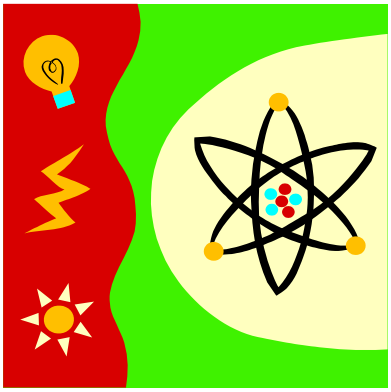
Point Road School

Little Silver

SciVention Convention



Open to all students in

Grades K - 4

This booklet along with dowloadable Project Proposal, Abstract and Project Card forms are provided on the Point Road School Website.

This booklet was adapted from:

Elementary Science Mathematics Engineering and Invention Fair Handbook, The Lassen County Science Fair Elementary Handbook, and the Freemont Unified School District Science Fair booklet.

Introduction

This booklet is published for the purpose of helping students and parents prepare and present at the **Point Road SciVention Convention**. Included in the booklet are guidelines and ideas to help you develop and carry out a project.

The Point Road SciVention Convention, otherwise known as a Science Fair, is a school-sponsored activity that supplements the regular curriculum of classroom instruction. The classroom teacher and school principal have the responsibility to regulate the content and presentation of all student projects to assure that they are consistent with the interest of the school community. The purpose of the SciVention Convention is to encourage students' interest in science and invention, to develop their inquiry and investigation skills, and to enhance children's pride in completing and presenting a research project.

Elementary-level Science Fairs:

- Stimulate in young people an active interest in science and encourage them to apply creative and critical thought to the solution of science problems.
- Enable students to exhibit their projects and share ideas with other students and community members.
- Provide opportunities for students to receive feedback from professional scientists and community members.
- Provide students with exciting opportunities to work with the scientific method on a topic of their own choosing which need not necessarily relate directly to the curriculum at a particular grade level;
- Are non-competitive events and students can be given recognition for participate or merit based on a rubric or set standard, without projects being classified by ranking (i.e. first place, second place, etc.); and
- Should adhere to standards of effective scientific instruction. Projects that "fail" to turn out as expected are an important learning opportunity. Experimentation is a very valuable part of learning and "failure" of a project or experiment is considered a valid project for display.

Project Selection and Approval

All project ideas must be submitted through the online Project Proposal form. The proposal must contain student names, the name of the project and a brief abstract of what will be presented. Projects are immediately approved once they have been submitted online. Projects without prior submission/approval, projects inconsistent with the prior approved proposal, or projects that have been substantially changed from what was previously approved will only be displayed at the principal's discretion.

Project Construction

Criteria all entrants should know:

1. The SciVention Convention project should be based upon a scientific investigation. Construction of apparatus and/or measurements and observations must relate directly to the investigative nature of your project.
2. THE PROJECT IS TO BE A STUDENT PROJECT, NOT A PARENT PROJECT. Judges at sites will mark projects down if, in their opinion, the student has not done the project on his/her own, if the topic is not appropriate to the student's grade level, or if too much adult assistance has been given to the student.
3. Equipment is rated highest that is built by the student himself/herself and that demonstrates ingenuity, simplicity, and economy of construction. The implication here, also, is that the project is the individual's own.
4. Purchase of expensive materials not normally available to students is not necessary. In general, modest equipment ingeniously used is more impressive.
5. A collection should be shown as a means to an end, not as an end in itself. Thus, a collection of minerals for instance, might be presented as evidence of study for rock or mineral formations. A collection of plant or invertebrate life might be shown as a means of studying genetic relationships or environmental influence.
6. Only observation of animals (to include invertebrates) is allowed. Please check with a member of your SciVention Committee for approval of any projects relating to animals.

Things to Consider

While you are contemplating what type of project you will want to enter in the SciVention, keep in mind the following:

1. Time required to complete the project in order to have it ready to display.
2. Available equipment and facilities.
3. Required technical skills – do you have to do soldering or wiring to complete your project?
4. All items must be firmly attached so that they cannot be easily picked up and carried away.
5. Beware of using expensive and/or movable equipment. The SciVention Committee will not be responsible for losses! Exhibitor must assume all risks as to damage of his/her project or parts thereon. We will provide minimal security.

Note to Parents

The work on the project must be done by the student. Parental help is encouraged but the project is not a parent project and is to reflect the student's ability. So, what can you do to help your child with the project?

- Give moral support; give encouragement when things seem to be right.
- Help him/her saw a piece of wood, bend wire, put the duct tape on the poster, cut the cardboard; help with lettering and spelling.
- Help him/her with ideas on where to find information in the library or internet that pertains to the project.
- Above all, DON'T DO THE PROJECT FOR HIM/HER.

