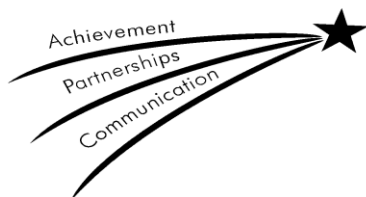


# Science Fair Booklet 2011



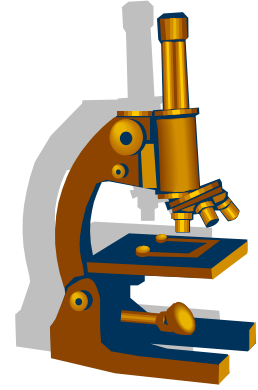
Pleasanton Unified School District



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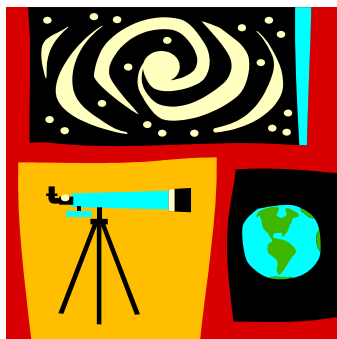
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## Science Fair Vision



- \*\* To demonstrate that ‘Science can be fun’.
- \*\* To stimulate and nourish a fond interest in Science.
- \*\* To promote understanding of and creativity in the Scientific Method of Investigation.
- \*\* To promote self-discipline (character trait) necessary to accomplish the project.
- \*\* To promote science education at all grades by individual presentation of science projects.
- \*\* To give the students a sense of pride and accomplishment derived from participation.
- \*\* To foster a lifelong appreciation of scientific processes in preparation for life in an increasingly technological society.
- \*\* To promote educational links among parents, school, community, and the world.

If you are interested, your Science Fair project may also be entered in the Alameda County Fair this coming summer. Students may enter hundreds of different projects in Open Junior, but there is a special division for elementary school student science projects. You must complete an entry form to enter. Every student who enters will receive a free admission ticket to the Alameda County Fair. Look for specific information at [www.alamedacountyfair.com](http://www.alamedacountyfair.com) or call (925) 426-7611.



## Questions about the 2011 Fairlands Science Fair

### What is the Fairlands Science Fair?

The Science Fair is a non-competitive science fair open to all our students – kindergarten through fifth grade. The event involves the voluntary preparation and then presentation of a project to peers and a static display of the project board. We will hold Fairlands' Science Fair evening event on Thursday May 19, 2011 from 6-8:00 pm. Individual teachers will announce their preferred due date so there is time to present projects in class. Expect projects due in class the week of May 8. Projects will be turned in to the MPR on Tuesday, May 17.

### Is my student required to do a science project for the Science Fair:

**5<sup>th</sup> Graders: YES, all 5<sup>th</sup> graders are required to do an EXPERIMENT.**

K-4<sup>th</sup> graders: No, the Science Fair is open to all K-4 students on a voluntary basis. Your student's teacher may require a science project as part of his/her, curriculum but that is up to the individual teacher. Projects are to be done at home and little assistance is required by the parents, even the youngest students. No registration or notification is necessary, just bring the completed project when it is due.

### What do I need to know as a parent?

Science projects should be done at home with family support. 5<sup>th</sup> graders must do individual projects. K-4<sup>th</sup> grade students may work alone or in team groups of 2-3 students. Siblings may work together, but care should be given that students share the work and that all are as involved as age allows. If your student wants to use plants, it is suggested to use quick growing seeds such as radishes or fast-growing annuals from the nursery. Display boards will be available for purchase at school at a discounted rate. You may also buy them from any local store (office stores, Wal-Mart, Target, Michels) or REUSE cardboard and make your own. Standard folded size is 24" wide and heights around 30-40 inches tall. Students may bring other materials to put on display, but please DO NOT BRING anything exceptionally fragile, valuable or potentially harmful (NO MOLD, BACTERIA, etc.) Photographs of items can be a great choice here!

