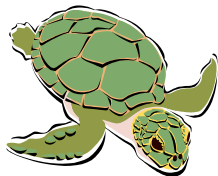
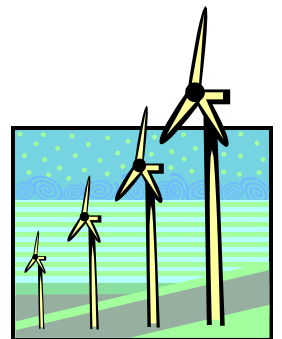
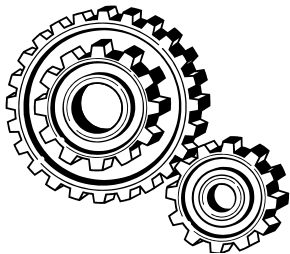
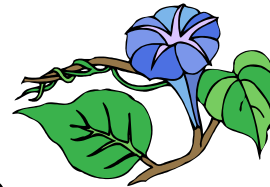
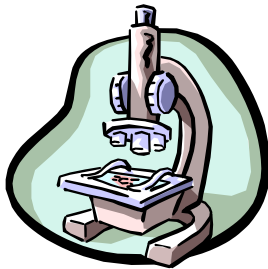


# SCIENTIFIC SURVEY PROJECT

7<sup>TH</sup> GRADE



## Student Information Packet





# SECONDARY

# SCIENCE FAIR

# STUDENT INFORMATION PACKET

Revised 2009, 2011

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## SCIENTIFIC SURVEY PROJECT

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# ***SCIENCE FAIR***

## ***STUDENT INFORMATION PACKET***

### ***INTRODUCTION***



You are surrounded by science. Everything uses some form of science to make it work. Even the chair you sit on was made by a person using tools to build it based on knowledge of science and technology. How did they know what shape to make the saw and how sharp the teeth needed to be to cut wood? How did they know to make one saw for wood and a different one for metal? Why does the wood-cutting saw have larger teeth than the metal-cutting saw?

Science is asking questions and finding answers. A science project, simply put, is the process of asking a question about something you are interested in, for which you don't already know the answer, and then hypothesizing (best-guessing) what the answer might be, researching for information on that topic, experimenting, inventing, surveying, etc., analyzing your results, and coming to a conclusion!

The purpose of a science fair is to provide a focus for you, the student, to apply skills and concepts you have learned in science as well as in math, reading, writing, and technology. It gives you a place to use these skills creatively in your own way.

What your accomplishment will mean for you:

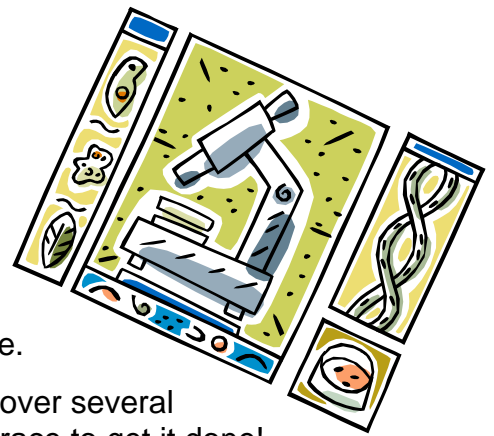
- ★ Developing self-reliance
- ★ Gaining self-confidence
- ★ Acquiring organizational skills
- ★ Knowing what the scientific method is and how it can help you.
- ★ Having your work viewed and recognized by your school and community

Everything you need to know about doing a great science project is inside this packet. You'll be discussing the contents in class. Approximately every two weeks between now and your school science fair, your teacher will give you a **Student Timeline for Science Fair Project** sheet to check your science project's progress. The timeline sheet is designed to keep you on target, and keep your teacher and parents informed so that they can help you if needed

***You must keep this packet, timeline sheets, letters home to parents, and all other information in a separate folder. Your science fair folder should be kept at home unless your teacher asks you to bring it to school.***

You will find the science fair to be an exciting and rewarding experience. Let's make this year's fair the best ever!

# Helpful Hints for Students



- ⊕ Start EARLY; don't wait until the last two weeks before it is due.
- ⊕ Plan it out. It will be much more fun if you spread the time out over several days per week or several weekends, and you won't have to race to get it done!

It might look like this:

**Week 1** – Decide on your PROBLEM – what you want to solve.

**Week 2** – Conduct your preliminary research by reading books about your topic, visiting libraries, universities, making contact with other sources, and checking out web sites.

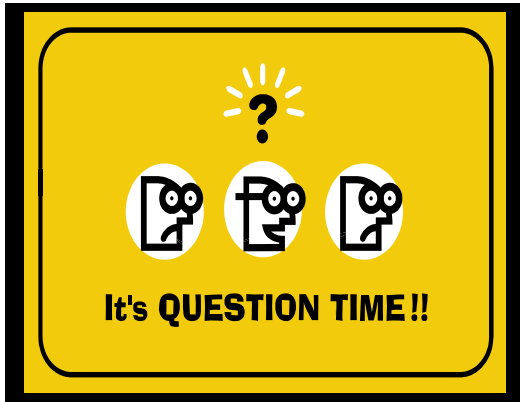
**Week 3** – Work the “steps” of your project.

