

## OAKWOOD ELEMENTARY

### STEM Fair 2022 4<sup>th</sup> and 5<sup>th</sup> Grade Guidelines

**Preapproval Forms Due: Friday November 19<sup>th</sup>, 2021**

**Projects Due: Monday, December 8<sup>th</sup>, 2021**

**Judging: Tuesday, December 9<sup>th</sup>, 2021**

Welcome to the STEM Fair for Oakwood 5<sup>th</sup> graders! At this level, your hard work can pay off with a trip to the District or even the Regional STEM Fair. All kinds of Science, Technology, Engineering, and Math projects are eligible to participate in the Fair. We can't wait to see yours!

Because your project may be chosen as an outstanding project that advances to the District Fair, it is important to adhere to specific guidelines outlined by the District STEM Office. This handout summarizes the process of the Fair for 5<sup>th</sup> graders, as well as gives guidance about topic selection, safety rules, and laboratory notebooks. **Engineering projects are welcomed, but they do follow different guidelines than other STEM projects.** The Oakwood STEM Fair General Information Handout (also emailed to you from the school) has useful information about differences in a Science project and an Engineering project, The Scientific Method, a recommended timeline, and suggestions about websites with topic ideas. Please use this as a resource as well. If you need a physical copy of the General Information Handout, please check in the main office. **Still have questions? Please ask!**

The regional and district science fairs **REQUIRE that students get pre-approval for their project BEFORE beginning experimentation.** This is a pre-write of your student's project and will require time and signatures (including supervising scientists, in some instances) to complete. This form was given to your student in class. **This form MUST be returned to your teacher by Friday November 19<sup>th</sup>, 2021.** The form can be found at: [https://usef-downloads.s3.amazonaws.com/forms/2020\\_elementary\\_junior\\_division.pdf](https://usef-downloads.s3.amazonaws.com/forms/2020_elementary_junior_division.pdf)

The top projects from Oakwood Elementary (up to 15 projects) will be able to submit a VIRTUAL project (i.e. an electronic file of your STEM Fair project) to the Granite School District for consideration for the District Science Fair. **The virtual project will be due at the District (electronically) on January 24, 2022, by 3 p.m.** I encourage students to prepare their display board using the computer (Google Slides is the easiest format) so those files can easily be used for the Virtual Fair. Virtual projects chosen by the District (winners will be notified on January 31<sup>st</sup>, 2022) will participate in the District "In Person" STEM Fair on February 7<sup>th</sup>, 2022.

The District is encouraging originality in projects – see the extensive list of “What NOT to DO” in this packet. **This is not meant to discourage you, but rather to encourage you to be innovative**

and scientifically engaged. If you are interested in a topic on the "What NOT to Do" list, make sure you take a unique angle and have a well-created project with a single variable and many trials. Most of all we want you to enjoy the process and have fun learning to do science!

Included in this packet are the judging guidelines. We will judge the Oakwood projects with the "GSD District In-Person Fair Rubric". Review this as you complete your project in order to be sure to address all of the required elements. We are encouraged by Granite School District to only send projects to the Virtual Fair that have a score of 90 or above.

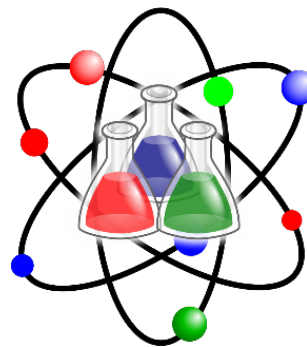
All district information is available on the Granite District Science Fair website:

<https://sites.google.com/granitesd.org/gsdscience/stem-fair> Click on the "Granite STEM Fair Handbook 2022" for more complete information. *Subsequent pages in this handout are from the District Handbook.*

Projects should be experiments or engineering design projects, **NOT demonstrations or reports** and should reflect the student's own work and ideas. Please refer to the General Information Handout for 3<sup>rd</sup>-5<sup>th</sup> grade for a list of resources to help you select project ideas. The following list outlines topics that are **commonly seen at STEM Fairs and are not generally competitive enough to win awards**. **Students should avoid these projects**. Chances are if you got the project in a book, it may not be competitive. **Use caution in finding a project online for inspiration—there is a difference in getting an idea from another project and just copying someone else's work! Projects Not Recommended**

