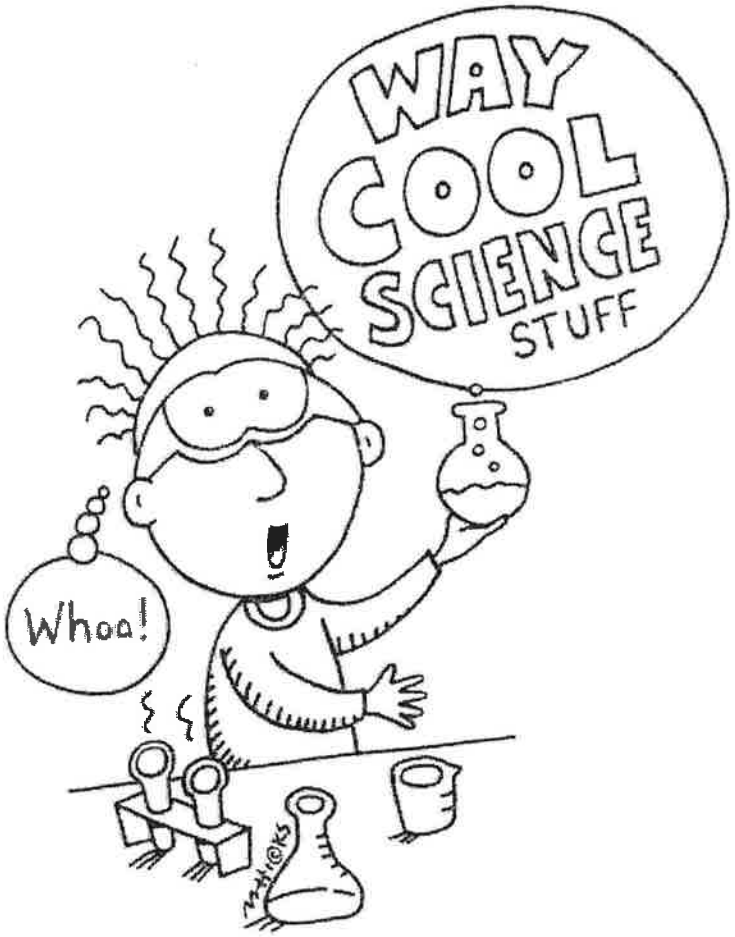
2012 Flatirons Science Fair

Student Handbook



2012 Science Fair Schedule

Morning – Wednesday, February 15th – projects brought to homerooms

School Day - Wednesday, February 15th

- After your students lunch: Setup science fair projects
- 12:30 – 2:10 **Family and Classroom Viewing** in the gym – Students' projects will be on display. Students will be standing at their project during their classroom time.
    - 1st – 12:30-12:50
    - 2nd – 12:50-1:10
    - 3rd – 1:10-1:30
    - 4th – 1:30-1:50
    - 5 – 1:50-2:10

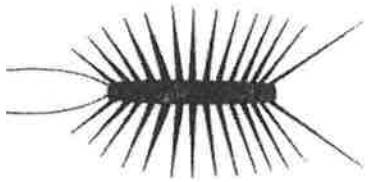
Afternoon - Wednesday, February 15th – 2:20-2:50: Students are required to pick up their projects and take them home.

INTRODUCTION TO ELEMENTARY SCIENCE

Benefits for elementary school children are maximized when these students have active involvement in a science program, which emphasizes experiential learning.

Experience in the primary grades will be mostly concrete in nature. Experiences in the intermediate grades should begin to introduce students to the abstract concepts and approaches to science. The conceptual schemes and processes defined in this document are organized to meet these criteria.

The K-5 science curriculum blends processes, content, skills, and attitudes to give teachers general direction in yearly science curriculum planning. The format allows flexibility in the topics that teachers can use to satisfy the grade level objectives and learning outcomes. The table below illustrates the sequential approach used to introduce the processes that serve as a structure for science instruction.



Examples of Science Processes to Look For

Kindergarten

Observing

Find several rocks in your yard. Look under them and record what you discovered.

First and Second Grades

Classifying, Measuring, Collecting, Organizing

Collect, classify and organize rocks or soil and clay using sorting, washing comparing, separating and straining methods.

