Dear students and parents:

Welcome to Maple Grove's Science Fair! Please read this entire Information Guide—it will help you to select and perform your experiment, prepare your display and experiment notebook, and tell you how to get your questions answered. Our Science Fair has five parts:

1. Ask a question, then design and perform an experiment to answer the question.

2. Prepare a display showing the experiment and its results and write in the Experiment Notebook.

3. Set up the display at school.

4. Discuss the experiment with a visiting scientist and explain it to other Maple Grove students.

5. Attend the Science Fair celebration.

Each participant will receive a certificate signed by a visiting scientist, a Science Fair name badge and ribbon, and recognition during the Science Fair celebration.

Science Fair is for all students at Maple Grove. Parent contacts are assigned to each student to help students develop project questions and develop their experiments. So give it a try, we've got lots of resources to help you do your Science Fair project and have fun!

What to Find in This Guide

Maple Grove's Science Fair

Using Jefferson County School District's guidelines for science fairs, the parents at Maple Grove developed our Science Fair to provide students the opportunity to learn about *experimental science*. *Experimental science* is the search for cause and effect relationships in nature and the universe. These relationships are explored by using the *experimental scientific method.*

The *experimental scientific method* is a series of steps that will help a student systematically investigate the relationships he or she has observed.

Experimental Scientific Method and Process

a. **Your Experiment -** Ask a question or present a problem that can be stated in terms of a hypothesis (an initial guess) that can be tested.

b. **Design and perform an experiment** to check the initial guess or hypothesis. An *experiment* is the tests done to check the hypothesis. To design the experiment, the student must make a guess about the things that affect the system he/she wants to investigate. These are called variables, because varying one of these things may change the results of your experiment. Be sure to record the results of your experiment!

c. Perform your experiment. Do your experiment, observe everything that happens and record it in your Experiment Notebook.

d. **Summarize and draw conclusions.** Summarize the results of your experiment and draw conclusions about the hypothesis and variables used in the experiment.

e. What went wrong. It's OK if your experiment didn't turn out as you expected**.** Try to understand what happened to cause the results you observed. What did you learn from your experiment? That's OK; turn it in any way! You learned something

f. What is NOT an experiment. Models and displays are two types of projects that are commonly entered in science fairs; they are not, however, experiments. If you come up with a topic you are interested in and it would best be shown using a model or display, try to turn the topic into a question that can be answered by an experiment.

g. **Project display design and setup**. You must write up your experiment in an Experiment Notebook. It is much more interesting for everyone to see what you did by looking at your display. Your display should show: your question, hypothesis, experiment, and results.

h. Project review and recognition. On Science Fair day, a visiting professional scientist will review your project. He or she will ask you to explain what you did and what you learned. If you have questions about your experiment or its results, ask the visiting scientist! You will also be recognized during the Science Fair celebration!

A. Your Experiment

Parents: the following guidelines apply to all students at Maple Grove; please use them to help your student develop an age-appropriate Science Fair project.

Ask a Question, or present a problem that can be stated in terms of a hypothesis (an initial guess) that can be tested.

1. Sometimes you notice something and wonder why it happens, or you see something and wonder what causes it. Write down what you noticed and your question.

2. Next, find out more about what you observed by reading books and magazines or talking with your parents, teachers, and librarians. Check Section VI. of this guide for sources of information. Keep track of where you find your information.

3. Form a hypothesis (an initial guess) as to what the answer to your question might be. The hypothesis must be stated in a way that can be tested by an experiment.

Example: *"Does fresh water freeze more quickly than salt water?" Your hypothesis could be, "I think salt water will freeze more quickly than fresh water." You could then test your hypothesis by timing how long it takes for fresh water and salt water to freeze.*

4. Write your question and your hypothesis in your Experiment Notebook. Think about the purpose of your experiment and write it in your Experiment Notebook.

B. Design an experiment

1. Make a guess about the things that affect the system you want to investigate. These are called variables, because varying one of these things may change the results of your experiment.

2. Make a step-by-step list of the things you want to change to check your hypothesis.

3. Write a procedure (directions) explaining how you will conduct your experiment and how you will measure your results. A good experiment produces results that can be measured and repeated by someone else. Write your procedures and the variables you plan to change in your experiment notebook.