- Effect of music/talking/colored light/different liquids on plants
- Effect of cola, coffee, etc. on teeth, tooth decay, coloring, etc.
- Effect of running, jumping, music, video games, movies, etc. on blood pressure
- "Which brand is best?" -- (which popcorn pops better; which soap, fertilizer, paper towel, battery, laundry soap, etc.)
- Hovercraft design and Basic maze running
- Simple preference: what do girls/boys/cats/dogs like better
- Effect of color on memory, emotion, mood, how food tastes, etc.
- Optical illusions (including stroop effect)
- Reaction times in general and distractions effecting reaction speed

- Many male/female comparisons, especially if bias shows
- Build a “kit” (solar, robotic, etc.)
- How the amount of music/video games/sleep affects learning
- Taste/color or paw-preferences of cats, dogs, fish, etc.
- Ball bounce tests with poor measurement techniques
- Magnet demonstrations (or hot/cold magnets)
- Fingerprints, heredity, and memory tests
- Growing bacteria from doorknobs, student’s hands, places at school, hand sanitizer tests
- Types of Insulation effectiveness
- Coke & Mentos/volcanoes



### Projects we DO need more of:

- Computer science
- Mathematical applications
- Engineering

### Online Resources

- Below are a number of different websites which offer great ideas and information for science/STEM Fair projects. Check out the different sites and find an idea that sparks your curiosity. Remember, some of these projects are done commonly--if you choose one of these, make sure you do a clear, complete job, with multiple trials and thorough explanation. Even better, find a way to change the research question to make it more unique!



--District STEM Fair: <https://sites.google.com/granitesd.org/gsdscience/stem-fair>

--Regional STEM Fair: <https://usef.utah.edu/> (includes links to help find local labs and experts)

### --Additional Resources:

<http://www.sciencebuddies.org>

<http://faculty.washington.edu/chudler/fair.html>

<https://sciencebob.com>

<http://sciencefair.math.iit.edu/>

<http://www.education.com/science-fair/>

[@wonder\\_kids\\_stem on Instagram](#)

Please don't hesitate to contact me with any questions. We hope you have a great experience with your projects and we look forward to seeing them in December!

Jenette Stewart, STEM Fair Chair, [Jenetestewart@gmail.com](mailto:Jenetestewart@gmail.com) , 801-824-7747

## **Safety Guidelines:**

At Oakwood, we follow all district and regional fair safety guidelines. Highlights are included on the following pages of this handout. Projects which do not meet safety guidelines will not be eligible for Oakwood judging. **Additional rules need to be followed if you are experimenting on humans or animals.** You *must* have one human consent form per participant, *with appropriate signatures*, where applicable. This form is included in this packet.

## ***Is it OK to do a project about...?***

For the safety of the students as well as following all the guidelines at the District and Regional Fairs, here is a quick guide to avoiding problems with your projects.

### **1. I want to have PEOPLE be a part of my project**

- No-Skip to #2
- Yes-See page 5. You will also need to have EVERY person fill out an Informed Consent Form (pg. 7) if you have them:
  - Eating/drinking something
  - Asking them survey questions
  - Doing something physical like running, jumping, walking

### **2. I want to have ANIMALS be a part of my project**

- No-Skip to #3
- Yes-To avoid animal cruelty, any project with animals other than observing behaviors of pets needs a vet's signature before beginning. See page 5.



### **3. I want to have BACTERIA/MICROBES/FUNGUS be part of my project**



- No-Skip to #4
- Yes-You CANNOT grow bacteria at home or at the elementary school. See page 5. Emily Harward (District STEM Coordinator) can help you find a lab to grow bacteria. [eharward@graniteschools.org](mailto:eharward@graniteschools.org)

### **4. I want to have WEAPONS/HAZARDOUS CHEMICALS/FIRE be part of my project**

- No-Skip to #5
- Yes-You will need to check with your teacher, Jenette Stewart (school STEM Fair coordinator) and Emily Harward (District STEM Fair coordinator) for pre-approval. If you aren't sure if it's a hazardous chemical, contact Emily Harward.

### **5. My project idea is on the "Not Recommended" list on page 4-is that ok?**

Those projects are usually not competitive enough to make it to District or Regional fairs but, yes, you may do one.