Remember, parent-assisted projects often become parent-dominated projects. It's not exciting to attend a science fair and discover that the projects on display are often obviously NOT the work of a school-age child. Instead, the fair has become a competition among parents. Please remember, your child will get so much more out of doing the project (self-confidence, self-esteem, scientific knowledge, discovery, etc.) than watching you do it for them.

Types of Projects

Scientific Experimentation – This division must use the scientific method to investigate the relationship between two things. You can read more about Science Experiments under the heading "Creating an Experiment."

Invention Projects – It can be said that need is the mother of invention. Your idea for an invention will come from something that you or someone you know needs. With the invention project, you will be turning your idea into an invention! You can read more about inventions under the heading "Creating an Invention."

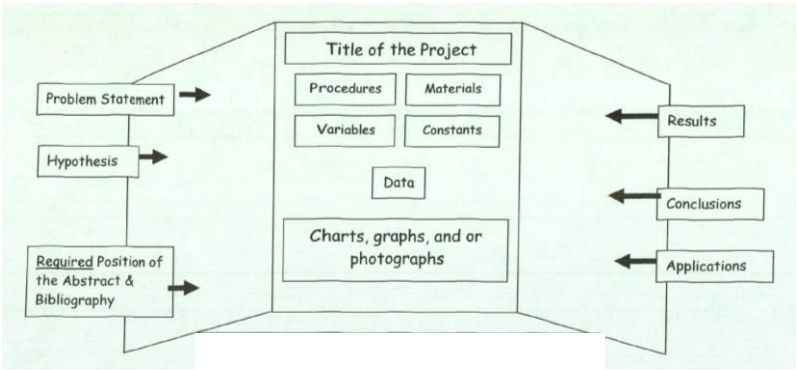
Projects can be submitted as either an Individual Project (one student only) or a Group Project (2-3 students).

Exhibit Requirements

Display Board:
Maximum height is about 36" and width (open) 48". Materials that can be used for the project panels are three sides of a large cardboard box, heavy cardboard, ½ or ¼ inch masonite, peg board, plywood, Tri Fold Display Board or wall paneling.

- Main points should be large and simple. Details must be clear and legible from three feet away.
- The use of pictures on the exhibit is highly recommended, but make sure your face is not seen in those pictures.
- No part of an exhibit may be attached to walls or tables.

Sample Display – Creating an Experiment



Sample Display – Creating an Invention

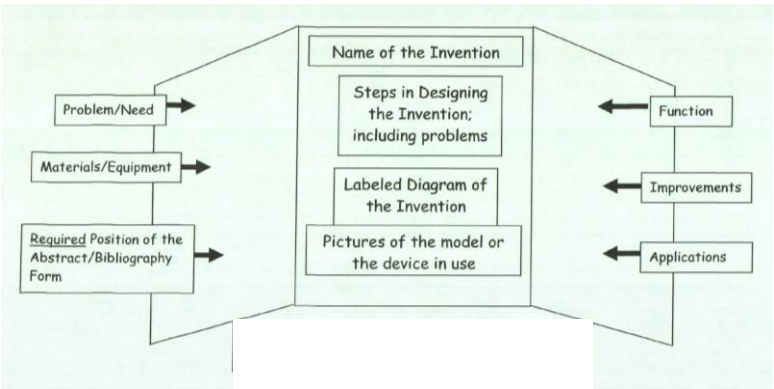


Exhibit Space (Maximum size):

- Width (side to side) – 4 feet, Depth (front to back) – 3 feet
- You will have a section of table designated for your exhibit.
- Make sure to display items that you feel would be interesting to support your experiment or invention. You can display these in front of your display board.
- Your Working Journal should be on display in front of your board.
- Provide battery power if possible as there is a limit to electrical connections. If you must have electrical hookup, please provide a 50-foot extension cord.
- Projects requiring participation by visitors (push buttons, levers, etc.) will be acceptable, but they must be so designed that they do not require operation or explanation by the exhibitor.
- All items must be firmly attached so that they cannot be easily picked up and carried away by visitors.

Judging and Rubrics

Student experiments and inventions will be judged based on a scoring rubric. Judges will be selected by the SciVention Committee and will consist of parents and community members that submit an application to be considered for judging. Judges will score the submitted projects and students will be provided with their final scores. Rubrics can be found on the Point Road SciVention Convention Website. It is important to view the rubric for the student's grade so that you will understand what is being looked for at each of the different levels.

