2024 STEM Expo Guidelines Packet
UPK, K, 1st and 2nd Grade Students

For up-to-date information and all the forms: ***http://www.ohef.org/stem-expo-2024.html***
Registration forms due on Thursday, December 14th, 2023

Important Dates:

Fri - October 13th, 2023	**Reply to Google survey to show interest**
Thur - December 14th, 2023	**Registration forms DUE**
Tue - January 23rd, 2024	**Posters due in the MPR at Drop-off**
Wed & Thur - Jan 24th & 25th, 2024	**Poster judging for UPK-2nd grade**
Fri - January 26th , 2024	**STEM Expo Award Ceremony - Evening**

Three Types of Projects for UPK-2nd Graders:

Type 1. Collection Projects
Type 2. Traditional Science Fair Projects
Type 3. Innovation Projects

**Please note, the younger student scientists in UPK-2nd grade are <u>not</u> required to have a data log book or journal at their poster display like the older students.*

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Type 1: Collection Project

This type of project works well for most UPK-K students. Collect items of interest from the natural world then analyze/sort/examine them and record the similarities and differences.

Step 1. Choose a **TOPIC** you find interesting.

Examples: *insects, fossils, seashells, leaves, seeds, pond water from separate ponds, feathers, snails, orchard apples, sand samples from different beaches*

Step 2. Ask a **QUESTION** about that topic.

Examples: *Which types of insects live in my backyard (or in a park, or on a farm)?*
What kinds of leaves grow in my neighborhood?
What shapes and sizes of seashells can be found at Carpinteria Beach?
Do the snails in my friend's garden in Arizona look the same as the snails in my garden in California?
How do sand samples from different beaches differ and how are they the same?

Step 3. Do **BACKGROUND RESEARCH** to find information to help you better understand your topic. You will be learning about your topic by reading the work and research conducted by others. You should use **at least two different references** as sources of your background information. Make a list of the references you read and put that list on your poster.

Types of References for Background Research

Encyclopedias/textbooks/books from the library
Magazines - such as Scientific American, National Geographic, Time, Smithsonian
Newspaper articles
Respected websites on the internet
Interviews with experts *(farmers, marine biologists, engineers, mechanics, physicians, exterminators, geologists, dentists, etc.)*

Examples of How to List References

Book:
Smith, G. 2010. Weather Patterns and the Ocean. Little and Brown, Inc., Boston, 23-59.
Magazine:
Cochran, J.A., Wiles, G. and J. Manack. 2012. How Tesla Will Change the World. Smithsonian Magazine. Volume 34 (3): 47-55.
Personal Communications with an Expert (via phone, email, or in person):
Black, Dr. Charles –Interviewed via phone on December 16, 2015. Assistant Clinical Professor of Opthamology, UCLA, Los Angeles, CA.
Internet Resource:
Saved by the Sun-Ask the Expert. Viewed on November 14, 2015. NOVA website. http://www.pbs.org/wgbh/nova/solar/expert.html

Step 4. Form a **HYPOTHESIS**, which is what you think will be the answer to your question from Step 2 above. It is your "best guess" before you actually go collecting.

Examples: *Insects found in my backyard will include beetles and pill bugs.*
A collection of fallen leaves from the local park will include oak tree leaves.
More than 10 different types of seashells will be found at Carpinteria Beach.
A garden in Arizona will have different types of snails than my garden in California.
Sand collected from different beaches will contain different amounts of magnetic particles and broken seashells.

Step 5. Make your **COLLECTION**.