### Rules for Experiments Involving Animals

Student projects that use living organisms (excluding plants) must follow these guidelines:

1. Behavior observation studies or supplemental nutritional studies involving pets may be done at home. Any other experiments involving laboratory animals CANNOT be conducted in a student's home. It **MUST** be done in a lab. Proper animal care must be provided daily, including weekends, holidays and vacations. Experimental procedures that cause unnecessary pain or discomfort are prohibited. Experiments designed to kill vertebrate animals are NOT permitted. Experiments with a death rate of 30 percent or higher are NOT permitted.
2. A veterinarian's signature is required of ALL projects with vertebrate animals (except behavior observations of pets).



### Rules for Experiments Involving People

Experimentation on humans must conform to the same regulations as other animals. Human studies (including surveys, taste testing, and physical exertion) **must have an Informed Consent Form** signed by the participant and the parent/guardian. **One form should be completed for each participant.** This form is included in this packet or page 3 of the District STEM Fair Handbook. Hard copies are also available in the main office.

Institutional Review Board (IRB) approval is required for projects using Informed Consent Forms. The IRB will be the classroom teacher, the STEM Fair coordinator and, when needed, an administrator. Contact Emily Harward or Megan Black at the District Office with questions.

### Rules for Experiments Involving Pathogens (including bacteria cultures)

**Culturing Bacteria: Bacteria/Fungus may NOT be grown at home or at an elementary classroom.** Pathogenic bacteria experimentation is prohibited. Other bacteria experiments must have sealed Petri dishes. As part of the project, the student should have a plan for disposal, and the experiment must be done in a BioSafety Level (BSL) 1 or 2 lab (the GTI offers its lab as a location for growing bacteria). Projects not following this guideline will be disqualified. If you need help locating a lab, contact Emily Harward, District STEM Coordinator.

## Hints for Keeping a Project Data Book

A project data book is your most important piece of work. Accurate and detailed notes make a logical and winning project. Good notes show consistency and thoroughness to the judges and will help you when writing your research paper.

### Project Notebook Guidelines

- Don't remove any pages. Simply put a line through errors.
- All pages should be numbered before any data is entered.
- All entries should be dated.
- Each new entry should begin on a separate page.
- Use more than one notebook if necessary.
- All entries must be legible if handwritten

### Contents of the Project Data Book

- List of potential STEM Fair projects
- Project title
- Experimental design (identification of variables, etc.)
- Data tables (raw and summary data)
- Regular observations (similar to a diary)
- Calculations
- Graphs
- Ah-ha! moments
- Types of error you may have made
- What you might want to try next

### Documentation: The proof that the experiment was completed

- Date all entries in the Project Data Book.
- Photograph whenever possible. Photograph the progress in various stages when possible.
- If scientific equipment is used (spectrometer, HPLC, IR, NMR) save all printouts from the machine.
- If the project is to be a continuation from past years you must have all your old notebooks.
- The burden of proof that the project was completed is on the student. To avoid any questions as to the validity of your experiment you should document everything.

### Reference Page

- Reading notes from literature pertaining to the project, including references and citations.

## What do I turn in?:



The ONLY items which should be brought to school for the Science Fair are the project board (blank boards will be provided to each child by their teacher) and the project log book. Photos and written/verbal descriptions of experiments are terrific! But NO EXPERIMENTS SHOULD BE BROUGHT TO SCHOOL. Per the guidelines, experiments brought to school will result in the project being disqualified. This is

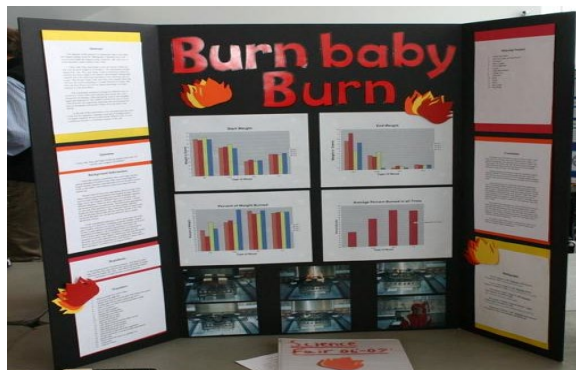
for safety reasons. If necessary, a laptop with video of a part of your project will be allowed. The laptop should be brought from home with the battery charged, as there are no power outlets that will be available during judging. The district provides a great notebook template to follow found at the link below:

<https://docs.google.com/document/d/1OQp1fDCd9Nes-JVYhdNGUhFckNmtymJlSL9iaxiLG9s/edit>

## Display Board Contents

An example of a display board is shown. The following are components that should be included.