Creating an Experiment

Science projects should involve students in an experiment where the result can be guessed at but isn't known for sure. Science Projects do become complex, so keep the experiment simple. The simpler the experiment, the less likely that some unknown variable will cause the result. If you start simple, hopefully the experiment will stay manageable. When doing an investigation, you will want to follow a research method used by scientists when they do experiments.

- Scientific investigations involve asking and answering a question and comparing the answer to what scientists already know about the world.
- Simple instruments like magnifiers, thermometers, and rulers, provide more information than scientists obtain using only their senses.
- Scientists develop explanations using observations (evidence) and what they already know about the world (scientific knowledge). Good explanations are based on evidence from investigations.
- Scientists make the results of their investigations public; they describe the investigations in ways that enable others to repeat the investigation.
- Scientists review and ask questions about the results of other scientists' work.

Step 1 – Decide on a Problem

GET BOOK TO BE USED AS A WORKING JOURNAL! From this point forward, everything should be recorded in your Working Journal!

- Write about your ideas.
- Write about the problems you had and tell how you solved them, or if not, what you did.
- Record all of your observations.
- Basically, anything to do with your project should be recorded in your log book! Don't forget to put the date on each page!

Begin by exploring a scientific concept that you are interested in. Perhaps it is something you read about or saw on television. Think of some kind of experiment that you would like to try. Remember that you must be able to measure the experiment each day.

- Set up a control group and an experimental group. Remember to change *only one variable*.
- Write down your problem. Make sure that there is a purpose to your experiment.

Step 2 – Form a Hypothesis

At this point, your brain will start asking "What if…" questions. One of these questions is what you will use to design your experiment. It is called the "TESTABLE QUESTION." Once you have a testable question, you have some decisions to make:

- How do you design the experiment to answer the question?
- What measurements do you need to take to record your results?
- Think about what might happen in your experiment. This is called a HYPOTHESIS. Write down what you think BEFORE actually doing the experiment.
- Be specific! Make a chart of the numbers that you are predicting and give reasons for your guesses. Include other guesses such as height, color, condition, size, time, etc.

Step 3 – Experimental Design

The experimental design is a plan to confirm your hypothesis. This is not a specific item on your display board, but is determined by what your hypothesis is, the materials that you need and the procedures that you will carry out.

Step 4 – Materials/Equipment

Now that you have planned your experiment, gather all the materials you will need to do the experiment. As you begin the experiment, make detailed observations of what is happening. Take your measurements carefully. Keep carefully written notes about what you do and how you do it.

Materials used for your experiment must not exceed $25. All costs must be posted to your Working Journal.

Step 5 – Procedure

Write a detailed description of how to do your experiment. As you work through it, you may find that you have to change it. That's OK, just make notes and change your procedure afterwards, to show the changes. Remember, any scientist should be able to take your procedure and repeat your experiment following your instructions.

- It is easier to use a numbered list, like in a cookbook rather than write a paragraph.
- Start each sentence with an action verb: mix, stir, get, measure, etc.
- Include quantities or amounts that you will measure. You may have to make your own scale, i.e., scale for leaf color ++++dark green -> + yellow-green.

Step 6 – Variables and Controls

- Identify the independent (manipulated) variable, this is the one that you control, or are changing in your experiment, i.e., temperature of water, amount of light.
- Identify the dependent (responding) variable, this is the one that reacts or changes in response to the independent variable, i.e., amount of salt that dissolves or the height of the plant.
- How do you use constants in your experiment? Constants are the part of your experiment that you do not change so that you can compare the results of your test.
- It is wise to use a control group in your experiment. A control group is the group that does not receive the experimental variable. It has what is usually considered normal conditions, ie.., room temperature, normal amount of water, normal amount of sunlight. A control group helps you to be sure that what you are testing for is really happening because of what YOU DO in your experiment.

Step 7 – Experiment

- Carry out your experiment.
- Make and record observations using a measuring tool (i.e., ruler, thermometer, balance, etc.) whenever possible.
- Record measurements in metric units, i.e., centimeters (cm); grams (g); degrees Celsius (°C).
- Design a data table to keep track of your results.

Then, REPEAT THE EXPERIMENT over again at least two times. Record your results as carefully as you did for the first time. ALL scientists repeat their experiments; we INSIST you repeat yours as well.

Step 8 – Results

- When you have all of your results, from all the time you did the experiment, you need to design the way that you will report your results.
- Many students use graphs, charts and written summaries of what happened in the experiment.
- Determine averages, mean, mode, or frequency when appropriate.
- Use photographs whenever possible to show changes.
- Display all your results and measurements, even if it doesn't match what you thought was going to happen.