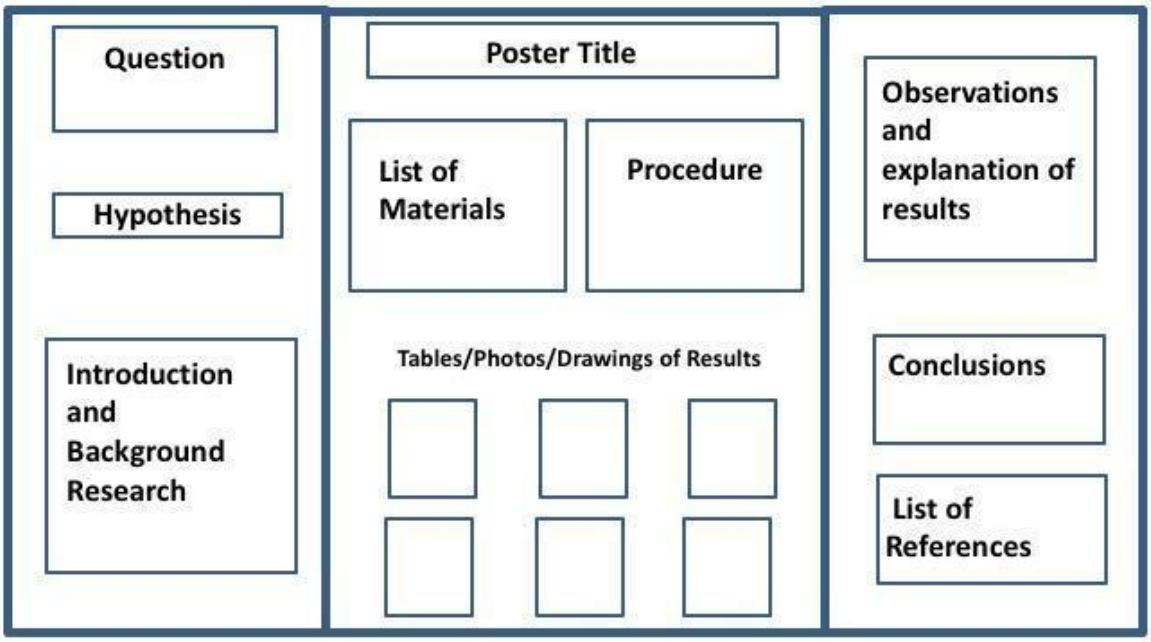
Materials:	Find all the materials you will need to gather/analyze your collection.
Collect:	Have fun collecting! **If your collection project involves living organisms such as insects, take photos and sort the photos rather than collecting and sorting the living organisms.*
Sort:	Once you have your collection together, sort it in two or more different ways. Group your objects in such a way that comparisons can be made.
Analyze/Examine:	How do these items differ, how are they the same, and can I measure any differences? Compare lengths, weights, shapes, colors, textures, presence of something or lack of something, etc.
Record Results:	Take photos or make drawings to record your results. How are the objects in your collection the same? How are the objects in your collection different? Make tables/figures to display the results/observations.

Step 6. Write your **CONCLUSIONS**.

What did you learn from studying your collection? What were the differences and similarities you noticed and what does that tell you about our natural world? What would you do differently in the future if you repeated this project? Look at your results and decide if your hypothesis was supported or not supported by your results. Was your "best guess" correct? Remember, it is absolutely OK if your hypothesis was not supported by your results. That is a normal part of the scientific process. There is no need to change your hypothesis to fit your results.

Step 7. Make your Collection Project **POSTER** for the STEM Expo. The figure below is simply a suggestion for how to organize your poster.

Sample of a STEM Expo Poster Display – K, 1st and 2nd Graders
Collection Projects AND Traditional Science Fair Projects



Posters must be legible and neatly presented on a display board and, due to limited space, can be *no larger than 36 inches tall by 48 inches wide by 18 inches deep*. The poster display board must be able to stand by itself on a table top without support. Your full name, grade level and your teacher's name must be legibly printed on the back of your display board.

* This Sample Display is also for UPK participants.

Type 2: Traditional Science Fair Project

Conduct an experiment using The Scientific Method which includes:

- Selecting a **topic** of interest - Asking a **question** - **Planning** the experiments - Doing **background research** - Making a **hypothesis** - Collecting **materials** and writing out the steps of the **procedure** - Conducting the **experiment** (at least 3 times) - **Measuring and recording the results** - **Showing the results** in pictures/tables/graphs - **Stating your results and conclusions**

Step 1. Choose a **TOPIC** you find interesting.
Example: I see interesting ants…in my backyard and at my picnic!

Step 2. **All great science fair projects start with a great question!** Ask a **QUESTION** about your topic that can be answered with an experiment.

Three Types of Questions for Traditional Science Fair Projects

The "Effect" Question:
What is the effect of _____ on _____?

sunlight	plant height
different oils	the speed at which an item slides down a ramp
temperature	the size of a balloon

The "How Does/Affect" Question:
How does _____ affect _____ ?

temperature	how far a hockey puck will slide
moisture	the distance snails can travel
wearing makeup	people's opinions about celebrities

The "Which/What and a *Verb*" Question:
Which/What _____ *(verb)* _____?

amount of salt	*decreases*	the temperature at which water boils
paper towel	*is*	the most absorbent
smells	*attract*	ladybugs

Example: My observation is that ants seem to be attracted to sugary foods.
My question is: <u>Which</u> type of sugar best <u>attracts</u> ants?

