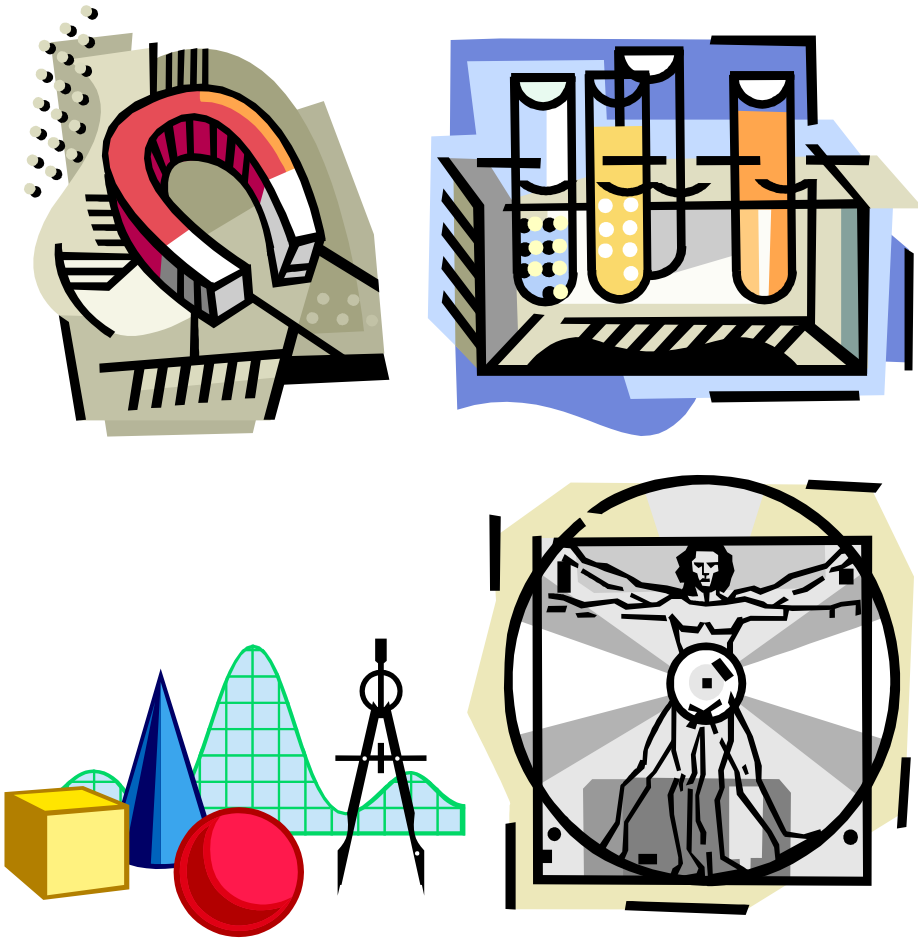
Science, Math and Engineering Fair



Santa Rita Elementary School

2010

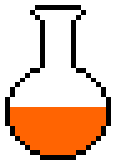
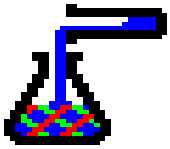


TABLE OF CONTENTS



Welcome to the Santa Rita Science, Math and Engineering Fair

The purpose of the Science Fair is to have fun and to learn about science, math and engineering. This handbook will help you get started.

Schedule for 2010 Santa Rita Science Fair

Mark the date of the Science Fair on your calendar, Thursday, March 18th, 2010. Invite your family and friends to see your exhibit. See what other students have done. Get some ideas for what you want to do for next year's Fair.

Thursday, March 18th, 2010	**Science, Math and Engineering Fair** in Santa Rita Multi-purpose Room
4:00PM – 6:00PM	Check in and set up your Science Fair exhibit.
6:00PM – 7:30PM	Science Fair is open to the public. The exhibits are judged.
7:30PM – 8:00PM	Optional: Exhibits broken down and taken home.
Friday, March 19th, 2010	
8:30AM – 2:30PM	Exhibits on display for students
2:20PM - 3:30PM	Required: Exhibits broken down and taken home.

Frequently Asked Questions (FAQs)

1. **Who is allowed to participate in the Science, Math and Engineering Fair?**

   Any student at Santa Rita.

2. **Can projects be done by a team or only by individuals?**

   Typically these types of fairs are individual events. However, if you want to do a team project, it is OK. For practical purposes, it is best to limit a project team to 2 people.

3. **Is this a competition? Are projects judged and awards given to winners?**

   Judges are available for those participants who specifically ask for structured and formal feedback. Everyone who presents a project for judging will receive an award medal. There are no prizes for first, second or third.