**Week 4** – Think about the results and make your charts or graphs.

**Week 5** – Write your report.

**Week 6** – Make your display.

- ⊕ The goal is that you learn to use “the scientific method” or “the engineering design process” through direct experience.
- ⊕ Check with your parent or teacher if you want to use a web site for research. Not all web sites give correct information. *Remember:*
  - Anyone can create a web site; this does not mean its information is correct!
  - Make sure the web site is run by a large, recognized group such as a college or organization.
  - DOT “org”, “gov” or “edu” are generally trustworthy for accuracy of content.
- ⊕ What is an acceptable science fair project?
  - Something that answers a question to which you do not know the answer
  - Something you can figure out yourself
  - Something you can change somehow, add another variable, and then predict the outcome. That's an experiment!
- ⊕ What is NOT an acceptable science fair project?
  - Reproducing results found on the web is *not* an experiment; it's a reproduction.
  - A demonstration is not an experiment (i.e., volcano).



# ***SCIENTIFIC SURVEY PROJECT***

## ***CONDUCTING A SCIENCE FAIR SCIENTIFIC SURVEY PROJECT BY GATHERING & ANALYZING DATA USING THE SCIENTIFIC METHOD***

### **For 7<sup>th</sup> Grade ONLY**

Learn how to use carefully controlled, scientific methods for gathering data related to consumer products or opinions. The project must follow the same guidelines as any science fair project using **The Scientific Method** (see Written Report Content), but you will also include the following specific elements★:

#### ★ **DESIGN OF GOOD SURVEY QUESTIONS**

Questions need to be unambiguous and carefully designed to elicit the direct answers to the question being asked. Questions cannot be “leading”, unless you are studying survey responses to “biased” vs. “unbiased” questions.

#### ★ **STEPS TAKEN TO ENSURE VALID RESULTS**

There should be a large enough population to reach a statistically significant conclusion. The specific method, time, and location for the survey to be given must be predetermined. This will be spelled out in detail in the “Procedures” section – *not* “I asked questions.” You will show the process used to get a randomized respondent population – *not* “I asked my friends.”

**Students’ Scientific Survey Projects must follow The Scientific Method by including the following:**

- I. **PROBLEM:** Describe the observations which lead to a question.
- II. **PRELIMINARY RESEARCH:** Research similar studies done by professionals or academics.
- III. **HYPOTHESIS:** State your “best guess” in a one-sentence statement at what the survey outcome will be for the population being studied.
- IV. **EXPERIMENTATION:** Experiment by giving the survey under strictly controlled conditions.
  - A. **Materials:** Design your survey questions as above. Predetermine “who, what, how, when and where” your survey will be conducted.
  - B. **Procedure:** Plan *how* you will record you data, developing a good record of the method, times and locations, how you obtained a randomized population to survey, and what that population consisted of.
  - C. **Observe and record data:** Observe and record what happens during your survey. Include all details and list any problems.
  - D. **Results:** Summarize findings. Give at least two types of graphical representations of the data collected.
- V. **CONCLUSIONS:** Provide an objective evaluation of the results - what really happened - *not* how you liked the result. Describe and explain any flaws or unexpected outcomes found after the survey.

# SECONDARY SCIENTIFIC SURVEY

## WRITTEN REPORT CONTENT

7<sup>th</sup> Grade



Scientists always report their research and experiments so that others may benefit from this new knowledge. Some research is reported through published papers while other work is presented at conventions, on TV, or through the Internet. Your research will be presented through your written report, a project display, and an oral presentation.

### ABSTRACT

The abstract is a concise summary of your whole project. Others can read the abstract if they do not have time to read your full report. The abstract must *not* be more than one page long. It includes your problem, hypothesis, research, experimentation, and conclusion. You will write the abstract *after* your report is complete.

### TITLE PAGE

The title page belongs *after* the abstract. The project title must be centered on the page. See the **Written Report Format** sheet for information that needs to be in lower right corner.

### PURPOSE

In one short paragraph, tell why you did your project on the topic you chose.

### ACKNOWLEDGEMENTS

On one page, say “thank you” to all the people who helped you with your project. Include any family members, teachers, or experts who assisted you with information, materials, or equipment, or participated in some way in your experiment.

### TABLE OF CONTENTS

Divide your Table of Contents into sections as indicated on the **Written Report Format** sheet. Put the actual page numbers at the bottom of each page *after* you have finished the final copy of your report.

### PROBLEM

Describe the observations which lead to a question in the form of a one-sentence question. Be specific. Your page numbering begins here.

### PRELIMINARY RESEARCH

This section is a summary in essay form of the information you collect about the history and general background needed by the reader to understand your project. It should include any previous research on your topic. Use notes from books, journals, the Internet, magazines, and interviews. If you are required to cite sources within this section, see **Written Report Format for Citing Scientific Research Sources.**

### HYPOTHESIS

The hypothesis is an educated guess, based on your preliminary research, as to what the survey outcome will be for the population being studied. The hypothesis is a statement which is generally one sentence long.

## ***WRITTEN REPORT CONTENT continued:***

---

### **EXPERIMENTATION**

Describe how the survey was given under strictly controlled conditions.

