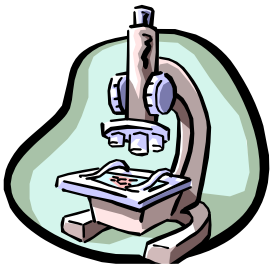
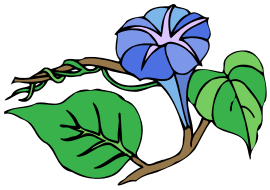
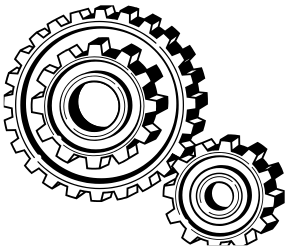
EXPERIMENTAL PROJECT

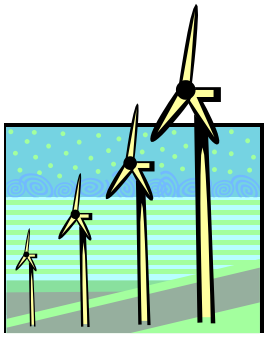
KINDERGARTEN – 5TH GRADE

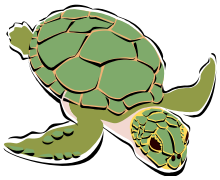
Student Information Packet











long beach unified school district

ELEMENTARY

SCIENCE & ENGINEERING FAIR

STUDENT INFORMATION PACKET

Revised 2009, 2011, 2015, 2016

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SCIENCE & ENGINEERING FAIR
STUDENT INFORMATION PACKET
INTRODUCTION

You are surrounded by science. Everything uses some form of science to make it work. The chair you sit on was made by some person. All the tools used to build it are because of knowledge from science and technology. Someone had to know what shape to make the saw and how sharp the teeth are to cut wood, right? How did they know to make one saw for wood and a different one for metal? Why does the wood saw have big teeth and the metal saw have small teeth?

Science is asking questions and finding answers. A science project, simply put, is the process of asking a question you have about something you are interested in, hypothesizing (best-guessing) what the answer might be, researching for information on that topic, experimenting, inventing, collecting or doing in-depth research, analyzing your results, and coming to a conclusion!

What your accomplishment will mean for you:

- ★ Gaining self confidence
- ★ Proving you can do it
- ★ Learning new things
- ★ Being recognized by your school and community
- ★ Knowing what the scientific method is and how it can help you.

Everything you need to know about doing a great science project is inside this packet. You'll be discussing the contents with your teacher and also your parents. Approximately every two weeks between now and your school science fair, your teacher will give you a **Student Timeline for Science & Engineering Fair Project** sheet to check your project's progress. The timeline sheet is designed to keep you, your parents and your teacher on target.

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 – Collect and read information about your topic.

  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.

- Check with your parent or teacher if you want to use a web site for research. Not all web sites give correct information.
- Students in 4th and 5th grades should be doing almost all of this by themselves.
- Students in 2nd and 3rd grades should be able to do many parts.
- Students in Kindergarten and 1st grade will need help for most of the project.
- This is to be a fun process. "Success" is a completed project where you had fun and learned a lot.
- Enjoy the fun!

EXPERIMENTAL PROJECT DEVELOPING A SCIENCE & ENGINEERING FAIR EXPERIMENTAL PROJECT USING THE SCIENTIFIC METHOD

For Kindergarten through 5th Grade

Conduct an experiment using ***The Scientific Method***. It includes asking a question, doing some preliminary research, making a hypothesis, planning and conducting your experiment, and analyzing your results.

I. PROBLEM

State the problem – one sentence in the form of a question. Choose a topic in which you are interested in learning more about.

II. PRELIMINARY RESEARCH

Research, read, watch science videos, contact resource people who may help. Incorporate prior knowledge.

III. HYPOTHESIS: Form a hypothesis as a one-sentence statement.

The hypothesis is an educated guess (your best guess) based on your preliminary research.

IV. EXPERIMENT

- **A. Materials:** Plan and collect the materials you will need for your experiment. It is best to borrow, make, or use inexpensive materials.
- **B. Procedure:** Plan the steps of your experiment carefully. Conduct your experiment.
- **C. Observe and record data:** Plan how you will record your data. Record what happens during your experiment.
- **D. Results:** Summarize findings in the form of data tables, graphs, and drawings. Write an explanation of your findings.

V. CONCLUSION

The **conclusion** answers the hypothesis. What did you learn from your experiment? Was your hypothesis proven? Why or why not?

ELEMENTARY EXPERIMENT

WRITTEN REPORT CONTENT

Kindergarten through 5th Grade

★ **TITLE PAGE**
See Written Report Format on next page.

★ **PURPOSE**
In three sentences or less, tell why you did your science project on the topic you chose.

★ **ACKNOWLEDGEMENTS**
In one or more sentences, say "Thank You" to those who have helped you with your project. You should include those who gave you guidance, materials and the use of facilities or equipment.

★ **TABLE OF CONTENTS**
List each of the following sections and the page numbers for each. Type the page number at the bottom of each page after you have finished the final copy of your report.