- Title
- Your Name and Grade
- Question or Problem
- Hypothesis or Design Goal
- Research
- Experiment or Engineering Process
- Data, Graphs, Diagrams and Pictures
- Conclusion
- Works Cited



Feel free to rearrange the elements, but each concept should be included. "The Process of a Research Experiment" (pg. 4) or "The Process for an Engineering Project" (pg. 5), will also help you to know what type of ideas you should include. Don't forget to pay attention to neatness and spelling--typewritten boards are not required, but are easier for your classmates and judges to read.

## Safety

Proper attention to safety is expected of all science fair participants. **No portion of your experiment should be brought into the school; non-adherence means disqualification.** ONLY your display board and logbook should be brought to school. If needed, a laptop with a video of some part of your project may also be present. (The battery for the laptop should be charged as there are not power outlets available.)

# Informed Consent Form

## Grades 5-12: for projects testing/surveying people

This form must be signed by the parents or guardians of all subjects who are under 18. Form kept by STUDENT scientist in his/her Project Data Book

Student Researcher's Name \_\_\_\_\_

Title of Project \_\_\_\_\_

Adult Sponsor \_\_\_\_\_ Phone \_\_\_\_\_

Your child has been asked to participate as a subject in a STEM Fair project. The purpose of this form is to notify you of any possible risks and obtain your permission for him/her to participate. The student researcher will be supervised and any surveys or questionnaires should be attached to this page. (This project has been reviewed and approved by an Institutional Review Board. If you have any questions, please contact the Adult Supervisor listed above)

To be completed by the student researcher:

1. What will you ask the subjects to do?

2. Will your subjects be eating or drinking anything? No \_\_\_\_\_ Yes \_\_\_\_\_

If yes, what will they eat or drink? \_\_\_\_\_

3. Will your subjects be doing any kind of exercise? No \_\_\_\_\_ Yes \_\_\_\_\_

If yes, what will they do? \_\_\_\_\_

4. Will your subjects be answering questions or completing a survey? No \_\_\_\_\_ Yes \_\_\_\_\_

If yes, please attach a copy of the questions to this page.

To be completed by the subject prior to the experiment:

\_\_\_\_\_  
Subject's Name                      Signature                      Date

For subjects under 18 years old, a parent/guardian must give permission for participation:

I understand what my child will be doing and am aware of any possible risks.

\_\_\_\_\_  
Subject's Name                      Signature                      Date

\_\_\_\_\_  
Project's Adult Supervisor (Most likely the classroom teacher)

## 2022 Granite School **District In-Person** STEM Fair Judging Rubric

*This is the form which Oakwood Elementary will use to judge projects.*

<b>Interview &amp; Display (up to 15 points)</b> An excellent student will be able to explain in detail their research and experiment designs as well as interpret charts and graphs. Students should be able to explain the significance of their findings, usefulness and new questions/experiments that may arise from their research.	
<b>The Question (up to 10 points)</b> An excellent question will be interesting, creative, worded scientifically and relevant to the world today. You should also include your thought process and preliminary research on why you selected the question.	
<b>Hypothesis (up to 10 points)</b> An excellent hypothesis will lead on from the question, be tightly focused and build on existing knowledge and be testable. A hypothesis should be a concise statement of what they think will happen and explanation of why they think that will happen. It may be in an if/then or because statement. An Engineering/Invention project will have a design goal instead of hypothesis.	
<b>Research (up to 10 points)</b> Excellent students will undertake research to help them shape their question and hypothesis and to put their work into a relevant, real-world context. Engineering/Invention projects show research of how the new product will meet a need better than an existing product. It will detail how the project fills a need.	
<b>Experiment (up to 30 points)</b> Excellent students will demonstrate that they have used good experimental techniques and describe their experiment clearly and in detail. Multiple trials are an expectation in good experimentation. It should include a summary explaining the procedures, variables, materials, and testing/experimental trails. Engineering/Invention projects should show schematics, assembly information, refining of design, and prototyping.	
<b>Data/Observations (up to 20 points)</b> Excellent data will be relevant, sufficient to support a conclusion and should be recorded accurately and precisely, and be presented clearly. Excellent observations will describe patterns or trends supported by the data. Engineering/Invention projects show evidence of testing and the applications of the invention.	
<b>Conclusion (up to 5 points)</b> An excellent conclusion will explain how the experiment answers the question or why it fails to do so and whether or not it supports the hypothesis. Engineering will explain how their design met or did not meet the design goal.	
<b>Total</b>	