Example: *For the experiment described above, we could vary the salinity (amount of salt dissolved in the water) of water that we freeze to see if the amount of salt in the water will affect the speed of freezing.*

C. Perform Your Experiment

1. Make a list of the things you will need to do the experiment and prepare them. Write them in your Experiment Notebook.

2. Do your experiment. Observe everything that happens and record it in your Experiment Notebook. Be very careful when taking measurements or making observations; record the measurement or observation and the time of the measurement in your notebook.

3. Don't forget to write down anything unusual that happens or any problems you have. These may not seem important at the time, but may help you understand the results of your experiment.

4. The purpose of Science Fair is to learn about experimental science. It is more important to spend time designing and conducting your experiment than it is to make a "perfect" display.

D. Summarize and draw conclusions

1. Summarize what happened during your experiment and write it in your Experiment Notebook. Try to determine all of the possible causes for the results.

2. Explain what you learned from your experiment. Did it answer your original question? Was your hypothesis correct? Why or why not?

E. What went wrong?

It's OK if your experiment didn't turn out as you expected. Try to understand what happened to cause the results you observed. Write the explanation in your Experiment Notebook. What did you learn from your experiment? You may only have learned that your hypothesis was wrong. That's OK; turn it in anyway! You learned something. Maybe a visiting scientist can help you figure out what went wrong with your experiment or why your hypothesis was incorrect. Many important things have been learned by experiments that "didn't work."

Example: The scientist who invented Post-it Notes did it by accident. He was trying to invent a new adhesive that would **permanently** stick notes to a surface. His adhesive didn't do what he had hoped, but it created a whole new way of posting notes!

F. What is NOT an experiment?

Maple Grove's Science Fair is about experimental science; therefore, we would like you to conduct an experiment for your science project. We've told you what *is* an experiment but what, you may wonder, *is not*?

Models and displays are two types of projects that are commonly entered in science fairs; they are not, however, experiments. A model is usually a representation of some feature in nature—a human eye, the solar system**,** a volcano, or a ship. A display is a project that mixes specimens, photographs, drawings, and written reports to discuss a topic. While building a model or preparing a display may be challenging, it does not require use of the experimental scientific method.

If you come up with a topic you are interested in and it would best be shown using a model or display, try to turn the topic into a question that can be answered by an experiment. Having trouble doing that? Call your parent contact; that's what they are there for!

Examples:

Display: *What types of rocks are found in Colorado?*
Experiment: Are some rocks found in Colorado harder than others?

Model: *Construct a model of a ship.*
Experiment: *Does the shape of a ship's bow affect how quickly it moves through water?*

Display: *Crystals grown in a jar.*
Experiment: *Does crystal size depend on the temperature of the solution use to grow the crystals?*

G. Project Display Design and Setup

The most important thing in Science Fair is to design and conduct an experiment. You must write up your experiment in an Experiment Notebook—a display showing your experiment is not necessary. However, it is much more interesting for everyone to see what you did by looking at your display. Your display should show:

- Your question
- Your hypothesis
- Your experiment
- Your results

Be creative—use large type, color, eye-catching drawings and photographs, or 3-dimensional graphs. Think about what will draw the observer to your display. It's OK to use a computer to make your display as long as you do the work yourself (parents may assist younger students).




You can purchase your display board at an Office products store, Walmart or Target. Display boards are 3-sided (30" by 30"). Table space is limited to board size.

Display Guidelines

- A team may submit either a combined display or separate displays.
- Each person must have an Experiment Notebook.
- You must provide all equipment for your display (including an extension cord).
- Request special needs (floor space, wall, specific height or electrical outlet).

Display Setup

- Display set-up is after school the day before Science Fair (See Science Fair Calendar/Student Checklist).
- Parent supervision during display set-up is required.

Display Protection

1. The school assumes no responsibility for loss or damage to equipment and materials.
2. Valuable instruments, manuscripts, object should be left at home.
3. **Display must include your Experiment Notebook.**
4. **Each member of a team must have a separate Experiment Notebook.**

Tip: Although a scientist may wish to present a "hands-on" display, please understand that it may not remain intact until celebration.

H. Project Review and Recognition

You've finished your experiment, display, and experiment notebook and set up your display. Now what?