★ **PROBLEM**
State the problem in the form of a *question*. The problem is one sentence long and specific. Your page numbering begins here.

★ **PRELIMINARY RESEARCH**
This part of your report has information that was found by other scientists and relates to your topic.

★ **HYPOTHESIS**
State your *best guess* for answering the question before you have performed an experiment. The hypothesis is one sentence long.

★ **EXPERIMENT**
The experiment is used to test your hypothesis.

MATERIALS
List the materials you used.

PROCEDURE
List the steps of your experiment. Diagrams are helpful in this section. Do not use the words "I" or "you".

DATA
Show what you observed during the experiment. Include measurements you made. You may also use drawings to help show what you observed.

RESULTS
The results are a summary of your data. The results section of your paper is organized into graphs and charts. This is where you tell about your data and what you observed. *Remember, even if your data shows that your hypothesis was incorrect, your project is still good.*

★ **CONCLUSION**
Look over you report, graphs, charts and tables. Use two or three sentences to tell what you learned from your experiment. Was your hypothesis valid? Why or why not?

★ **APPLICATION**
Now that you have finished your project, use this section to share with others your thoughts about this experience. Did you have any problems? What would you do differently next time? Explain how what you learned from your project applies to the real world.

★ **SOURCES / BIBLIOGRAPHY**
List all books, articles, pamphlets and other communications or sources that you used for researching your topic and writing your paper. You must have at least two sources, and only one may be an encyclopedia. Interviews with experts in your field of study are encouraged.

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

ELEMENTARY EXPERIMENT
WRITTEN REPORT FORMAT

- Each line with a box (❑) in front of it begins a new page in the report.
- **Items with a star (★)** must be included in reports for **Kindergarten–2nd grade** projects. Other sections are optional for K-2nd grades.
- **ALL** of the items listed below must be included in reports for **3rd–5th grade** projects.

❑❑❑❑❑❑❑❑❑★Title page

Title *in middle of page*

In lower right-hand comer:
Last Name, First Name
Grade ___
Teacher Name
School Name
Date (include year)

❑ Purpose

❑ Acknowledgements

❑ Table of Contents (with page numbers)

❑ ★ Problem (page numbering starts here)

❑ Preliminary Research

❑ ★ Hypothesis

❑ ★ Experiment
- Materials
- Procedure
- Data
- Results

❑ ★ Conclusion

❑ Application

❑ ★ Sources / Bibliography (Use format on next page.)

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.**

ELEMENTARY EXPERIMENT WRITTEN REPORT FORMAT FOR SOURCES / BIBLIOGRAPHY

Entries in a bibliography are alphabetized by the last name of the author or the first word of the title. 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.*

Books

Basic Form Bronowski, Jacob. The Ascent of Man. Boston: Little & Brown, 1973.

Two Authors March, James G., and Herbert A. Simon. Organizations. New York: Wiley, 1958.

Magazines

Weekly Tuchman, Barbara W. "The Decline of Quality." New York Times Magazine, 2 Nov. 1980: 38-57.

Monthly Brown, Norman O. "Apocalypse: The Place of Mystery in the Life of the Mind." Harper's. May 1961: 27-35.

Newspapers

Basic Entry Kristof, Nicholas D. "Oil Futures Plunge on OPEC Doubt." New York Times, 3 Jan. 1985: Dl3.

Reference Works

Encyclopedia Entry, Unsigned

"Huygens, Christiaan." Encyclopedia Britannica. 13th ed.

Dictionary Entry

"Advertisement." Webster's Third International Dictionary. (Because the number of the edition appears in the title, the date is not necessary.)

Atlas Entry

"Hidden Face of the Moon." Times Atlas of the World. 1981 ed.

Nonprint Sources

Video

Redford, Robert, dir. Ordinary People. With Mary Tyler Moore and Donald Sutherland. Paramount, 1980.

Computer Materials

Computer Software

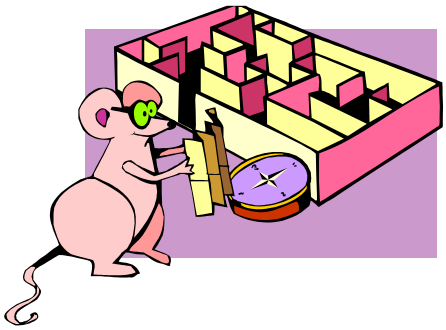
Visispell: Fut.heuristix. Version 1.00. Computer software. San Jose: Visicorp, 1983. Disk.

Web Sites

Corte, Corrinne. "Why Are British Sailors Called Limeys?" *Ask A Biologist*. Arizona State University. http://ls.la.asu.edu/askabiologist/research/scurvy/index.html (8 Mar. 2001)

Interview

Persons name (last name first), position or work title, place of interview, date of interview.



ELEMENTARY EXPERIMENT 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 Conclusion. All items on the display must be glued to the board. Do not use pins, tacks, staples, or tape.

DRAWINGS, PHOTOS AND GRAPHS

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 must be used in the results section. They may be computer-generated. All graphs and charts must have explanatory titles. Graph axes must be labeled.