## Student Planning Guide (5 Week Plan)

### Week 1 (Week of November 2<sup>nd</sup> and 8<sup>th</sup>, 2021)

- ✓ Identify topics that interest you
- ✓ Start a project notebook (logbook) to record your ideas and research
- ✓ Review the Scientific Method
- ✓ Gather Information (research) books, experts, interviews



### Week 2 (Week of November 15<sup>th</sup>, 2021)

- ✓ Choose a topic and record your hypothesis in your logbook
- ✓ Organize and plan the experiment—record this information in your logbook
- ✓ Think about how you will display your work
- ✓ Turn in your pre-approval form (Due Nov 19<sup>th</sup> for 4th and 5th grades only)

### Week 3 (Week of November 22<sup>nd</sup>, 2021)

- ✓ Conduct experiment
- ✓ Take pictures of your project
- ✓ Do more than one trial of experiment – Keep track of data
- ✓ Continue to write in project notebook
- ✓ Have fun!

### Week 4 (Week of November 29<sup>th</sup>, 2021)

- ✓ Remember, if your results aren't what you expected, it isn't failure.
- ✓ Look at your results and figure out what happened
- ✓ Make adjustments and try again, if needed
- ✓ Analyze results and make conclusions
- ✓ Write in your project notebook
- ✓ Complete your project, record and write up your results



### Week 5 (Week of December 6<sup>th</sup>, 2021):

- ✓ Make graphs, charts and heading for display (computers help a lot with this info)
- ✓ Set up your display
- ✓ Review your work – Practice your presentation to answer judge's questions
- ✓ **Be sure to put your name on your project** – you can be proud of your effort and work.
- ✓ Acknowledge those people who helped you!
- ✓ Turn in project Wednesday December 8<sup>th</sup>!

## The Scientific Method

### Identify the Problem

This is an important step in the scientific process. Topics can be very large and often need to be narrowed down to something that is easier to study.

### Refer to Authoritative Sources

Reading books, magazine articles, and reputable websites will help the student learn about their topic of interest. All good scientists will first learn basic facts about their subject before conducting their research. A visit to the local library, a trip to the Zoo or Aviary, or visiting a local garden shop may help the student learn new information about the topic.

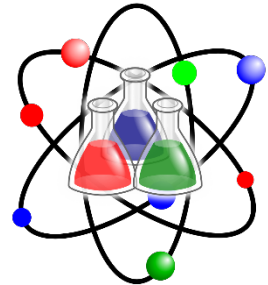


### Ask an Appropriate Question

If a student is interested in plants, asking various questions related to plants may help the student to choose a topic. How do plants grow? What nutrients are needed? How much water do they need? Can they grow using different liquids?

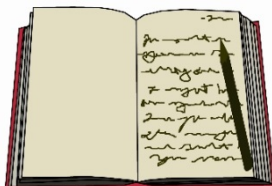
### Develop a Hypothesis

A hypothesis is an educated guess--a statement of how the scientist thinks the experiment will turn out. It is a prediction, based on the best available information of what the scientist believes will happen at the end of the experiment. Examples include: "Plants will not grow without sunlight" or "clothes will be cleaner using the hot water cycle of the washing machine rather than the cold water cycle."



### Conduct An Experiment

This involves testing your hypothesis. A student will learn what happens when a condition is created or changed. Whether plants will grow without sunlight can be tested by planting two groups of plants and then allowing one to have sunlight and the other to have no contact with light of any kind. What happens to the plants? Can your question be answered?



### Keep Detailed Records of Methods and Results

In order to come to a conclusion, students should keep a log or record of their work. Observations and summaries of the “events” of the experiment will help the student find the answer to their questions. They will then be able to analyze the results of their experiment.

## The Scientific Method (cont.)

### Analyze the Results

What facts or numbers were produced as a result of the experiment? Analyzing the results allows the student to look at the information from the experiment and develop a conclusion or answer to the questions that were originally asked. It is often helpful to summarize findings in a graph or table of information.

### Develop a Conclusion

The conclusion should provide some answer to the original question. For example, if your hypothesis was that clothes get cleaner using the hot water cycle and if, in fact, through your experiments, you discover that this is true, then your conclusion would be that clothes do become the most clean using hot water. It is often most interesting when the hypothesis is found to be incorrect, and the experiment proved something unexpected to be true. A conclusion can also tell why information is important, or what future action should be taken as a result of the results of the experiment.