### When can families view the science projects?

Families, friends and students will be invited to come to see all of the projects at Fairlands in the MPR on Thursday May 19, 2011 from 6-8:00 pm. On that evening we will have a few science-related businesses and groups show off projects or products and have activities for children. Please plan on staying VERY CLOSE to your children this evening, as we want to keep all projects and children safe.

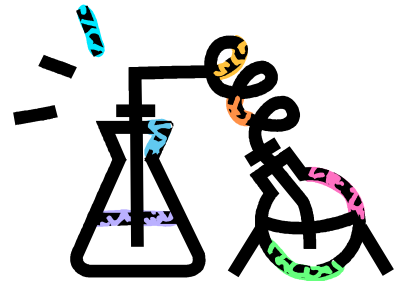
### What if a student wants to enter a competition?

The Alameda County Fair, held in June-July at the Pleasanton Fairgrounds, has a division for science fair projects. Last year a Fairlands student entered and won a first place ribbon! Entering the Alameda County Fair is completely separate from our school's science fair. It is a judged competition. If interested, please check their website for guidelines.

## Getting Started...

The first step in getting started on your project is choosing a topic. Think about the fun projects, experiments and questions that come up in science lab. What are some topics you are interested in? Here are some suggestions. The world is full of hundreds of ideas from A to Z.

- A amphibians, animals, archaeology, astronomy
- B bats, biology, birds, boats, bones, brain
- C chemistry, color, computers, conservation, constellations, caves
- D dew, digestive system, dinosaurs, disease, drugs, decomposition
- E ear, ecology, electricity, enamel, energy, eye, earthquakes
- F fingerprints, fish, flowers, fossils, friction, fruits
- G gardening, geology, giraffes, glass, glaciers, gravity
- H habitats, heart, herbs, hot-air balloons, human body, heat
- I insects, instinct, insulation, invertebrates, ice
- J jellyfish, jet propulsion, jet stream, joints
- K kaleidoscope, kangaroos, kelp, kidney, knee
- L lava, life cycle, lightening, lizards, lung
- M machines, magnets, matter, minerals, molecules, motors
- N natural resources, nervous system, nutrition
- O oceanography, optical illusion, osmosis, ozone, oxygen
- P paleontology, petroleum, plants, pollution, plate tectonics
- Q quail, quartz, quasar, queen bee, quicksand
- R rain forest, reptiles, respiratory system, robots, rocks
- S soap, solar power, sound, spiders, springs, sundial
- T teeth, telescope, terrarium, turtles, tsunami
- U ulcers, unicycles, Uranus, umbrellas
- V vertebrates, vitamins, vocal cords, velocity, viscosity
- W water, weather, work, worms
- X x-rays, xylophone
- Y yams, yeast, yogurt
- Z zebras, zinnias, zucchini



Your project does not have to be complicated or use expensive materials. In fact, the best projects are simple and based on something the student is interested about. Keep it easy and just have fun. Students from the upper grades may use books or the internet to find an idea, but are encouraged to modify the experiment to make it original. Adults can help with your project if you need it, but they should help as little as possible. Your work should be your own so that you really understand your project.

Use the scientific method if at all possible (mandatory with an experiment, with other projects it depends on exactly what you are doing). Using the scientific method will help guide your discoveries and prepare you for future scientific studies. Remember too, that ALL types of projects require a FREE-STANDING display board. The project board should be bright and colorful and clearly show what you have learned. It should be labeled on the top of the right flap with your school name, your grade, and your name and room number.



## Science Fair Project Research

Once you have a topic, it's time to learn something about it to narrow down exactly what you want to find out in your project.

### Finding things at the school or public library

Science books, including books about science fair projects, are generally on shelves found in the 500's and 600's. Mrs. Peterson has a great collection for you in the Fairlands Library. Some examples of where to look in our or other libraries...