4. **Do students need to sign-up in advance?**

   Pre-registration is optional. Participants who pre-register by Friday, March 2nd will receive a personalized label to affix to the back of their Science Fair Medal. To pre-register simply complete the registration form found at the back of this handbook and drop it in the Science Fair Box located in the Santa Rita office.

5. **Are computer projects allowed?**

   Yes. Computer projects might include programming, multimedia production (audio and video), web design, animation, or game development. Computer controlled robots are other devices can also be included. The computer could also be used in math oriented projects that involve graphing, statistics, or other topics. Power outlets are limited, so if possible exhibit your project on a battery powered computer.

Choosing a Topic

First, choose a topic for the Science Fair. Make sure that your project is simple enough to complete within an age appropriate time frame (a weekend for younger kids, 4 – 6 weeks for older students). Plant and animal projects usually take longer so plan accordingly...

These are some sources for finding a topic.

- Your interests or hobbies
- Teacher and Science Aide suggestions
- Science class topics
- Family and friends
- Doctor, dentist, scientist, engineer, veterinarian
- Library
- Linden Tree Bookstore in Los Altos

Resources

Books and Magazines

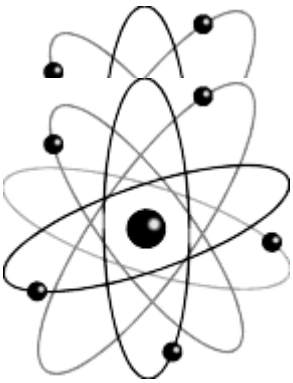
Science Fair resources (in the Santa Rita Library)

Science Experiments You Can Eat by Vicki Cobb

More Science Experiments You Can Eat by Vicki Cobb

Gizmos & Gadgets: creating science contraptions that work and knowing why by Jill Hauser

Great Science Fair Projects by Phyllis Katz



Kitchen Science by Christopher Maynard

101 Great Science Experiments by Neil Ardley

Let's Experiment with Science by Jack Challoner

Making Things Change by Gary Gibson

The Science Explorer Out and About by Pat Murphy

Dr. Zed's Science Surprises by Gordon Penrose

175 Science Experiments to Amuse and Amaze Your Friends by Brenda Walpole

Simple Science Experiments with Marbles by Eiji Orii

Experiments with Sound and Experiments with Light, both by Salvatore Tocci

Crystals and Crystal Gardens You Can Grow by Jean Stangl

Seeds to Plants: Projects with Biology by Jeffrey Bates

Internet

If you need help in deciding what to do, there are many interesting web sites. Do a Google search on "Science Fair Projects" or try the KidSpace @ The Internet Public Library site at http://ipl.sils.umich.edu/div/kidspace/browse/mas6000/ and http://www.ipl.org/div/kidspace/projectguide/ for links to many of the most popular Science Fair project sites.

Supplies

For science laboratory equipment, books and display boards, visit San Jose Scientific, 1043 DiGiulio Avenue, Santa Clara (off of Lafayette), 408-727-7301.

Display boards such as the 36" by 48" are available at local office supply stores such as Office Depot and Office Max for prices starting at around $7.

Types of Projects

After you select your topic, the next step is to choose how to conduct your experiment. There are several types of projects to choose from. Each type of project asks a question.

Investigations

Do an investigation if you want to see how changing different variables may change the outcome. These are some examples of investigative science projects.

- Can I change the freezing temperature of water?
- How much salt does it take to float an egg in water?
- Under what conditions does mold grow best?
- How do different fertilizers affect the growth of tomato plants?

Surveys

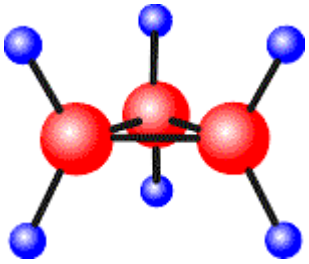
You can survey almost anything. You may want to get some help from your math teacher or science aide on what method is best for analyzing the results of your survey. Here are a few survey ideas. What new survey ideas can you come up with? See if you can find a cause and effect (do taller kids have freckles more often than shorter kids?)

- In my class, who can jump rope the longest – boys or girls?
- What is the most popular food for hot lunches at school?
- In my class, what kinds of pets do the students have?
- Do different kinds of apples have the same number of seeds?

Collections

If there is something that you like to collect for a hobby, you may be able to develop it into a Science Fair project.