- **MATERIALS**

List the materials you used. Include a copy of your questionnaire.

- **PROCEDURE**

The procedure is a detailed list of the steps used to conduct your survey. Describe how you selected and randomized the people answering the survey, what that population consisted of, and how you attempted to survey as many people as possible. Include details such as methods of distributing and collecting the data, dates, times, locations, and the number of people who declined to answer, etc. How did you try to remove bias from the questions (or add bias to them if that was the point)?

- **OBSERVE AND RECORD DATA**

Write about your observations and your recorded questions and answers and what happened during the survey process. Include all details and list any problems you had.

- **RESULTS**

The results are a summary of your findings. Summarize findings in the form of at least two types of graphical representations of the data collected (i.e., drawings, photos, graphs, charts, etc.). See **Examples of Data Tables and Graphs**. Write a narrative explanation of your findings as well. At the end of your narrative explanation, analyze why you got the results you did. Include all possible variables and errors that may have affected your results.

### **CONCLUSIONS**

The conclusion answers the hypothesis. Look at your survey results and provide an objective evaluation of the results - what really happened - not how you liked the result. Describe and explain any flaws or unexpected outcomes found after the survey.

### **APPLICATION / REFLECTION**

Explain how your project findings apply to society and/or you personally. Reflect on and write about the benefits of doing the science project.

### **SOURCES / BIBLIOGRAPHY**

List all books, articles, pamphlets, and other communications or sources that you used for writing your preliminary research section. You must have at least five sources, only one of which may be an encyclopedia. College libraries, as well as city libraries, should be used. Interviews with experts in your field of study are encouraged. See **Written Report Format for Sources / Bibliography**.

**Rewrite your paper several times to correct errors.  
Have someone you trust proofread your report before you make the final copy.**

**BOXED** topics are part of the rubric criteria for judging. The other parts are used only for grading the written report by the teacher.

# ***SECONDARY SCIENTIFIC SURVEY***

## ***WRITTEN REPORT FORMAT***

Each line with a box (☐) in front of it begins a new page in the report.

Abstract

Title page

***Title in middle of page***

**In lower right-hand corner:**

Last Name, First Name

Grade \_\_\_\_

Period \_\_\_\_

Teacher Name

School Name

Date (include year)

Purpose

Acknowledgements

Table of Contents (with page numbers)

Problem (page numbering starts here)

Preliminary Research

Hypothesis

Experimentation

- Materials
- Procedure
- Observe and Record Data
- Results

Conclusions

Application / Reflection

Sources / Bibliography

### ***OTHER POINTS TO REMEMBER:***

- ✓ Type or write on one side of paper.
- ✓ Do not put pages in plastic.
- ✓ Make two copies of your original report: Original to teacher, one copy you keep, second copy to use on display board (if you wish).
- ✓ Put report in a store-bought folder with three brads or rings.
- ✓ Put name, subject, period, date, and teacher's name on front of the folder in *upper right-hand corner*.

1. The ORIGINAL report goes inside the report pocket on the display board.
2. A COPY should be kept at home or on the computer.

# **WRITTEN REPORT FORMAT FOR CITING SCIENTIFIC RESEARCH SOURCES**

*(When used within the report)*



Citations are similar to footnotes in English or history papers but are much easier to include. Citations are included only in the Preliminary Research. Scientific citations are placed *within* the paper itself, not at the bottom of the page. Citations are placed *at the end* of a sentence or paragraph that contains the information you gathered from another source.

- Rule 1: Cite all sources that refer to information on your species, experiment, or study site.
- Rule 2: Cite all sources that back up your conclusions.
- Rule 3: Cite anything that brings in a fact not directly taken from your own personal observations or experiment.
- Rule 4: When in doubt, cite!

## **EXAMPLES OF PROPER CITING**

*(author, date)*

White sharks are known to be maneaters (Halstead, 1954). They are the only shark that regularly preys on marine mammals for food. Some scientists believe that great whites attack humans by mistake: the silhouette of a surfer paddling on a surfboard may be mistaken for a seal sunning on the surface (Ellis, ed., 1987).

*(editor, date)*

## **VARIATIONS IN SCIENTIFIC CITATIONS**

|   |          |  |
|---|----------|--|
| <b>One Author</b>   | Example  | <i>(last name only, date)</i><br>(Bronowski, 1973)                           |
| <b>Two Authors</b>  | Example  | <i>(both last names only, date)</i><br>(Walker and Maben, 1980)              |
| <b>Three or More Authors</b>                                    | Example: | <i>(all last names only, date)</i><br>(Cochran, Wiles, and Kephart, 1975)    |
| <b>No Authors</b>   | Example: | <i>(abbreviated title, date)</i><br>(Insects of Guam, 1942)                  |
| <b>Only an Editor</b>   | Example: | <i>(last name only, abbreviation for editor, date)</i><br>(Ellis, ed., 1987) |
| <b>Citing an Expert You Have Spoken to or Corresponded with</b> | Example: | <i>(last name, "personal communications")</i><br>(Collins, pers. commun.)    |



# WRITTEN REPORT FORMAT FOR SOURCES / BIBLIOGRAPHY



Entries in a Sources / Bibliography section of a report are alphabetized by the last name of the author and the date is placed directly afterwards. An entry for which the author is unknown, such as a newspaper article or an unsigned review, is alphabetized by the first word of the title, excluding the articles *A*, *An*, and *The*. Always double-space and *indent the second and succeeding lines of each reference*. Do not number your references and if you have two or more references by the same author, alphabetize them starting with the most recently written paper.