Step 3. Plan an **EXPERIMENT** that is not costly or dangerous, and has **SOMETHING YOU CAN MEASURE** (such as number, length, time, distance, speed, temperature, weight, etc.). Use metric units if possible.

Example: I will count the number of ants from an anthill that are attracted to different types of sugars.

Step 4. Do **BACKGROUND RESEARCH** by reading at least two references about your topic. See page 2 of this Guidelines Packet for a list of "Types of References for Background Research." On page 2 you can find examples of how to properly list your references. Show your list of references on your poster.

Step 5. Write a **HYPOTHESIS**, which is what you think will be the answer to your question from Step 2 above. It is your "best guess" before you actually do the experiment. A hypothesis is sometimes written as an If-Then statement.

Example: If ants have a choice between imitation maple syrup (Log Cabin brand) and real maple syrup, more ants will move toward the real maple syrup.

Step 6. Find the **MATERIALS** you will need for your experiment.

Example: an active anthill, 3 small clean dishes of the same size, one grocery-store purchased bottle of Log Cabin brand imitation maple syrup, one grocery-store purchased bottle of real maple syrup (made from the sap of sugar maple trees), ruler, timer

Step 7. Carefully plan your experimental **PROCEDURE** and write out the step-by-step directions. Conduct your experiment and repeat it at least three times.

*Example: **1)** Put 50 milliliters (mL) of Log Cabin syrup into a small clean dish. **2)** Put 50 mL of real maple syrup into another small clean dish. **3)** Place both dishes 1-inch away from an active ant hill. **4)** Place an empty dish 1-inch away from the same anthill to serve as a control. **5)** Wait three hours. **6)** Count the number of ants in each dish. **7)** Record the data. **8)** Repeat the same experiment two more times, at the same time of day but on different days. **9)** Take photographs of your procedure steps and the results to display on your poster.*

Step 8. Analyze your **RESULTS** by summarizing your findings in the form of data tables, photos and/or drawings. Explain what happened in your experiment and what the data might mean.

Example: Data (number of ants) was collected three times on different days using the same anthill and photos were taken. Real maple syrup attracted 32, 29 and 33 ants and imitation maple syrup attracted 11, 9 and 6 ants. No ants were found in the empty dishes. In this experiment, more ants were attracted to the natural maple syrup (made from tree sap) compared to the empty control dish and the dish containing the imitation maple syrup. Imitation maple syrup contains large amounts of high fructose corn syrup. The main sugar

found in real maple syrup is called sucrose. The behavior of the ants in this experiment suggests that ants are more attracted to sucrose than to high fructose corn syrup.

Step 9. Write your **CONCLUSIONS**. What did you learn from your experiment? Look at your results and decide if your hypothesis was supported or not supported by your results. It is absolutely OK if your hypothesis was not supported by your results. That is a normal part of the scientific process and there is no need to change your hypothesis to fit your results.

Example: *In conclusion, this experiment showed that more ants were attracted to real maple syrup compared to imitation maple syrup. There may be another ingredient in the imitation maple syrup that the ants don't like. Or, the ants may prefer sucrose because it is a quicker source of energy for the ants. The hypothesis for this experiment was: If ants have a choice between imitation maple syrup (Log Cabin brand) and real maple syrup, more ants will move toward the real maple syrup. The hypothesis was supported by the results from this experiment. In the future, more experiments could be performed testing different types of sugary foods or using ants from an ant farm.*

Step 10. Make your Traditional Science Fair Project **POSTER** for the STEM Expo. **See the figure on page 4 of this Guidelines Packet for a suggestion on how to organize your poster.**

Type 3: Innovation Projects

These types of projects seek to solve a problem by 1) creating something new or 2) taking something old and making it better. These projects involve:

Defining the **problem** - Proposing a **solution** - Doing **background research** - Collecting **materials** and writing out the steps of the **procedure** - Making and testing a **prototype** - Recording the **results** - **Making design changes to prototype** based on results - **Re-testing prototype** - Stating your **results and conclusions.**

Step 1.