- If you display a rock collection, you might answer some interesting question about rocks, such as: Do all rocks have the same hardness? Use the rocks in the collection to test your hypothesis and explain the results.
- If you display a collection of bells, you might answer some interesting question. Does the size of the bell or the bell's material influence how it sounds?



Models

Models have been very important in science and engineering. You may want to build a model to understand more about how something works. Here are a few ideas for model projects. Can you think of something new and interesting?

- What design makes the strongest bridge?
- How can I make good pictures with a pinhole camera?
- How do I build a robot that backs away from the wall when it hits it?

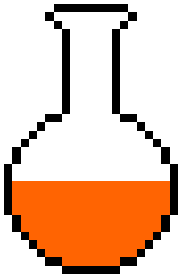
The Scientific Method

Follow these step-by-step instructions for your project. You have already done the hard work. You have picked a topic for your project.

Question

- What are you trying to find out? Ask a question about your topic. Ask a question that is interesting to you; one that you would like to know the answer to. What is your topic and question? Get a notebook and write your question in it. You can use the report at the end of this handbook.

- Brainstorm and think about how you might answer your question, using an experiment, survey, collection, or model.



Gather Information About The Question

- What do you already know about your topic?
- Go to the library; ask the librarian to help you find books about your topic. Check out the science fair section at the Linden Tree bookstore.
- Talk to people who are experts in the area of your topic.
- Read as much as you can about your topic.
- Write about your topic; keep a list of your sources of information in the form of a bibliography. Put the bibliography in your report.

Hypothesis

- Use the information you have gathered about your topic to think of possible answers to your question.
- Write these answers in your report. Be sure to include why you think these answers might be correct.
- Choose the best answer to your question. This hypothesis is the outcome that you think will really happen when you test your question. Write it in your report.

Procedure

- Design your experiment, survey, collection, or model:
  - Write out each step of your experiment. Be sure that these steps will give you an answer to your question. Keep your experiment simple and focused.
  - Check on whether there are any safety procedures or laws that must be followed. You must follow safe procedures if you work with materials such as chemicals, bacteria, or fire. You must be kind if you are working with animals. You must be respectful if you are working with people. Have an adult review your procedure if your experiment includes any of those things.

  - List all the materials you will need including any safety equipment (goggles, safety glasses, gloves, fire extinguisher, etc.).
  - Write what measurements you will make.
- Collect all the materials for your experiment. Include safety equipment if it is required.

- Perform the experiment as you designed it. Use your safety equipment if it is required.

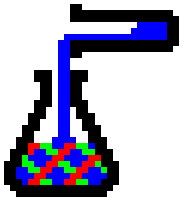
- If you are doing an investigation or model, write down all of your observations. Write your measurements and data carefully in your report. Record everything you see, hear, smell, touch, or taste in the exact order in which it happens. Be as accurate as you can be. What did you observe? When, where, and why was it observed?

Results

- Have you answered your original question? Write down the outcome of your experiment. Did you get the answer that you expected (you may get another answer or result)? Can you explain what happened?

Conclusion

- Write in your report about what you learned from your experiment.
- What other experiments might add to your knowledge about this topic?
- What new questions do you have about this topic?
- Prepare an exhibit for the Science Fair. Be sure to follow the Rules.



Making The Exhibit

After your project is complete, prepare your presentation. Your presentation might be a report, exhibit or computer based presentation. Note: if you choose to do a computer presentation, be aware that electrical power may not be available for everyone and you may need to use a portable computer on battery power.

1. Put your project title, your name, and your grade on the front of your **Report**. You may use the report at the end of this handbook or make your own. If you have a display board, place your report in front of it. You can also place samples or equipment with your report. Check the rules: you cannot display high voltage equipment, dangerous chemicals or live animals. Expect that viewers will want to handle the samples or equipment. Place a **Do Not Touch** sign by messy or fragile items.

2. The display board is optional for your Santa Rita Science Fair exhibit. It is a good way to catch the viewer's attention and make them want to know more about your project. If you would like to design a display board, this section tells you what to do.

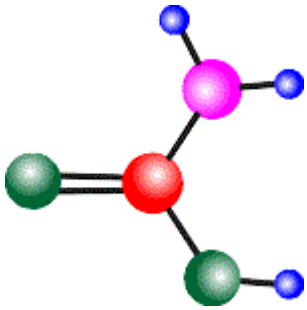
   Make a display board that will **stand up by itself**. You might use: a) a box with its top and front cut away, b) paint masonite or plywood, c) cardboard, or d) three foam core sheets hinged together with tape. Check the size requirements under the section titled Rules.