Third and Fourth Grades

Predicting, Inferring and Identifying Variables

Apply geologist's techniques to investigate rocks, minerals, and their properties to make accurate identifications.

Fifth Grade

Making and Testing Hypotheses

Simulate the creation of landforms using stream tables. Make and use topographic maps to describe your assimilation and real landforms.

DEFINITIONS of PROCESS terms

Observing-The learner will identify objects and their properties utilizing all five senses, identify changes in various systems, and make organized observations.

Classifying -The learner will sort objects by their properties, match objects by their likenesses and differences, and describe the subcomponents of objects.

Measuring- The learner will compare two like quantities where one is used as a unit of measurement.

Collecting and Organizing-The learner will gather, describe, and record data and then order, classify and compare the data to identify patterns and similarities.

Predicting- The learner will make an educated guess regarding the outcome of their exploration or experiment.

Inferring- The learner will suggest explanations for a set of collected data and then form generalizations.

Identifying Variables- The learner will identify factors that change or can be modified based on the design of the experiment. The independent variables are those that the experimenter changes, the dependent variables change as a result of (or are dependent on) the experiment.

Synthesizing- The learner will integrate the lower process skills in the design, experimentation, and interpretation of an investigation of an observable phenomenon.

The use of these processes will be continued throughout the secondary level science experience.

OBJECTIVES FOR ELEMENTARY STUDENTS

- To stimulate interest and to sustain natural curiosity in science, math and engineering.
- To provide educational experience through participation in some form of scientific research.
- To give public recognition to students for the work they have done.
- To give students an opportunity to share their learning with other students and community members.

Student's Role

- To select a topic for the project and complete an investigation, model, collection or demonstration of a scientific principle.
- To construct an exhibit which illustrates and explains the project
- To be ready to explain the project in scientific terms to other students and community members.

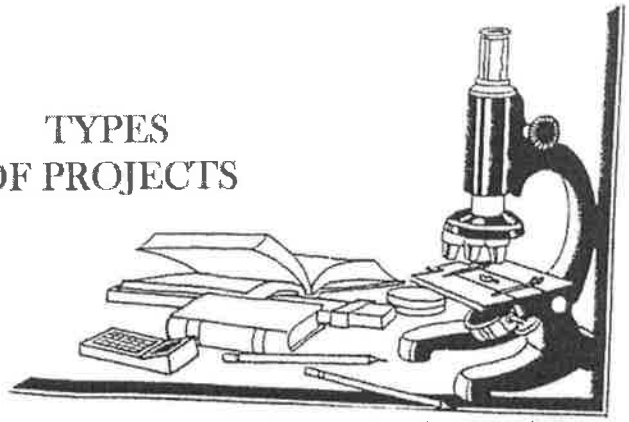
Parent's Role

- To motivate students (Ask students what they already know).
- To serve as an advisor (Ask what they want to find out or learn).
- To provide expertise on the topic as a resource person.
- To furnish supplies and help locate needed equipment.
- To transport students to library or to meet with resource people.
- To provide space such as a garage or room in the home for the student to work on project.

Teacher's Role

- To motivate students (Ask students what they already know).
- To serve as an advisor (Ask what they want to find out or learn).
- To support student ideas and promote creativity.
- To be generous with praise and enthusiasm.
- To contact resource people to serve as mentors.
- To arrange for special equipment.

TYPES OF PROJECTS



1. INVESTIGATION: Observe nature (plants, animals, people) and report what you observe. Your purpose is to find out how your specimens behave or function. This type of project should follow the scientific method. Example: Watch prairie dogs; record their barks; photograph their movements. You should try and ask a specific question to watch for when you make your observations. i.e. What position do prairie dogs take when they bark? Do they have various vocalizations? Do they have different positions for each?

Comparative Surveys: These surveys are sometimes called natural experiments. Identify two or more groups or classes of subjects that are generally alike but which may show a difference in one or more important factors. Express the difference as a hypothesis or prediction. Example: "Boys hearts beat faster than girls hearts do".