## Books

|                                    |   |
|------------------------------------|---|
|                                    | <i>(last name) (initial) (date) (title) (city) (publisher)</i>  |
| <b>One Author</b>                  | Bronowski, J. 1973. <u>The Ascent of Man</u> . Boston: Little & Brown, Inc. 376 pp.<br><span style="float: right;"><i>(total # of pages only)</i></span>  |
| <b>By Editor</b>                   | <i>(editor)</i><br>Ellis, R. (ed.) 1987. <u>Sharks</u> . New York: Wiley, 256 pp.   |
| <b>2 Authors,<br/>Local Agency</b> | Walker, R. G., and A. Maben. 1980. <u>The Feeding Ecology of Bats</u> .<br>Guam Div. Aquatic & Wildlife Resources. Mangilao, Guam. 44 pp.<br><span style="float: right;"><i>(agency) (city) (country) (total # of pages)</i></span> |

## Magazines and Scientific Journal Articles

|   |   |
|---|---|
|   | <i>(last name, first initial, then first initial, last names) (date) (title)</i>  |
| <b>3 Authors,<br/>Journal Article</b>     | Cochran, J. A., Wiles, G. and D. Kephart 1975. "Money, Banking, and the Economy". <u>Fortune</u> 34 (4): 47-55.<br><span style="float: right;"><i>(vol.) (no.) (exact pages)</i></span> |
| <b>No Author,<br/>Scientific Bulletin</b> | "Insects of Guam". 1942. Bernice P. Bishop Museum, Honolulu Bull. 17.<br><span style="float: right;"><i>(title) (date) (publisher) (bulletin # only)</i></span>                         |

## Newspapers

|                    |  |
|--------------------|--|
|                    | <i>(author) (exact day) (title)</i>  |
| <b>Basic Entry</b> | Kristof, Nicholas D. 3 Jan. 1985: "Oil Futures Plunge on OPEC Doubt."<br><u>New York Times</u> , D13.<br><span style="float: right;"><i>(publisher) (section #)</i></span> |

## Encyclopedia, Dictionary, Atlas

|                                    |   |                        |   |   |
|------------------------------------|---|------------------------|---|---|
| <b>Article Within Encyclopedia</b> | <i>(author)</i><br>Halstead, B.   | <i>(date)</i><br>1954. | <i>(title)</i><br>"Poisonous & Dangerous Marine Animals". | <i>(specific pages within)</i><br>Pp. 105-115 in<br><u>Encyclopedia Britannica</u> Vol. 93 (C. Brown, ed.), New York: Academic Press. |
|                                    | <i>(encyclopedia)</i>   | <i>(volume)</i>        | <i>(editor)</i>   | <i>(city)</i><br>New York<br><i>(publisher)</i>   |
| <b>Dictionary Entry</b>            | "Advertisement." <u>Webster's Third International Dictionary</u> . (Because the number of the edition appears in the title, the date is not necessary.) |                        |   |   |
| <b>Atlas Entry</b>                 | "Hidden Face of the Moon." <u>Times Atlas of the World</u> . 1981 ed.   |                        |   |   |

## Nonprint Sources

|                     |   |                        |  |  |
|---------------------|---|------------------------|--|--|
| <b>Video / Film</b> | <i>(director)</i><br>Shatner, William, dir. | <i>(date)</i><br>1989. | <i>(title)</i><br><u>Star Trek V: The Final Frontier</u> . | <i>(actors)</i><br>With William Shatner, Leonard Nimoy, and DeForest Kelley. Paramount Studios, Hollywood. |
|                     |   |                        |  | <i>(studio)</i><br>Paramount Studios<br><i>(city)</i><br>Hollywood   |

## Computer Materials

|                          |  |                        |  |  |                                    |                              |
|--------------------------|--|------------------------|--|--|------------------------------------|------------------------------|
| <b>Computer Software</b> | <i>(title)</i><br><u>SimEarth</u> .                                | <i>(date)</i><br>1990. | <i>(version)</i><br>Version 2.0.   | <i>(publisher)</i><br>Sunburst Software, Green Valley, CA. | <i>(city)</i><br>Green Valley, CA. | <i>(format)</i><br>CD or DVD |
| <b>Web Sites</b>         | <i>(title)</i><br>"How to Produce Award-winning Science Projects". | <i>(date)</i><br>2005. | <i>(source)</i><br>Nat. Assoc. of Biology Teachers Bulletin Board, NABT.edu. | <i>(Internet address)</i>                                  |                                    |                              |

## Citing "personal communications" with an Expert

(in person, on the phone, in letters or on the Internet)

*(full name and title)* *(date interviewed)*  
Collins, Dr. Charles 2009. Prof. of Biology, Calif. State Univ., Long Beach, CA  
*(address of work or home)*



# EXAMPLES OF DATA TABLES AND GRAPHS

## DATA TABLES

Experimentation that produced data in the form of numbers (quantitative data) must be placed in data tables. Data tables are needed in reports so that you can display your observations (data) in a clear, organized form. Several data tables may be included on one page, as long as the format is clear and easy to read.