What is a **PROBLEM** you would like to solve? What can you create to **SOLVE** this problem? Or how can you modify something that already exists to solve the problem? Also, think about what or who could benefit from this project.

Examples:
**How can I improve the design of a vacuum handle so my grandma with arthritis can more easily use the vacuum?*
**How can my dog get in and out of the house without using a traditional doggie door?*
**How can I help my little sister get up and down the stairs safely?*
**How can we stay cool while sitting in the sun at this sporting event?*
**How can I design a better life vest for water safety?*
**How can I help my grandparents be more active by creating a new app on their phone?*

Step 2.

Perform **BACKGROUND RESEARCH**: Find different references and **read** about your chosen problem and the other solutions people may have attempted to solve this problem. You should use **two different references** for your STEM Expo project - see page 2. Also, on page 2 you can find examples of how to properly list your references.

Step 3.

List all the **MATERIALS** you will need and the **PROCEDURE** for testing your prototype (which is your first model of your creation).

Step 4.

BUILD/CREATE your prototype and then **TEST** its function.

Step 5.

RECORD exactly what happens and write the **RESULTS**.

Step 6.

REDESIGN and **RETEST** your model – were the results reproducible? Make adjustments and redesign and retest again!

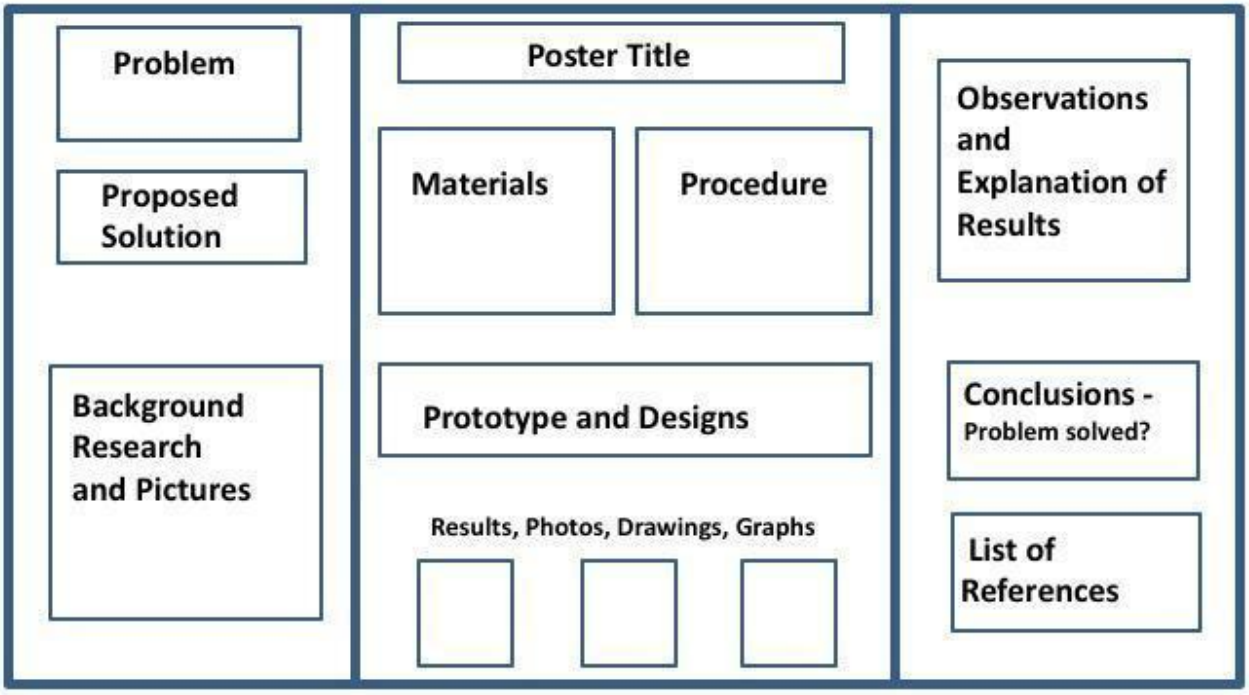
Step 7.

Report your **RESULTS** and make **CONCLUSIONS**. Does your design effectively solve the problem or meet the need? Who or what will benefit from your innovative project?

Step 8.

Make your **POSTER** for the STEM Expo. The following image is a suggestion of how to organize your poster.

Sample of a STEM Expo Poster Display – K, 1st and 2nd Graders
Engineering/Design/Computer Projects



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