On Science Fair day, a visiting professional scientist will review your project. He or she will ask you to explain what you did and what you learned. If you have questions about your experiment or its results, ask the visiting scientist!

Now that you have completed your Science Fair project, you have joined the ranks of "Maple Grove Scientists." In recognition of your hard work, you will be awarded a certificate. Because this is not a competition, there will be no "prizes" awarded.

You will receive a certificate if you have done the following:

- Demonstrated knowledge of your experiment and results
- Followed the steps of the experimental scientific method, as outlined in this guide and the Experiment Notebook
- Included the Experiment Notebook with your display
- Demonstrate that you conducted most of the work yourself

On Science Fair night, you and your family are invited to the Science Fair celebration. You all can view all of the Science Fair displays and attend a spaghetti dinner! **Don't miss the fun!!**

After the Science Fair celebration, you must take down your display and take it home. If you cannot attend the Science Fair celebration, please make arrangements to have your display taken down by a friend that night after the program

General Rules for Science Fair

- ✓ You or your team must design and perform the experiment. Outside help is allowed as appropriate for the age and safety of the students.

- ✓ You cannot repeat one of your Science Fair projects, unless you are looking at a new variable, expect different results, or have a different explanation**.**

- ✓ Live subjects (animals, insects, or friends!) must not be harmed during your experiment**.**

- ✓ Prohibited Items include**:**
  - Open or concealed flames
  - Combustible or flammable materials
  - Dangerous chemicals or concentrated caustics or acids
  - Live disease-causing microorganisms
  - Live or dead microbial cultures or fungi
  - Unknown specimens that could be a public health hazard

- ✓ High voltage wiring, switches, and metal parts must be located out of reach of observers and designed with an adequate overload safety factor. All wiring must be properly insulated and installed.

- ✓ Teams of siblings or friends may work on a project together. Guidelines for team projects are given below.
  - Family projects—Siblings may work together on a project. The work can be divided based on each student's ability level and particular talents.

  - Other team projects—Friends may work together on a project, as long as the work is divided evenly among all team members.

  The Science Fair Committee has found that team projects can lead to strained friendships if one person does not do their share of the work or decides to pull out at the last minute.

- ✓ **All teams must follow these rules:**
  - Each team member must know and understand the entire project.
  - Each team member must complete his/her own Experiment Notebook.
  - The team may complete one display or separate displays for each team member.
  - Each team member will have his/her project reviewed individually and receive a separate certificate.

Sources of Information

Below are some sources of information on science fairs, science fair projects, and basic scientific stuff! If you're having trouble coming up with a project question or an experiment, maybe these will help.

1. Look for additional information labeled "Science Fair Project Question Ideas". The list includes past Science Fair Questions that are categorized by topic area.

2. Come to the Science Fair Information meetings (see your Science Fair Calendar).

3. Check out the Internet: Most search engines (e.g., Google) will reveal numerous websites by searching under "science fair", "science experiments". Here are some good sites:
   www.stevespanglerscience.com/experiments/
   www.scifair.org
   www.exploratorium.edu
   www.accessexcellence.org/21st/TL/scifair
   www.chipublib.org/008subject/009scitech/scifideas.html

4. Talk to your parents, teachers, or parent contact. They may be able to help you come up with the perfect project.

5. Look over the science fair-related books that the Maple Grove librarian has placed on the Science Fair shelf. Library section 507.8 contains books on science fair projects. Sections 530 and 540 can help you find ideas for science projects in specific areas.

6. Look in the blue pages of the phone book for government agencies (federal, state, county, or city) that relate to one of your interests. Many agencies have a person designated to help students and teachers.

7. Go to museums and exhibits in the Denver area. Not only are they fun to see, they have great resources in their libraries and gift shops!
   - Denver Museum of Natural History
   - Denver Zoo
   - Children's Museum
   - Butterfly Pavilion

Oops, I Forgot! Whom Do I Call?

Call us if…

- You have a question about your project or you can't turn your idea into a project question
- Your experiment failed!
- We will assign you a parent contact to help!

Betsy Hunsicker, Science Fair Chairperson:
betsyy619@yahoo.com or 303-725-6120

Call your parent contact or the Science Fair Committee if…

- You can't set up at the scheduled times
- You need to drop out of Science Fair (please don't, its fun!)
- You can't attend the Science Fair celebration