   Plan your display so it tells the story of your project. Each step of the scientific process should be part of your display. Include a title, your name, and grade, the

question that you asked, your purpose and procedure, results and your conclusion. Pictures or graphs of your results will help people understand what happened in your experiment. Your report should have all of these things already written out. Work from your report when you make your display. Photographs can help tell your story very effectively. If you used special equipment, include it in your display. Make sure your display is easy to read and neat in appearance.

3. Pretend you have never seen your display. Does it tell a story? Is it easy to read? Are all the words spelled correctly? Does your display represent what is in your report? Does it look like you had fun? Great! You have completed a science fair display!

Rules



Check your project and exhibit against these rules.

1. Anyone who is a student at Santa Rita may enter the Science Fair. Students are encouraged to complete an individual project. However, group projects are accepted.

2. An adult may give advice and assistance during development, research, and construction of the project. Students are encouraged to complete as much of the project as possible on their own. Complete the Student/Adult Involvement Form on page 12 and include it with your project.

3. Limit the size of the exhibit to a base area of **2 feet deep, 3 feet wide, and 3 feet high**. It may sit on a table or on the floor.

4. The students are encouraged to include a display board with their project. This is not required.

5. **Exhibits may not use electrical outlets**. Only low voltage batteries are permitted in exhibits. Projects using computers might have access to power but cannot be guaranteed. If possible, use a portable computer if available.

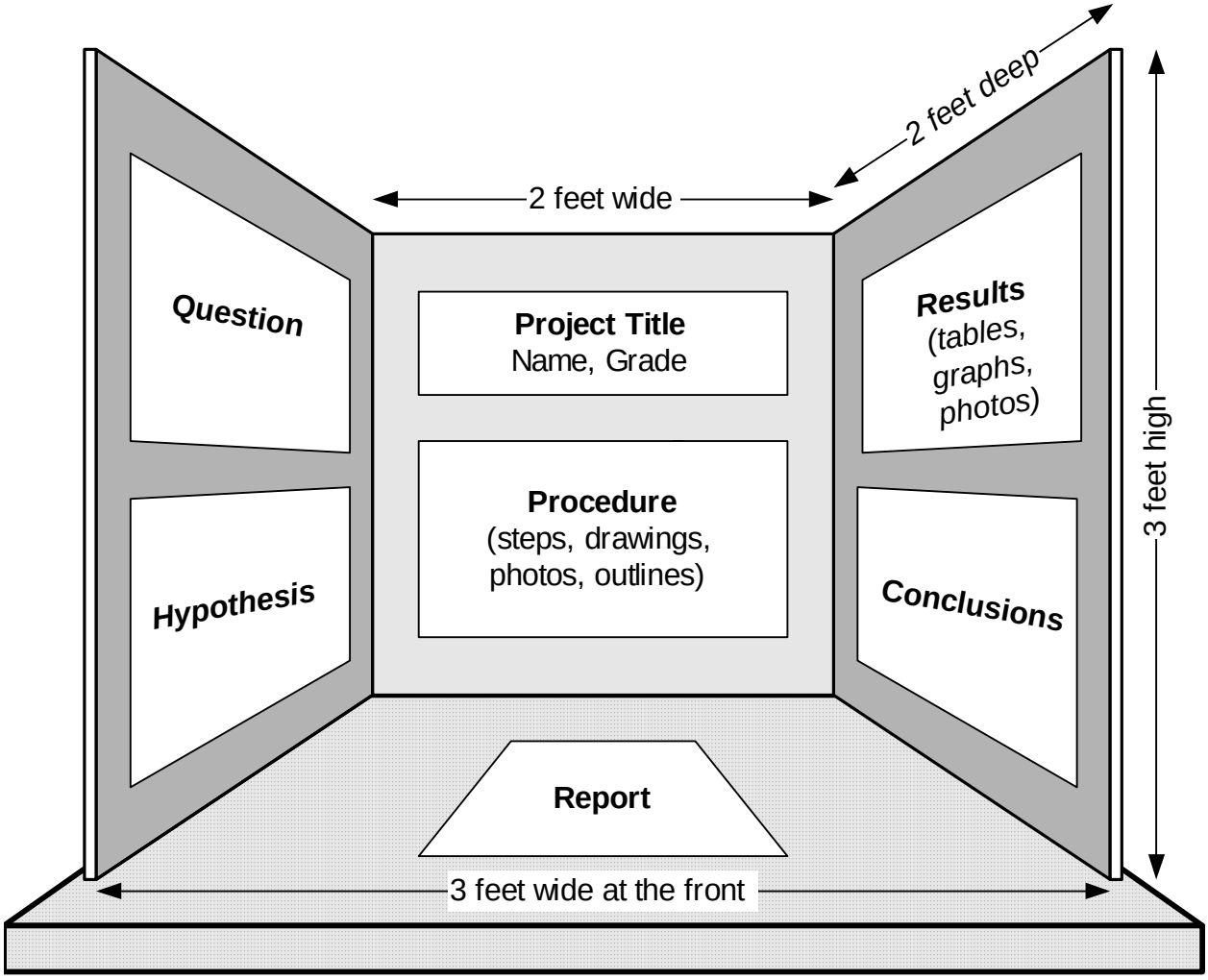
6. **Exhibits may not have live animals**. Experiments involving the use of live animals must demonstrate and document appropriate humane treatment of these animals.