Data tables should be created on computers. Each table's columns need headings above them (titles). Any units needed (centimeters, seconds, grams, etc.) should appear in the labels, not within the table itself. Rows may also need labels to identify a variable.

Titles for data tables should go *at the top* of each table and include a specific description of the kind of data the table contains. In formal reports, each title should also include the date and location where the data was collected. High school reports working with specific animals or plants should include the scientific as well as the common name. Always remember to underline or put into italics all scientific names.

**Table 1. Earth's human population since 1 A.D.**

| YEAR | POPULATION (in billions) |
|------|--------------------------|
| 1    | 0.25                     |
| 1600 | 0.45                     |
| 1700 | 0.59                     |
| 1800 | 0.90                     |
| 1900 | 1.55                     |
| 2000 | 6.10                     |

**Table 2. The number of brine shrimp found in sections of tubing after the shrimp were exposed to differences in light, pH, or temperature, on October 2, 2009 at Poly High.**

| VARIABLES        | SECTION 1     | SECTION 2   | SECTION 3   | SECTION 4    |
|------------------|---------------|-------------|-------------|--------------|
| LIGHT            | 5 (brightest) | 15          | 68          | 50 (darkest) |
| pH               | 13 (pH 5.5)   | 37 (pH 6.7) | 76 (pH 7.8) | 65 (pH 8.6)  |
| TEMPERATURE (°C) | 68 (coldest)  | 64          | 32          | 44 (warmest) |
| CONTROL          | 23            | 34          | 21          | 37           |

## GRAPHS

Graphs are a perfect way to visually present your data. A data table will show your results in numbers, but is often uninteresting or difficult to interpret. A graph can take the same data, make it eye-catching and easily show large differences in your results. Graphs show comparisons between two or more groups or differences between variables.

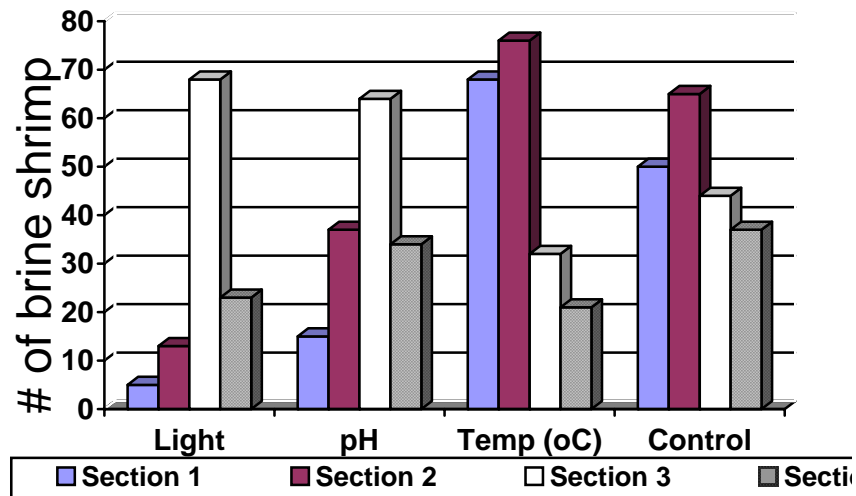
A graph cannot stand alone - it must be preceded by a data table. The data table contains exact details from an experiment that a graph often cannot show. They complement each other: one gives the details, one displays the trends.

Label both the X and Y axes and include any units necessary (grams, centimeters, etc.). Data from **dependent variables** (data that vary as the experiment continues) are placed on the Y axis. Data from **independent variables** (data that do not vary during the experiment, such as the days of the week,

experimental group numbers, and time periods) are placed on the X axis.

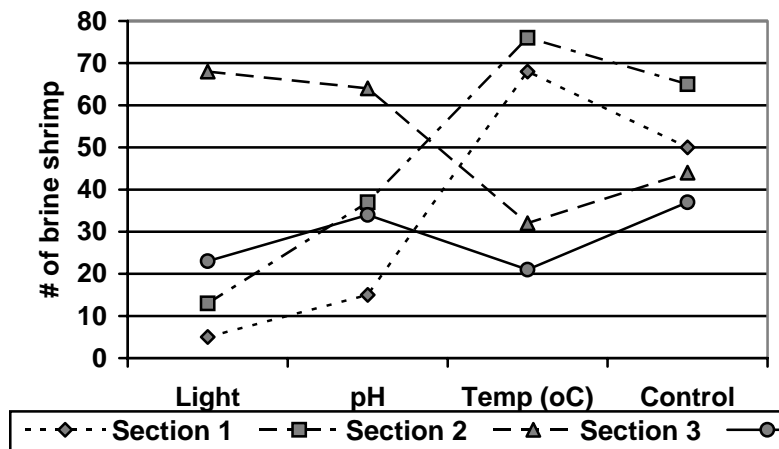
Graphs must be properly titled. The **formal title** for a graph goes **at the bottom** of the graph and like a data table, includes a description of the kind of data the table contains. In formal reports, each title should also include the date and location where the data was collected.