Controlled Experiment: This kind of experimenting involves more complex investigations. Example: You might have a group of plants as an experimental subject and another group of the same type of plants as a control group. The independent variable in this experiment could be the amount of fertilizer added to the experimental plant group. The dependent variable is the difference observed in the growth of the plants.

Simple Experiment: In this kind of experiment your purpose is to change something. You will be observing what happens as a result of changes. Example: Melt an ice cube; incubate an egg; inflate a balloon.

2. MODEL OR COLLECTION: Construct a kit or model, or exhibit a collection. The purpose is to provide an answer to a question or hypothesis you are presenting. You must be able to explain your model or collection. Example: The purpose of a model of a solar home could be to determine the use of solar energy in lowering heating costs. Read; talk to experts to find answers.

3. DEMONSTRATION OF A SCIENTIFIC PRINCIPLE: Find a scientific rule or law that is interesting to you. Example: Measure lung capacity using several people. The purpose could be to find out if a large lung capacity is an advantage during exercise. Experiment and find the answers.

THE SCIENTIFIC METHOD

When doing an investigation, you will want to follow a research method used by scientists when they do experiments. Our suggested method, takes into consideration a process that young children can use that relates directly to the historical scientific method.

Use the bold headings when organizing your thinking as well as for demonstrative purposes.

Scientific Method Suggested Method for younger children:	Scientific Method (Fourth and Fifth Graders)
Question Come up with a question that you want to answer based on your curiosity about a given subject, idea, or process.	**Purpose** A question or statement saying what you are tying to find out with your experiment.
My Prediction Make an educated guess or *hypothesis* about what you think will happen based on the design of your experiment. "What I think will happen is..."	**Hypothesis** Your prediction of the outcome of the experiment.
"What we used" Describe the materials you used to research your question, set up, and follow through with your experiment or exploration.	**Materials** A list of items used.
"What we did" Write a clear description of what you did for your experiment or exploration. Write it with the intent that someone could follow your directions and do the same thing you did.	**Procedure** A description of the "how" you experimented or observed.
"What I found out" Many projects may be done in groups, but each individual is responsible for describing what they learned by doing their project. Include a description or display of the information collected. The response should also include an answer to the specific question the project was designed around.	**Data Gathering** Collecting information and results. **Results** Finding out what the experiment proves. **Conclusion** A summary of what your experiment shows, how your work can be used for more research, and any description of real-world applications.

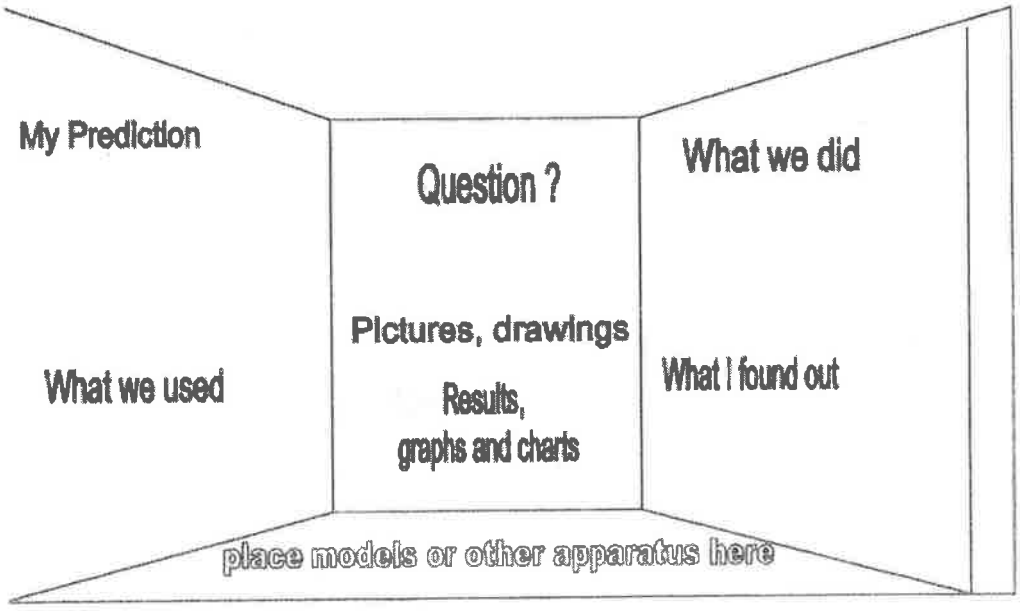
EXAMPLE: PROJECT EXHIBIT

Each child or group of children is encouraged to create some sort of formal display to exhibit their project. Here are a few guidelines for them.

