring your world. Examples: What kinds of insects can be found in my backyard? What types of tree leaves can be found on my street?

EXPERIMENT (S) – You will conduct an experiment to find the answer to your question/problem. The Scientific Method will take you through the correct process of asking a question, doing some preliminary research, making a hypothesis (your best guess at how it will turn out), planning and conducting your experiment, and analyzing your results.

INVENTION (E) - You will use science, math, and creativity to dream up and design an object or a process to solve a real life problem. Using The Engineering Design Process will take you through all the necessary steps: asking a question, brainstorming, planning, creating, testing, and making it even better.

RESEARCH PROJECT - Someone has already found the answer to your question/problem, and you will look for their answer/solution by reading books, talking to experts, and gathering information from other sources such as schools and public libraries. Your display board will have drawings, photographs, charts, graphs, dioramas, etc. Examples: How does a solar cell work? How does a light bulb operate?

Use this planning packet to guide your project. Follow each step. Steps specific to Science Experiments will be followed by an (S); steps specific to an Engineering Problem will be followed by an (E).

Student(s) Name: _____

Due Date	Done?	Things to do
		Choose a topic and ask your parent/guardian to help you write the question you want to answer or solve. Please use your own words or pictures. Use this packet to write it all down.
		Get approval from your teacher for the subject.
		Research your topic and write down or draw key words and ideas.
		Think about how you can answer the question you want to answer or solve. Is there an experiment you can do?
		Write what you think the outcome will be of your experiment, collection, test or research.
		Write or draw your plan (steps you plan to follow) to do your experiment, collection, test or research. Include the materials you are going to need.
		Gather the materials you need to do your experiment or test.
		Follow the steps you planned for your experiment. Write down what happens during this test.
		Draw or create a Table, Chart or Graph that shows the information you collected from your research, collection, experiment or test.
		What did this information tell you? What are the conclusions?
		Make a project display. You can make it on the computer or you can draw your charts by hand.
		Write a summary of your project. Use your own words.
		All projects due in classroom. This includes your project display and this project planning packet.
		Present your project at the Science & Engineering Fair (LE &P Day).
		Take your project home after the Fair is over.

Project Development

1. **Purpose of your project: the question you want to answer.**

   The best way to choose a topic to investigate is to think about what interests you. What are you curious about? Your question will drive your entire project. Your question or statement should be able to be measured or answered. Your question will also be the title of your project. Examples include: *How does _____ affect _____? or What is the effect of _____ on _____?*

   The question you want to answer or problem you want to solve is:

   _____

   _____

   _____

   _____

   _____

   _____

2. **Research Your Topic.**

   Spend some time learning more about your topic. Use reliable internet sources, books and magazines from the library, talk to people who know about the subject, or use other resources. Remember, anyone can create a web site; this does not mean its information is correct! Websites that end with ".org", ".gov" or ".edu" are generally trustworthy for accuracy of content. Not only do you want to be an expert on your topic, but you want to teach others about your topic, so make sure you understand your research and can put it in your own words.

   A. Key Words – Locate at least 3 key words related to your topic. Make sure that the words you choose are directly related to your topic. Provide a definition of each key word IN YOUR OWN WORDS. (You can have help writing down your thoughts.)

Key Word	Definition

B. Key Resources

Resource title/website	Information found (brief listing in own words)

3. **What you think will happen.** (your Hypothesis (S) or Problem Statement (E)):

After you have done your research, you can then take a guess about what is going to happen when you do your experiment, collect your materials, finish your project or learn from your research. Decide what you think the outcome of the project will be or solution to the problem you observe. Make a good guess as to what you think the answer to your question will be, IN YOUR OWN WORDS. "If (I do this), then I think (this will happen), because (your reasoning for thinking it will happen)". For example: **If** I plant bean seeds in clay, sand and potting soil, **then I think** the beans will grow bigger in the potting soil **because** potting soil has more nutrients than sand and clay.

Remember, it is ok if you do not have the right answer; that is how scientists and engineers make discoveries. Sometimes you learn more from getting the wrong answer! Remember, use YOUR OWN WORDS. (You can have help writing down your thoughts.)

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4. **Design your Research, Experiment or Test.**

Now that you have a question to investigate and have guessed what you think will happen, it is time to design the experiment or test that will allow you to investigate the question.

A. Identify the variables: Variables are any factors/features that can change or be changed in an experiment or test. List the variables that you are going to keep the same, and the one variable that you are going to change. In changing this one variable you can see if your guess is correct.

Variables staying the SAME	Variable that is CHANGING

B. List the steps: Create a list of steps so that you can perform the experiment, test or research again exactly the same way or someone else could follow your steps to do the same things. Think through each step and list them in order. Indicate how the variable is being changed and how you will record your findings.