**An Example of a BAR GRAPH**  
*(Three variables and the control are graphed)*



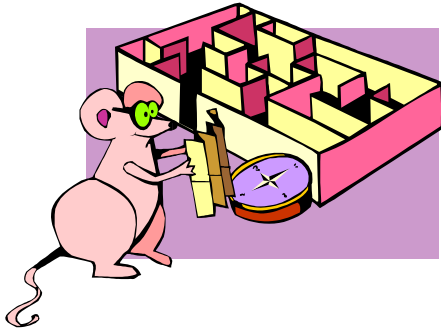
**The number of brine shrimp preferring various levels of light, pH, and temperature.**  
 (See Table 1 for details.)

**An Example of a LINE GRAPH**  
*(Three variables and the control are graphed)*



**The number of brine shrimp preferring various levels of light, pH, and temperature.**  
 (See Table 1 for details.)

**NOTE:** The preceding examples show three variables graphed. It is suggested that you use only one variable in your experiment unless you have teacher permission. Also, the preceding examples are of a bar and line graph. As you know, there are other types of graphs that you have seen or made in science and other classes. You may select the type of graph(s) you would like to use in your written report.



## ***SECONDARY SCIENTIFIC SURVEY DISPLAY INFORMATION***

### **BACKBOARD MATERIALS**

The backboard must be sturdy and stand by itself on a table. Foam core-board and cardboard are the best materials. If you need to cut through the sides of your core-board to make “wings”, do not cut all the way through.

### **COLORS**

If you need to paint your backboard, enamel paint works best. Do not use water-based paint. Contact paper may also be used. Use a minimum of three contrasting colors on your board.

### **LETTERING**

Your title and subtitles may be computer-generated or cut from construction paper. Do not freehand the letters. The title letters should be 3-4 inches high. The subtitle letters should be 1-2 inches high. The subtitles, which are mandatory on the display board, are: [Problem](#), [Hypothesis](#), [Procedure](#), [Results](#) and [Conclusions](#). All items on the display must be glued to the board. Do not use pins, tacks, staples, or tape.

### **DRAWINGS, PHOTOS AND GRAPHS**

Have at least two types of graphical representations of the data collected (i.e., drawings, photos, graphs, charts, etc.).

Drawings and photos are most useful on the display. Drawings should be drawn in pencil first and then retraced. Drawings should be in color and outlined in thin black felt tip pen. Graphs and charts may be used. They may be computer-generated. All graphs and charts must have explanatory titles. Graph axes must be labeled.

If you have a camera, you could photograph yourself in action, conducting your survey. All photos must be titled.

### **DISPLAY DIMENSIONS**

1. When backboard (display portion) is flat, it should be 48 inches wide.
2. Side panels (“wings”) should be 12 to 18 inches.\*
3. Height should be no more than 48 inches.