1. Keep the exhibit neat, uncluttered and to the point.
2. All posters, charts, etc. must be attached to the exhibit.
3. No part of the exhibit may be attached to walls or tables.
4. Build your exhibit compactly. It must be self-supporting (FREE STANDING).
5. Be sure to adhere everything securely so it can be safely transported.
6. Exhibit backboards can be used to display your project.
7. Use neat, attractive and correctly spelled lettering.
8. Main points should be large and simple.
9. Details should be clear and legible.
10. You are encouraged to post pictures, drawings, graphs and charts to help communicate what you used, what you did, and what you found out!

***Backboards (like the one below) will be available for sale through the office at Flatirons Elementary at a cost of $3.00.**

This is an **example** of where and how you might create a formal display of your project. Note, under each heading you will want to post your work. Talk with your teacher about your needs or desire to have other props included with your exhibit.



ANIMAL RESEARCH

- No live or preserved vertebrate or invertebrate animals may be displayed.
- Photographs or surgical procedures, autopsies, dissections, and/or other lab techniques depicting vertebrate animals may not be displayed on the exhibit, but may be contained in a notebook.
- Human/animal parts, tissues and body fluids may not be displayed. Exceptions: teeth, hair, nails, and histological dry mount sections.

PROTECTION AND CARE OF EXHIBITS

All equipment and materials exhibited at our Science Festival are entered at the risk of the exhibitor. Normal wear and tear on exhibits is to be expected during the time of the festival. For this reason, each exhibitor is advised to protect his or her exhibit as completely as possible. Valuable instruments, objects, collections, etc., must be securely fastened or covered to guard against possible theft or damage.

STUDENT CONDUCT

Responsibility for conduct and welfare of exhibitors remains with each student and the schools and school officials who certify the student's entry.

ELEMENTARY SAFETY GUIDELINES

Anything, which could be hazardous to the public, the exhibitor or other exhibitors, is PROHIBITED at the Science Festival.

No organisms may be displayed

For example:

Vertebrates	No owl pellets No mice, live or dead. No fish, live or dead. No skeletons.
Microbial cultures	No fungi, live or dead. No bacteria, viruses, viroids, prions, rickettsia, live or dead. No parasites, human or other, live or dead.
Invertebrates	No worms, live or dead. No insects, live.

No chemicals may be displayed

For example	No acids, dilute or strong. No salt solutions No insecticides No repellents.

No flammable substances may be displayed

For example	No gases No solid rocket fuel No liquids No fumes

Equipment without an OSHA warning/tag will NOT be allowed to remain at the festival.

Electricity

Only one 110 volt, 60 cycles, single phase AC connection will be provided for exhibits (if requested). Exhibitors who require electricity must furnish a 25 foot, three pronged (Grounded) extension cord, maximum amperage 5 amps, maximum wattage=500watts.

Electrical connections using voltage over 12 volts must be soldered or fixed with approved connectors, and all connecting wires must be properly insulated. Nails, tacks or uninsulated staples must not be used to fasten wire. All switches and metal parts must be located out of reach of observers and be designed with adequate overload protection. Bare wiring and exposed knife switches may be used on circuits of 12 volts or less only.

ELEMENTARY SAFETY GUIDELINES (continued)

Lasers

Class I and II lasers may be exhibited ONLY with proper warning signs, constant presence of operator, protective housing and power disconnected when not in use.

Class III and IV lasers may be displayed but not operated.

Pathogenic Agents

Students are NOT allowed to work with pathogenic agents. Pathogenic agents are disease-causing or potentially disease causing agents such as:

Bacteria
Viruses
Viroids
Prions
Rickettsia
Fungi
Parasites

Any /all organisms collected, isolated, or cultured from any environment during student research projects are considered potentially pathogenic.