Step 9 – Compare your results with your Hypothesis

Look again at your HYPOTHESIS and at the results of your experiment. Think about what happened and why it happened that way. Write down the reasons you think the results happened the way they did.

Step 10 – Conclusion

A summary of what your experiment shows and how your work can be used for more research.

- Explain what you learned from your experiment

- Explain the importance of your results, how it contributes to making something better.
- Try and show an application for your experimental results.
- Write comments about your project. Explain how you could have improved your project.

Step 11 – Project Abstract and Bibliography

- No more than 250 words.
  Paragraph 1 – Describe your purpose and hypothesis.
  Paragraph 2 – Briefly describe your procedure.
  Paragraph 3 – Describe and explain your results and also state if your hypothesis was supported or not supported by the results. Suggest a reason why it was or was not supported.
  Paragraph 4 – Explain your conclusion and application(s).
- A layout for the Project Abstract/ Bibliography is provided in this booklet. See the Bibliography Guidelines section of this booklet for specifics.

Creating an Invention

Creative problem solving is a process for finding workable solutions to problems. However, finding the right problem to solve is often the most difficult part of the process.

Inventions must fit into the following definition:

- An invention can be anything that solves a real problem. It is something that no one has ever thought of before. It cannot be purchased in a store or found in a book.
- Sometimes an invention is an improvement to an object that was already invented. An invention must serve a purpose.

Inventors are encouraged to use recycled materials. The cost of the invention must not exceed $25. All materials costs should be documented in your Working Journal.

Advice to Parents and Students

This type of project needs to meet three criteria:

1. It should be an original idea from the student.
2. It should be a novel, unique solution to a problem.
3. It may be a significant improvement upon an existing invention.

Step 1 – Learning About Inventors

GET A BOOK TO BE USED AS A WORKING JOURNAL! From this point forward, everything should be recorded in your Working Journal!

- Write about your ideas.
- Write about the problems you had and tell how you solved them, or if not, what you did.
- Record all of your tests and what you learned each time you tried again.
- Basically, anything to do with your invention should be recorded in your log book! Don't forget to put the date on each page!

Then, first step in becoming an inventor is to learn all that you can about inventors and their inventions. You will discover how and why certain products were invented. Did you ever wonder why the safety pin was invented? Or how toothpaste was packaged before it was put into tubes? And how about mousetraps? Did you ever think of how many different types have been invented? In reading about inventors, you will learn that their inventions were made to fulfill a need.

Step 2 – Getting Ideas
It can be said that need is the mother of invention. Your idea for an invention will come from something that you or someone you know needs. There are several ways to find ideas for inventions. One way is to ask people if there is anything they need.

Another method is called brainstorming. You can brainstorm alone or with others. Another way to generate ideas is to modify ideas is the SCAMPER technique. Choose a common object then SCAMPER with ideas instead of objects. Here is an example of SCAMPER with a paper lunch bag:

SUBSTITUTE – What if you make the bag from a different material?
COMBINE – What if you combine it with another common object?
ADAPT – How can you adapt the bag to another situation? Is it similar to other objects?
MAGNIFY, MINIFY, MODIFY – What if I make it bigger, smaller, or change it in some way?
PUT IT TO OTHER USES – What else can you use the bag for?
ELIMINATE – What could you take away?
REARRANGE/REVERSE – Can you rearrange the parts? Can you turn it upside down, backwards, inside out?

Step 3 – Find a Problem
Focus on problems that you may have noticed during your daily life, i.e., opening a can of dog food, reaching the top shelf in your closet, having a place to sit as you wait in line. Also consider problems that handicap individuals encounter.

Step 4 – Consider the Situation
What do you already know? Focus on originality. If an inventor has an idea, it is important to know what already exists so that the inventor doesn't waste time "reinventing the wheel." Call around to stores and do research in catalogs to find out if the invention already exists. Your parents may have to help you call stores because they will be taken more seriously. Be sure to record all this information in your Working Journal.

Step 5 – Brainstorm
Brainstorm a list of possible solutions and record it in your Working Journal. Review the list and eliminate all of the solutions that are impossible and those that already exist. Reasons for eliminating a solution include lack of knowledge, insufficient technical ability, and lack of necessary materials.

Step 6 – Research and Planning
Before an invention can be successful, you have to make a plan. You plan should include all the steps you can think of, from beginning to end. When writing your plan, ask yourself questions such as these.

- What can I read about that will help me with my invention?
- Who can I talk to about solving problems and planning properly?
- What materials will I need?
- How can I control the cost of my invention?
- What steps should I follow?
- How much time should I allow for each step?
- How can I test my invention?