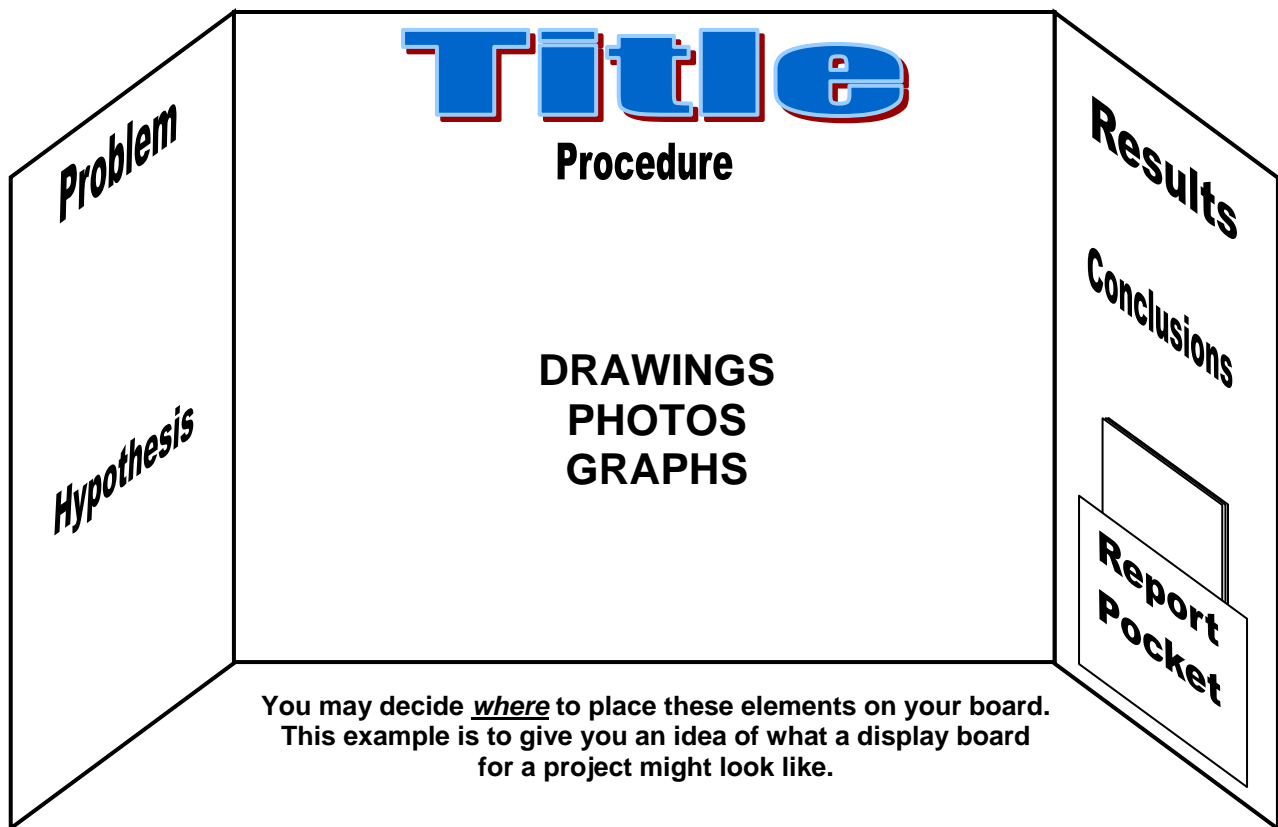
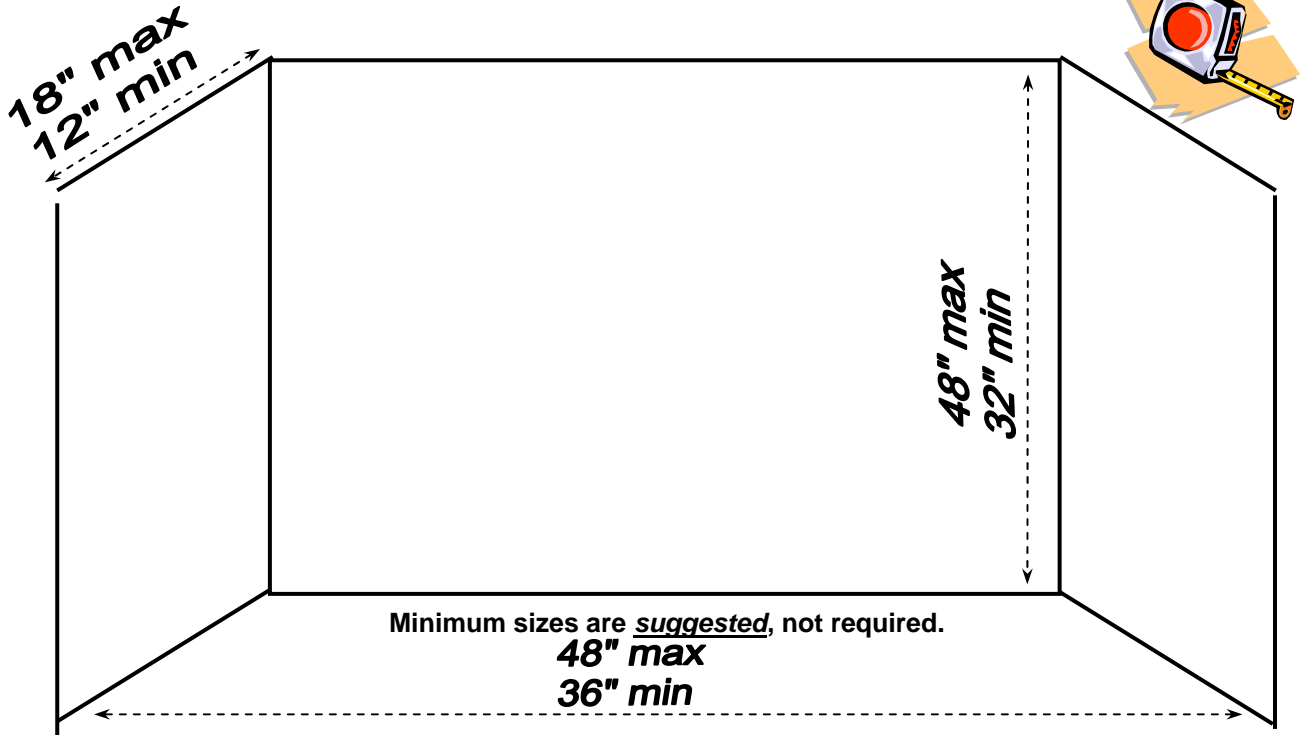
### **REPORT POCKET**

There must be a “pocket” on the display to hold your report.

**When you have decided what you are going to put on the backboard (display), lay the unglued display on the floor and look at it carefully. Have family and friends look at it and ask their opinions. Then, you should glue everything into place. Examples of displays will be shown and discussed in class.**

# DISPLAY SIZE & SET-UP

## FOR SCHOOL SITE AND LBUSD SCIENCE FAIRS





**PROBLEM**

**HYPOTHESIS**

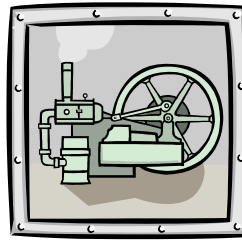
**PROCEDURE**

**RESULTS**

**CONCLUSIONS**

**REPORT**

# ***DISPLAY ITEMS***



Part of your display should include something that represents the project and should be placed in front of or on the display board. Depending on the type of project you do, the display items may or may not be the focus of the display.