J502.8 – J507.8	How to do a science fair project
J500.507, J520 – 523	Space, Universe, Astronomy experiments
J530-J533 – J538	Physics, Sound, Color, Electricity, Magnets
J542	Chemistry and Volcanoes
J550-J552	Earth Science, Rocks, Fossils
J582.16-J595.7	Plants and Trees, Zoology, Insects & Spiders
J612 – J612.3	Human body, Food and Nutrition
J621	Machines and Electronics
J635.986	Gardening experiments

#### **Pleasanton Public Library 462-3535**

<b>12:00 a.m. – 9:00 p.m.</b>	<b>Monday and Tuesday</b>
<b>10:00 a.m. – 9:00 p.m.</b>	<b>Wednesday and Thursday</b>
<b>10:00 a.m. – 5:00 p.m.</b>	<b>Friday and Saturday</b>
<b>1:00 p.m. – 5:00 p.m.</b>	<b>Sunday</b>

### Websites:

- <http://www.fairlandspta.com/science.html> Mrs. Holder's collection of favorite science resources...plus, an electronic version of this packet....just in case it gets misplaced.
- [www.ipl.org](http://www.ipl.org) (Librarians' index to the Internet, a librarian-evaluated selection of thousands of websites. Great for ideas, but don't copy anything exactly!)
- [www.science-project.com](http://www.science-project.com) (A one-stop "everything about science fairs" site by Dr. John Gudenas, Aurora University. They even sell materials!)
- [www.kidsclick.org](http://www.kidsclick.org) (A research site especially for kids by librarians at the Ramapo, NY Catskill Library System. Contains valid links to other website.)
- [www.stevespanglescience.com](http://www.stevespanglescience.com) (A commercial site selling all sorts of science materials and equipment. One of Mrs. Holder's favorite places to shop! They also have lots of ideas. Great place to start! Please remember that any student can borrow items from the lab such as thermometers, graduated cylinders, eyedroppers, etc. Just ask!

# Types of Science Fair Projects

5<sup>th</sup> Grade Projects must be EXPERIMENTS, all other grades can choose one of five categories: Collection, Observation, Model, Experiment, or Invention

. (HOT TIP: for plant experiments please choose fast-growing plants. Radish plants go from seed to full-grown radish in 1 month making them great for experiments!)

## 1. COLLECTION

A collection study is a fun way to learn the proper names of objects that interest you. It involves collecting the objects, describing them, grouping them, and identifying them by their proper name.

The five senses may be used to describe objects:

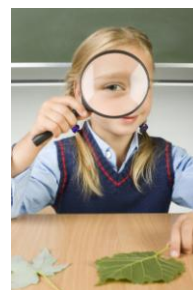
Eyes	color, shape, sheen
Hands	texture, weight, temperature
Ears	pitch, rhythm, loudness
Nose	odor, strength
Tongue	sweet, sour, salty, bitter

Examples of a collection might be leaves, insects, seashells, fossils, rocks, coins, or simple machines. Your display board should have labels, explanations and/or background information.



## 2. OBSERVATION (over time)

An observation study begins with the selection of a topic and a question that can be investigated by observing. Specific movements, behaviors, or actions in nature might be observed over a period of time, and once the observations are gathered, they are studied for patterns that will answer the question. Examples of observation might be ants' eating habits, pollination process, moon phases, family pet behavior or insect life cycles. Display boards should have drawings, photographs, explanation of how you gathered information and/or background information.



## 3. MODEL

A model study may begin with a curiosity about how something works. It is a way to display the parts of something and how what each part does to carry out a particular function.

Examples of functional models may include building an electromagnet, showing how lungs work, making a solar cooker, or connecting wires to show the difference between parallel and series circuits. Another type of model is an enlargement or reduction as a scaled version of an object. Examples of enlarged-scaled models include building a flower model, a model of the human eye, or a cross-section of an apple. Examples of reduced scale models include making craters on the moon, the solar system, a dinosaur, or a space shuttle. It is important for the student to make a comparison between the real item and the model...what is “good/bad” about the model? Display boards should include information on how it works, diagrams of parts and/or other interesting information.