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C. Gather materials: List or draw a picture of all the materials you will need to complete your research, experiment or test. Also, include all the equipment you will use to conduct the research.

List/drawings:

D. Conduct the Research, Experiment or Test.

Now that you have all of the important steps planned, it is time to conduct your test or experiment. Gather your materials, have adult supervision and get started. Follow your steps. Be sure to take or draw plenty of pictures and record what you see and any measurements. Did anything change? Did anything stay the same? What created the change?

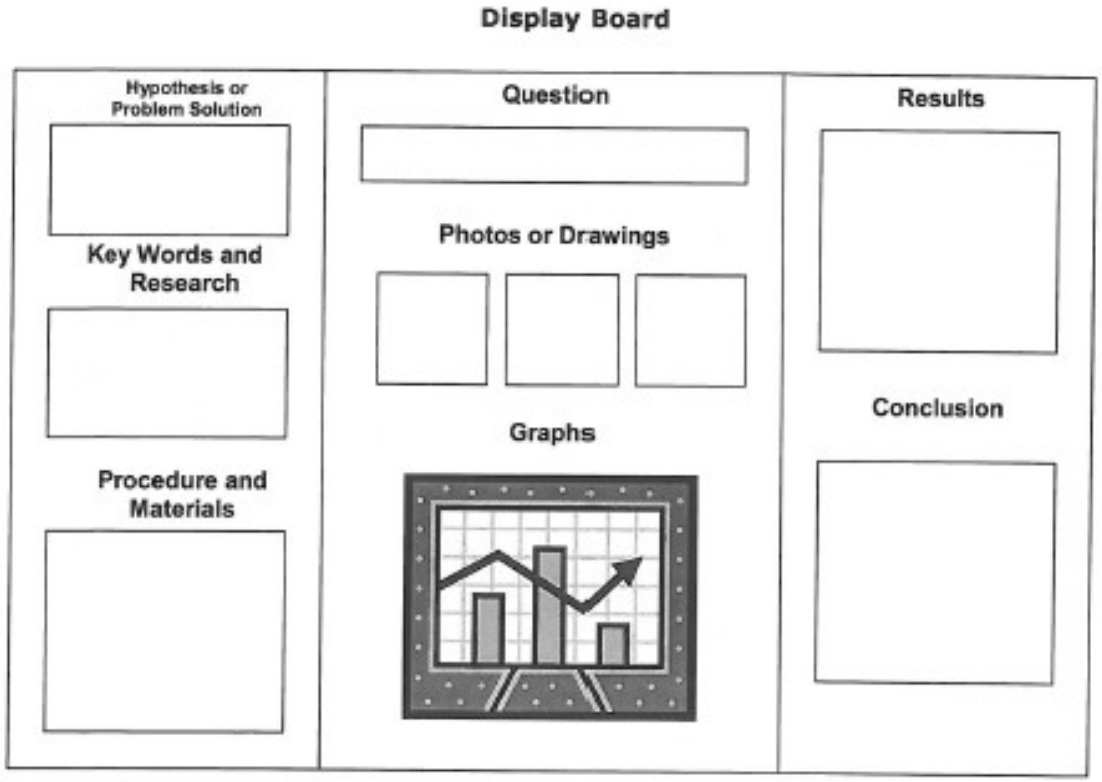
Notes/drawings:

E. Conclusions.

After you have determined the results it is time to decide the answer to your original question. IN YOUR OWN WORDS, share if your original idea was correct or successful. If not, share why you think it wasn't correct. Shae any problems or difficulties that you had in doing the experiment and what you might do differently. Be sure to include what you learned from the experiment and any ways that you can use that information in real life.

Display Board

Now that your experiment, test or research is complete, you will make a display board to share the results with others. Your display board should have as many of the following parts as you can in the locations identified below. You can write the information neatly or type it. Use the pictures you took or drew during the experiment and any graphs that you made. Your parents/guardians can help you.



At the Fair

You will bring your display board and any additional project items to show about your experiment, test, or research to school and share them with your teachers, your friends, and with judges. The judges will ask you questions about your project like: “What was the question or topic you researched?” “What resources did you use for your research?” “How did you perform your experiment?” “What results did you observe?” “What did you think was going to happen in your experiment?” “Is that what actually happened when you did the experiment?” “What would you do differently next time?” “What did you learn from your project?”

Use your own words to answer the questions and share any of the information that you found most interesting or surprising! Don’t worry if you don’t have an answer to every question. The judges just want to know how you approached your project and what you learned in the process! They may share suggestions based on their own experience and knowledge.