A STEM Fair Project must answer a question. Demonstration projects are interesting, but do not fulfill the Scientific Method. The best projects are those that answer a simple question, use only one variable (don't try to test the answer to more than one question), and involve multiple trials.

Oakwood Elementary will observe Granite District STEM Fair safety rules at all grade levels (see below for highlights.) We also utilize the "GSD District STEM Fair Judging Rubric". For more complete information about safety rules and judging criteria, the link to the Granite School District STEM Fair Handbook is as follows:


The Granite School District STEM Fair website site also has many helpful suggestions under the "Help Documents for STEM Fairs" heading. http://www.graniteschools.org/curriculuminstruction/science-k-12/science-fair/

Judging, Outstanding Projects, and Advancing to Further Competition: At Oakwood’s Fair, judges will select up to 20 qualified projects from the 5th and 6th grades to participate in the Granite District STEM Fair. (A detailed handout has been prepared for 5th and 6th grade students because it is important that they follow specified criteria if their project is chosen to advance. This handout was emailed to parents. Hard copies will be available from Oakwood’s Main Office, if needed.) The students selected to advance will first submit their work as a PowerPoint to the District "Virtual" Fair. Virtual Fair entries will be narrowed by District judges for advancement to the District "In-Person" Fair, and then to the Salt Lake Valley Science and Engineering Fair. Additionally, at the school level, we will acknowledge outstanding projects in the 3rd and 4th grades. K-3rd grade class projects are not judged, but each student will be recognized for their participation and classes will have the opportunity to present to peers in their grade.

TOPIC categories (Projects must fit within one of twelve following):
- Behavioral & Social Sciences
- Biology & Biochemistry
- Chemistry
- Earth and Environmental Sciences
- Energy: Chemical and Physical
- Engineering: Civil and Environmental
- Engineering: Electrical and Computer Science
- Engineering: Materials and Biomedical
- Engineering: Mechanical
- Medicine and Health Sciences
- Physics, Astronomy, and Math
- Plant Sciences

Engineering Projects: Engineering projects can follow a different process than science experiments. Guidelines are found on page 23 of the District STEM Fair Handbook.
Project Data Book (required in 3rd-6th grades): Each project needs to have a project data book on display. It should contain detailed notes about the project, recorded as the project progresses (not after it has been completed). There should be lots of information included--ideas, amounts, steps, errors, results, drawings, formulas, etc. Data tables, information collected, and observations should all be recorded here. Make sure entries in the data book are dated. This is also where students should place permission forms for human test subjects. The book may be handwritten, but needs to be legible!

Safety: Proper attention to safety is expected of all science fair participants. No portion of your experiment should be brought into the school. This includes bacteria, food, flammables, chemicals, lasers, dry ice, and like items. ONLY your backboard and logbook should be brought to school.

Pathogens, including 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. Must be done in a BSL 1 or 2 lab (the GTI offers its lab as a location for growing bacteria). Projects not following this guideline will be disqualified. Please observe this District requirement!

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

Behavior observation studies or supplemental nutritional studies involving pets may be done at home. Any other experiments involving laboratory animals (rats, mice, hamsters, gerbils, rabbits, etc) cannot be conducted in a student’s home. 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.

A veterinarian’s signature is required of all projects with vertebrate animals (except behavior observations of pets).

Human Experimentation: Experimentation on humans must conform to the same as animals. Human studies (including surveys, taste testing, and physical exertion) must have prior approval from the mentor teacher or district science specialist and permission slips signed by the participant and parent/guardian. One form should be completed for each participant. This form is pg 26 of the District STEM Fair Handbook.
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!


Regional STEM Fair website: [https://slvsef.org/](https://slvsef.org/) (includes links to help find local labs and experts)

Additional Resources:
- [http://www.sciencebuddies.org](http://www.sciencebuddies.org)
- [http://faculty.washington.edu/chudler/fair.html](http://faculty.washington.edu/chudler/fair.html)
- [https://sciencebob.com/](https://sciencebob.com/)
- [http://sciencefair.math.iit.edu/](http://sciencefair.math.iit.edu/)

Display Board Contents

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

- Title
- Your Name, Grade and Teacher
- Introduction or Purpose
- Hypothesis
- Procedure
- Data, Graphs, Diagrams and Pictures
- Results
- Discussion

Feel free to rearrange the elements, but each concept should be included. “The Process of a Research Experiment”, listed below, 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.
The Process of a Research Experiment

1. Identify your hypothesis
2. What is it that the experiment is about? What are you investigating and why (what are your goals for the research experiment?)
3. Explain how you went about investigating it
   a. Discuss the steps you followed in designing and conducting the experiment, including your setup, the equipment and tools you used and how you used them.
   b. Use drawings or pictures as well as words to illustrate your work
4. List the data you collected
   a. Use tables, graphs, or any other charts that help organize and present your data.
5. Analyze the data you collected
   a. Does the data address your goals?
   b. Justify your results using the data
6. Conclusions and Results
   a. What exactly did you do?
   b. What observations did you make?
   c. What are your findings?
   d. How do they meet or not meet your goals?
   e. Are the findings what you expected?
   f. Discuss the strategies you attempted in setting and carrying out your work (and how successful they were), your analysis, any unexpected results, errors, possible alternative findings, and explanation.
   g. Discuss any revisions that you think may be necessary to your methods and findings.
7. Reflections (included in your Discussion section)
   a. What did you think of this experience?
   b. What did you learn?
   c. How did this activity help you (or not?)
   d. What were some of the issues and how did you address them?
8. Suggestions
   a. How could your results help someone (what group might be interested in knowing more about your results or could benefit from your research?)
   b. What will you try next?

Student Planning Guide (6 Week Plan)

**Week 1** (Week of Dec 5, 2016):
- 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 Dec 12, 2016):
- 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

**Week 3** (Week of Dec 19, 2016):
- Turn in your pre-approval form (for 5th and 6th grades only)
- 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 Jan 2, 2017):
- 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
- Make conclusions
- Write in your project notebook

**Week 5** (Week of Jan 9, 2017):
- Complete your project, record and write up your results
- Make graphs, charts and heading for display (computers help a lot with this info)

**Week 6** (Week of Jan 16, 2017):
- 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!
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?
The Scientific Method (cont.)

**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.

**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.