#### 4. EXPERIMENT

An experiment occurs when one variable (the independent variable) is changed. Another variable (the dependent variable) responds to the first and is watched. Other variables (constant variables) remain the same, or are unchanged, throughout the experiment. An experiment starts with an interesting observation and then answers a question using the scientific method. Questions should be based on fact, not opinion, should be open ended (not yes/no) and should seek to measure something rather than answering a “How does this work or happen...?” type of question. Examples of observations that could lead to experiment ideas might include: that mold seems to grow differently on bread, cheese or fruit, that you can roll really far on some surfaces but not others, the ocean is full of salt water but rain isn’t salty or that fertilizer is supposed to make plants grown fast. The key is to take an idea and then turn it into a MEASURABLE, open-ended question.



#### 5. INVENTION

An invention can be one of two things. First, it can be some thing or some process that has never been made or done before (for example, the first spaceship made from a cereal box that actually flies or a way to purify water using only a Ziploc bag). The other type of invention is one in which a thing or process is modified in some way (for example, a better television, a better brake system in a car, or the classic a better mousetrap DON’T HARM ANY ANIMALS TO DO YOUR PROJECT!). Such a changed thing or process is still considered an invention. Examples of an invention for the Science Fair might be – design a new toy, make a lunchbox that will keep food fresh for 12 hours, design a new pot for growing plants, make an electromagnet that will pick up 10 nails, or build a bird feeder that will attract only a certain bird (but not squirrels!!!).



# The Scientific Method

Use this guideline for an EXPERIMENT project.

Other projects may or may not be able to follow this format, it depends on the individual project.

## 1. MAKE AN OBSERVATION

Notice the world around you. Listen when people talk. Read books. When you hear an interesting idea that makes you think, “I wonder what would happen if.....”, use it!

## 2. SELECT A QUESTION

You need to be able to answer it by conducting an experiment. The best science project comes from a question that YOU want to answer. It is also a good idea to include an explanation as to why you selected the project. Your question should be asked in such a way that it couldn't be answered with a simple yes or no. For example, “At which temperature does salt water freeze? is a better question than “Does salt affect the freezing point of water?” The question should be based on fact, not opinion. Instead of, “Which fertilizer works best?” try “Which fertilizer produces more blooms?”

Be careful of questions that begin with “Why” or “How”. Usually these questions aren't measurable. In other words, there's usually no data for the student to collect! In other words, if you can find the answer by reading it on the internet or in a book, it's not a good science fair experiment

## 2. FORM A HYPOTHESIS

This is a guess or prediction about what will happen as a result of your experiment. Forming a hypothesis will help you design your procedure, and the experiment will prove or disprove your hypothesis. “I think...” or “I predict...” Doing some research first helps you to add an explanation of WHY you think that will happen.

## 3. PERFORM THE PROCEDURE

Plan the details of your experiment. Select the independent (manipulated) and dependent (responding) variables.

Decide which things you must keep the same – these are your controlled variables.

- Determine what you will be measuring and what instrument you will use.
- Select the materials to form the test equipment. Plan how the tests will be done. If applicable, do a “small scale” test to see if things will even work as you are hoping.  
Which test will you do first?, How many tests will you do?, What will be recorded?, How many times will each test be repeated?
- Assemble the equipment to be used in the experiment. (Sometimes you have to invent something!)
- Prepare data sheets for recording measurements and for your comments.
- As you perform the tests, enter all measurements on your data sheets. It is important that you repeat each test several times. Take photos as additional records if applicable.

## 4. PREPARE AND EXPLAIN THE RESULTS

Group and organize the measurements you have made. Make charts, graphs, and tables to show what happened. It is a good idea to spend some time thinking about your results and talking to other people about them. Try to explain “how” and “why” the results are what they are. What was the cause? Do the results agree with your hypothesis?

## 5. DRAW CONCLUSIONS

What can you say about your experiment in general? What can you count on happening again if someone else does a similar experiment? If possible, try to describe how your results might apply to everyday experiences. Use the following format for a very thorough, powerful conclusion:

CLAIM: (What is your question's answer? What are you saying you discovered?)

EVIDENCE: (Restate some of your results, especially those which relate to your claim)

REASONING: (This almost feels like “stating the obvious” at this point, but you connect the evidence to the claim. “Because \_\_B\_\_ happened when I did \_\_A\_\_, that means \_\_A\_\_ caused \_\_B\_\_ (the plant to grow faster) (for example).