If you cannot decide what to use to represent your project, brainstorm with family, friends, and classmates. Keep in mind that the items you choose will set the tone for your display and must be approved.

No part of your display may pose a safety hazard. Do not include harmful chemicals, bacterial cultures, sharp objects, or any source of heat or flames. No live or preserved animals are allowed at the LBusD district-level science fair, at the Los Angeles County Fair, or at the California State Fair.

## **Some examples of display items are listed below:**

- ◆ **Equipment or materials** you have built or used as part of your project or experiment (i.e., an incubator, variously shaped kites, a solar oven, a microscope with slides, etc.)
- ◆ **Models**
- ◆ **Artistic representations** of your topic (i.e., a large paper maché nose for an odor project, toothpick bridges for a physics project, or a collage of leaves for a plant project)
- ◆ **Samples or specimens**
- ◆ **Simulated items** such as photos, video, and audio taken while working on your project or during your experiment. (Keep in mind that use of extension cords requires special permission.)

There are endless possibilities. Be creative! Put on your thinking cap!



# Science Fair Scientific Survey Projects (7<sup>th</sup> Grade)

## Rubric for School Site Science Fair

|  | Attempted<br>1 point   | Proficient<br>3 points  | Advanced Proficient<br>5 points  |
|--|--|---|--|
| <b>Problem</b><br>(Double Points) (x2)   | States the problem as a question that is vague, or as a statement, or addresses an issue to which the student already knows the answer. Shows limited or no connection to a valid scientific or mathematical concept   | States problem as a question, and represents a genuine learning opportunity for the student. Generally addresses a valid scientific or mathematical concept.  | States problem as a question, provides evidence that it comes from the student's personal interests or experiences, and represents a genuine learning opportunity for the student. Specifically addresses a valid scientific or mathematical concept, or has a beneficial application to some aspect of society.                                   |
| <b>Preliminary Research</b>              | Uses limited sources from only one type of information resource (e.g., text, encyclopedia, businesses, magazines, catalogs, internet, or interviews), or uses some resources that are not reputable sources. Fails to mention what is already known about the problem, or material is copied rather than written in the student's own words.                         | Uses three or more reputable sources, cited correctly. Cites more than one type of information resource. Makes a general connection between the research and the problem in the student's own words.  | Uses five or more reputable sources, cited correctly. Student cites at least four types of sources. Makes a clear connection between each source and the problem in their own words.   |
| <b>Hypothesis</b>                        | Hypothesis is either not testable or does not connect to the stated problem, or shows no connection to the research.   | Hypothesis is complete (in one sentence), testable, addresses the stated problem, and shows some connection to the research.  | Hypothesis is complete (in one sentence) and is testable, and clearly addresses the stated problem. Student clearly shows a direct connection to their research.   |
| <b>Procedure</b><br>(Double Points) (x2) | Survey questions are not relevant to the hypothesis, or ambiguous, or are biased (leading) questions. Or, the survey only samples a small number of people and makes no attempt to randomize the respondents. There is no intention to determine anything beyond the direct answers to the questions.  | Survey questions are relevant to the hypothesis and unbiased. The procedure shows efforts to sample the largest number of people possible and seeks to randomize the respondents. There is no intention to determine anything beyond the direct answers to the questions.   | Survey questions are relevant to the hypothesis and unbiased. The student clearly surveys the largest number of people possible and seeks to randomize the respondents. The survey is designed to determine something more than just answers to the individual questions.  |
| <b>Results</b><br>(Double Points) (x2)   | Fails to clearly summarize data from the survey or is displays it in only one way. Or, relationships, trends, and patterns are either not related to the problem or not evident at all. Does not make note of flaws or unexpected results, and does not make predictions about what might happen if part of the survey or the conditions of the survey were changed. | Summarizes data from the survey and visually displays it using at least two types of graphs and charts. Highlights trends or patterns relevant to the problem. May note flaws or unexpected results, but does not make reasonable predictions about what might happen if part of the survey or the conditions of the survey were changed. | Summarizes data from the survey and visually displays it using at least two well-chosen types of graphs and charts. Highlights trends or patterns relevant to the problem. Notes flaws or unexpected results (if any) and makes reasonable predictions about what might happen if part of the survey or the conditions of the survey were changed. |
| <b>Conclusions</b>                       | Conclusion does not answer the problem, or does not refer back to the hypothesis, or contradicts the evidence collected.   | Conclusion answers the problem and states if the hypothesis was supported or rejected.  | Conclusion completely answers all aspects of the problem. It also states if the hypothesis was supported or rejected, and explains why.  |
| <b>Visual Quality of Display</b>         | Project has limited eye appeal or is not easily readable at approximately two feet distance. The project has limited organization, or contains confusing visuals, or contains major language or spelling errors.   | Project is appealing and readable at approximately 2 feet distance. It is organized and clear, uses understandable visuals and/or models, and contains few language and spelling errors.  | Project is appealing and neat, and is readable at approximately 2 feet distance. It is well organized and clear, makes striking use of inventive or amusing visuals and/or models, and uses language and spelling flawlessly.  |

(Projects will receive between 10 and 50 points when all rubric criteria have been addressed.)

