CALLING ALL BRIGHT IDEAS !

2019 MORNINGSIDE STEM FAIR

	K-4th	5th
Preapproval Form due	---	Thursday, Jan. 3 2019
Backboard and Logbook due	Monday, Jan. 14, 2019	Monday, Jan. 14, 2019
STEM Fair Judging (3rd-5th)	Tuesday, Jan. 15, 2019 (K-2nd, in-class sharing)	Tuesday, Jan. 15, 2019

WHY STEM?

Get excited about Science, Technology, Engineering, and Math through hands-on experience! Gain knowledge. Try something new. Think creatively. Everyone can do STEM!

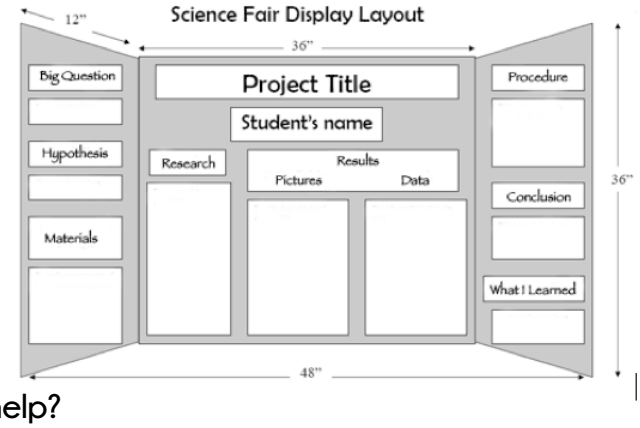
HOW do I start?

Find an interesting topic, and choose a *focused question that can be answered through an experiment.* Begin now--you want enough time to do your experiment well and to create an eye-catching backboard.

WHAT do I turn in?

Turn in backboard and logbook (required grades 3-5) only. Do not bring experiments to school. Photos of your experiment are great! Great backboards will include the following ideas--and remember, neatness counts:

SCIENCE FAIR PROJECT BOARD



WHERE do I get help?

Every class receives a kickoff presentation from the STEM Fair Committee. Go to http://morningsidepta.org for extensive handouts with school-specific guidelines, ideas, and resources (including terrific project website suggestions). Your teacher should also distribute these electronically. Tips will be included in the December and January school newsletters.

WHO works on the project?

STEM Fair is a student learning experience! But parent help *is essential* for instruction, encouragement, and safety. Help your child learn something new while doing the best project *he or she* can. In almost all cases, the STEM Fair project is an at-home experience. Pairs/triples can work together, as long as students are in the same grade and "school" (Morningside/Morningside Magnet are different "schools", according to District STEM rules).

More questions? Toni Mehraban (STEM Fair Chair) - tmehraban@gmail.com or 385-253-0684

Further Project Details (Including Safety Policies)

A STEM Fair Project must answer a question. Demonstration projects are interesting, but do not fulfill the Scientific Process. 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.

Morningside Elementary observes Granite District STEM Fair safety rules at all grade levels (see below for highlights.) We also utilize the "District STEM Fair" judging rubric. Please visit the District STEM Fair site and click on the "GSD 2019 STEM Fair Handbook" for more complete information:
http://www.graniteschools.org/curriculuminstruction/science-k-12/science-fair/
This site also has many helpful suggestions under the "Help Documents for STEM Fairs" heading.

Advancing to Further Competition: Judges will select up to 15 qualified projects from each school from the 5th grade to participate in the Granite District STEM Fair. (5th grade students will receive additional detailed handouts about this process; for the purposes of the District Fair, Morningside Elementary and Morningside Magnet are considered two different schools.) These students will first submit their work as a PowerPoint to the District "Virtual" Fair. These 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-2nd graders are not judged, but will receive certificates of participation and the opportunity to present to their classroom peers. But remember, the true reward is the fun of experimenting!

Topic Areas: Projects must fit within one of twelve following categories:

Behavioral & Social Sciences	Engineering: Electrical and Computer Science
Biology & Biochemistry	Engineering: Materials and Biomedical
Chemistry	Engineering: Mechanical
Earth and Environmental Sciences	Medicine and Health Sciences
Energy: Chemical and Physical	Physics, Astronomy, and Math
Engineering: Civil and Environmental	Plant Sciences

Engineering Projects: Engineering projects can follow a different process than science experiments. Guidelines are found on page 21 of the District STEM Fair Handbook.

Project Data Book (required in 3rd-5th grades): Each project needs to have its project data book on display. It should contain detailed notes about the process of the project, taken as the project goes along (not after).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:
1. 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.
2. 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 23 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!

District STEM Fair website: http://www.graniteschools.org/curriculuminstruction/science-k-12/science-fair/

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

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/

DISPLAY BOARD CONTENTS

Both the first page and this page of this handout show sample display boards. Feel free to rearrange the elements, but be sure to include each concept. "The Process of a Research Experiment," below, will also help you 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.

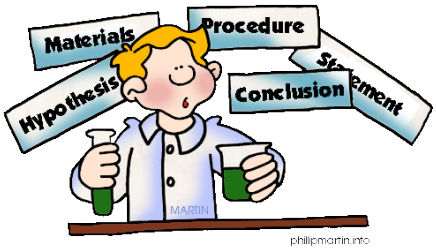
PURPOSE	TITLE/QUESTION	PROCEDURE
HYPOTHESIS	DATA	RESULTS
YOUR NAME, GRADE & TEACHER	GRAPH	DISCUSSION

The Process of a Research Experiment

1. What is it that the experiment is about? What are you investigating and why (what are your goals for the research experiment?)
2. 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
3. List the data you collected
    a. Use tables, graphs, or any other charts that help organize and present your data.
4. Analyze the data you collected
    a. Does the data address your goals?
    b. Justify your results using the data
5. Conclusions
    a. What exactly did you do?
    b. What observations did you make and what are your findings?
    c. How do they meet or not meet your goals?
    d. Are the findings what you expected?
    e. 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.
    f. Discuss any revisions that you think may be necessary in regard to your methods and findings.
6. Reflections
    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?
7. 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?

Adapted from NSTA Science Scope Magazine, “Tried and True: Teaching the practice of science, unteaching the scientific method”, Summer, Volume 33, 2010.

STUDENT PLANNING GUIDE
6 WEEK PLAN



Week 1:
Choose a topic (put it as a question)
Learn the Scientific Method
Gather Information (research) books, experts, interviews
Get approval from the teacher & fill out pre-approval form (5^{th}/6^{th} only)

Week 2:
Start a project notebook (log) to record your research
Organize and plan the experiment
Think about how you will display your work
Write in data, progress in project notebook

Week 3:
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:
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
Analyze results
Make conclusions
Write in your project notebook

Week 5:
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:
Set up your display
Review your work – Practice your presentation to answer judge's questions
Be sure to put your name on 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 AUTHORATITIVE 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.

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 you 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.