7. **Exhibits must not pose any physical hazards** to the school, other participants or viewers. **Bacterial cultures must be sealed. No open flames are allowed. Exhibits may not use toxic or flammable chemicals. Do not display liquids, including water. Do not include glass beakers or other breakable materials that may pose a hazard to others.**

8. The school or PTA cannot take any responsibility for damage to displays. They are entered at your own risk.

Display Board

Here is a suggestion on how to arrange your work to make an attractive display.



The maximum dimensions of the display are 3 feet wide by 3 feet high by 2 feet deep.

Santa Rita Science Project Report

Use this for your report or as a guide.

NAME: _____ Grade: _____

PROJECT TITLE: _____

QUESTION _____

_____

HYPOTHESIS _____

_____

_____

PROCEDURE

Materials Needed

_____

_____

_____

_____

Step-By-Step Directions (Please number each step.)

_____

_____

_____

_____

_____

_____

_____

NAME: _____ Project Title: _____

RESULTS

CONCLUSION

Student/Adult Involvement Form

This form MUST accompany your display at the fair

Directions: On the line for each stage of the project, mark the appropriate percentage that indicates how much work the student did. *Examples:* If all the work was done by the student, mark **100%** if most of the work was done by the student, mark **80%**. If there was a more equal sharing of effort between adult and child, mark **60%** or **40%**. If an adult did most of the work, mark **20%**. If an adult did all the work, mark **0%**. If something was not done at all, mark **Not Done**.

Stages of Project	**Percent of Student Involvement**						
	100%	80%	60%	40%	20%	0%	Not Done
Thought of a Problem							
Formed a Question							
Conducted Background Research							
Talked with Experts							
Kept Lab Notebook During Project							
Designed an Experiment							
Performed the Experiment							
Wrote about Results							
Made graphs or tables							
Designed the Display							
Made the Display							
Used the computer during project							
Learned to use applicable software							
Used the computer to make the display							
Learned Something							
Had Fun							

Adult/parental comments on level of involvement:

STUDENT INITIALS_____ DATE _____

PARENT INITIALS_____ DATE _____

Evaluation Form

(To be completed by a Science Fair Judge)

On Science Fair day, you may request that a judge evaluate your project. The judge will ask you questions about your project and complete this form for you to take home.

Student Name_____ **Grade** _____

Project Title_____

Oral Presentation of Project	**Rating**
1. Student's explanation of the purpose and motivation of the project.	| | | **Acceptable Very Good Superior**
2. Student's knowledge of the subject matter and project development elements.	| | | **Acceptable Very Good Superior**
3. Student's oral explanation of the project results and conclusion.	| | | **Acceptable Very Good Superior**
4. Student's knowledge of the subject matter and theory used.	| | | **Acceptable Very Good Superior**
Exhibit	**Rating**
5. Project Appearance: Neatness, Attractiveness, Organization	| | | **Acceptable Very Good Superior**
6. Clarity**:** Does the project clearly communicate the student's understanding of the project, its purpose, methods and findings?	| | | **Acceptable Very Good Superior**
7. Independent effort: Refer to the student/adult involvement form the less parental/adult involvement the better.	| | | **Acceptable Very Good Superior**
Scientific Thought	**Rating**
8. Use of a clear and testable hypothesis and experimental design which adequately tests the hypothesis.	| | | **Acceptable Very Good Superior**
9. Appropriateness of data analysis and conclusion.	| | | **Acceptable Very Good Superior**

Judge's Comments:

Science Fair Pre-Registration Form

Student Name:_____

Grade: _____

Proposed Project Topic:_____

If a team project, please provide the name and grade of your teammate:

Name_____ **Grade** _____

Please drop this form off to the Santa Rita office by Friday March 12th, 2010.