Don't be surprised if you have to change your plans along the way. Sometimes a plan will not work as well as you first thought it would. So keep an open mind for change. You may even discover a better way of completing a certain step.

Step 7 – Developing and Testing
Now the work begins. Follow your plan step by step. If you have difficulty with a certain part of your invention, find an expert to talk to. Try different things until you overcome the difficulty. Most of all, don't give up! As Henry Ford, one of the inventors of the automobile, once said, "Failure is only an opportunity to start again more intelligently."

If your invention is a new way to do something, describe your process in a written report. Give all the important details of your process. To show that your idea works, you should test it. The results of your test should be written into your report.

Step 8 – Naming the Invention

Develop a name for your product using the following guidelines:

- Don't make your brand name too similar to others.
- Don't make your brand name too descriptive. You want your name to be a unique eye-catcher.
- Be creative. Brand names that use rhyming or alliteration will grab people's attention.
- Remember when you are brainstorming to go for a bunch of ideas.

Step 9 – Project Abstract and Source Listing (Bibliography)

- No more than 250 words.
  Paragraph 1 – A written statement of the purpose of the invention and the problem it solves.
  Paragraph 2 – A list of materials used.
  Paragraph 3 – A list of all the steps taken to complete the invention.
  Paragraph 4 – Describe the problems encountered and include drawings or photographs of attempts that failed.
  Paragraph 5 – A written statement proving originality. In addition to parent verification, students should also describe what they did to ensure that their invention does not already exist.
- A layout for the Project Abstract/Bibliography is provided in this booklet. See the Bibliography Guidelines section of this booklet for specifics.

Bibliography Guidelines

It is important that you give credit to those you received information from. Any sources that you quoted from, used to help you with your project, and/or an experiment that you duplicated, should be cited. Please attach a source list to the back of your display board.

Books: List the author, title, publisher, city, and date. For example:
Dyson, Marianne J., Space Station Science, Scholastic Inc., New York, N.Y., 1999.

Magazines, Newspapers, or other Periodicals: List author, article name, Magazine or periodical name, edition or volume, date, page numbers. For example:
Defoe, Daniel, "Looking Into the Pit", Muse, Volume 6, Number 8, October 2002, Pages 9-13.

Web sites: List full web site, any name or credit given, date taken from site, time (optional) and web address. For example:
"Science Fair Project Resource Guide", from Internet Public Library, February 3, 2010 @ 2:00pm,
http://www.ipl.org/div/kidspace/projectguide

Student Checklist for a Good Project

	Size of project can be a three-panel display as small as a shoebox or a grocery bag. It may be no larger than 36" high x 48" wide and it **must stand-alone** or it will be disqualified.
	The **display** should be colorful (paint, colored paper, etc. to make it "eye-catching" or "attractive".
	Make your title interesting and appropriate. The title should be in large letters clearly seen and should describe your project (approximately two-in-high letters).
	Attach the Project Card provided on the **backside of the center panel** of the project. Be sure the student's name, school and grade level are written clearly.
	The Science Fair project should be neatly presented with correct spelling, math, projects, and science facts. Information sources (see Source List Guidelines) should be neatly written in ink or typed **by the student**.
	Pictures, charts, graphs, or tables that help explain your project should be neatly displayed with your project. Be sure your project is well constructed. (Keep in mind the transportation and setting up of your project).
	The project should include all steps that you took to complete either your Experiment or Invention.

Project Card

Glue to the back center panel of display

Name: _____

Grade: _____

School: _____

Teacher: _____

Project Type: ☐ Experiment ☐ Invention

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Information Sheet

Project Abstract/Bibliography

Student's Name: _____

Project Title: _____

Abstract

Be sure to include the following in the abstract of a project (no more than 250 words):

Experiment:

- Paragraph 1 – Describe your purpose and hypothesis.
- Paragraph 2 – Briefly describe your procedure.
- Paragraph 3 – Describe and explain your results and also state if your hypothesis was supported or not supported by the results. Suggest a reason why it was or was not supported.
- Paragraph 4 – Explain your conclusion and application(s).

Invention:

- Paragraph 1 – A written statement of the purpose of the invention and the problem it solves.
- Paragraph 2 – A list of materials used.
- Paragraph 3 – A list of all the steps taken to complete the invention.
- Paragraph 4 – Describe the problems encountered and include drawings or photographs of attempts that failed.
- Paragraph 5 – A written statement proving originality. In addition to parent verification, students should also describe what they did to ensure that their invention does not already exist.

Bibliography

There should be at least three (3) references. If the project concerns an animal, there should be one reference concerning the care of that type of animal.