## Planning your Science Project

The Title is \_\_\_\_\_

My question is \_\_\_\_\_

My hypothesis is \_\_\_\_\_

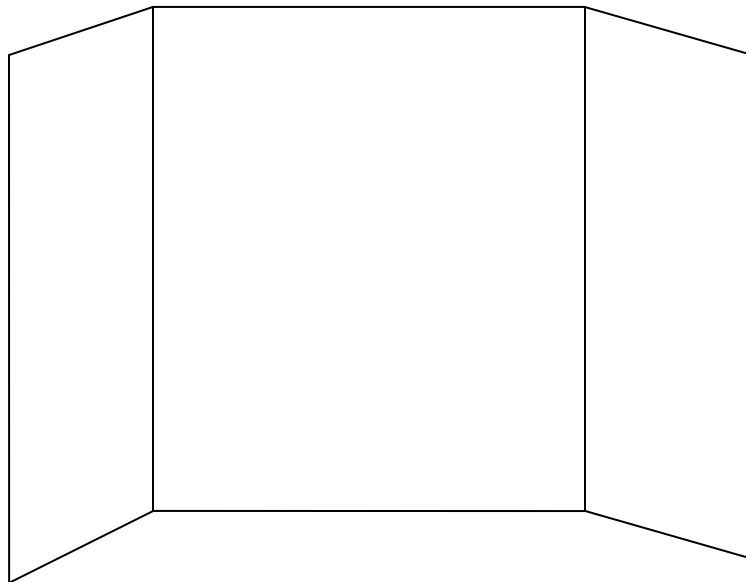
Reference I might use \_\_\_\_\_

Materials I might need \_\_\_\_\_

Experiment or activity I plan \_\_\_\_\_

How I will record results \_\_\_\_\_

Imagine what your project will look like. Draw a picture of it and label the parts.



## Special Note to Younger Students!

Doing a science fair project does not require technical expertise or fancy equipment. Here are some examples of experiments that can be done by young children. They are easy to do and use materials you already have in your home.

**EXPERIMENT Question:** What is the longest-flying paper airplane design?

Get several sheets of paper and make different types of paper airplanes. Be sure to keep the type of paper and size of paper constant. Only change the design. Then assign each plane a number and consistently toss each airplane (how can you be sure you are tossing them with the same force and motion?) and mark where each lands. Then measure out the distance each plane flew. Continue tossing the airplanes several times each. Write all your measurements on a graph in a note book. Which plane went the farthest?



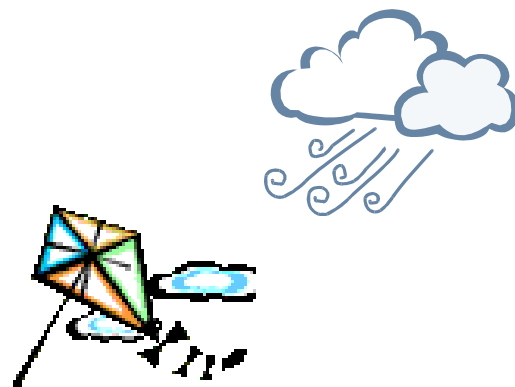
**MODEL Question:** How does a human ear work?

You will need a balloon, toilet paper or paper towel tube, cardboard (from cereal boxes?), and some other things like string or small tubing to represent other parts of the ear. After researching the parts of the ear and how we hear, student can assemble the model. On the display board be sure to label the parts of a REAL ear and compare it to a labeled drawing of the MODEL ear.

**OBSERVATION Question:**

What direction does the wind blow during different times of the day?

Make a wind vane and hold it in the same spot outside at different times of the day. it will point to the direction the wind is blowing to. Use a compass to find what direction the wind is coming from. Make a table showing the direction the wind was at different times for several days. Are there any patterns?



*You may wish to cut apart these headings to label your project board when using the scientific method*

**Observation**

**Question**

**Hypothesis**

**Procedure**

**Results**

**Conclusion**