If you have a camera, you should photograph your experiment's progress. A photo of you with your experimental set up is encouraged. 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 l2 to l8 inches.*
3. Height should be no more than 48 inches.

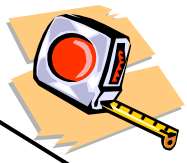
REPORT POCKET

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

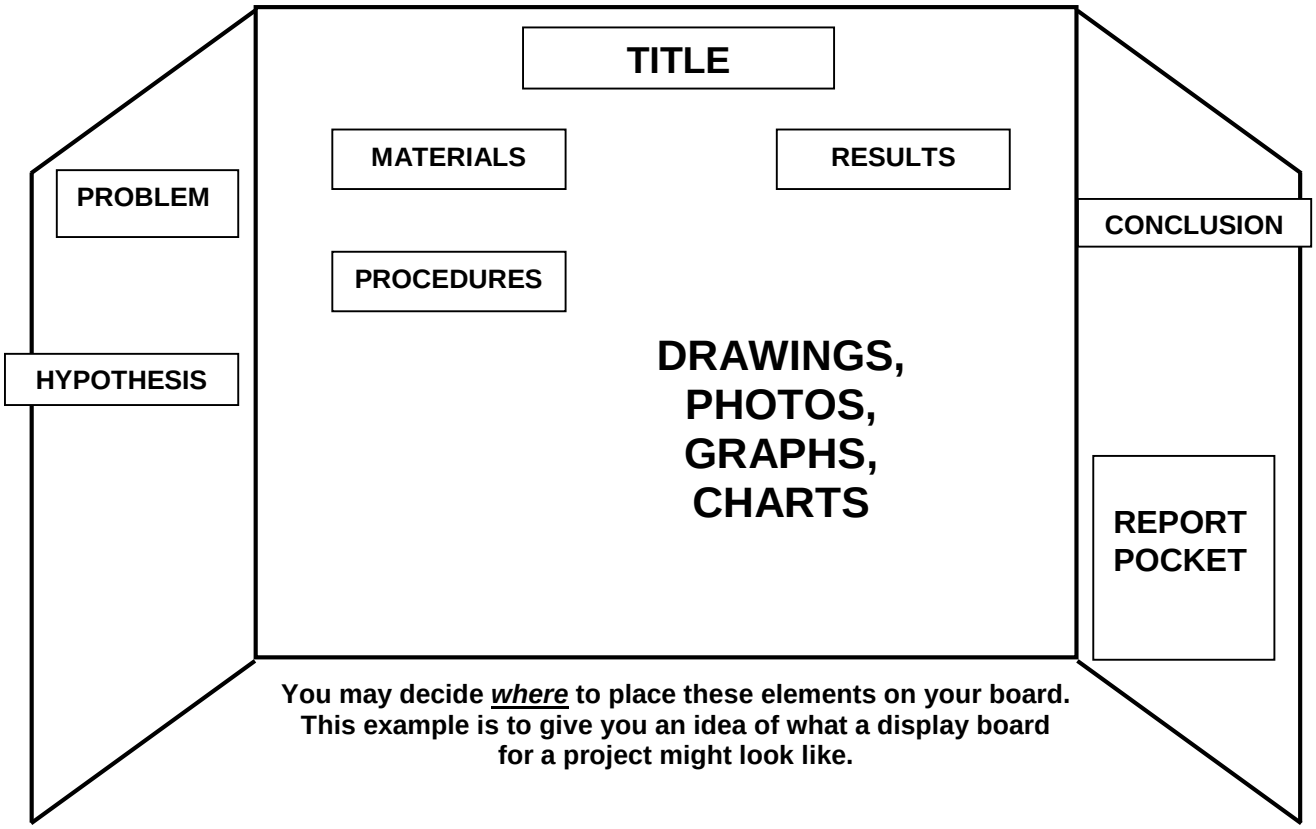
When you have decided what you are going to put on the backboard (display), lay the unglued display on the floor and look at it carefully. Have family and friends look at it and ask their opinions. Then, you should glue everything into place. Examples of displays will be shown and discussed in class.

DISPLAY SIZE & SET-UP

FOR SCHOOL SITE AND LBUSD SCIENCE & ENGINEERING FAIRS



Minimum sizes are *suggested*, not required.



You may decide *where* to place these elements on your board. This example is to give you an idea of what a display board for a project might look like.

ELEMENTARY EXPERIMENT

DISPLAY LABELS

PROBLEM

HYPOTHESIS

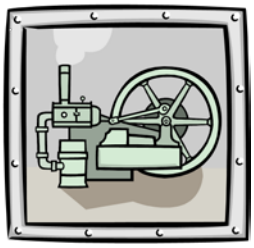
PROCEDURE

RESULTS

CONCLUSION

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 an extension cords requires special permission.)

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

Experimental Projects (K–2nd Grade)

Rubric for School Site Science & Engineering Fair

	Attempted **1point**	Proficient **3 points**	Advanced Proficient **5 points**
Problem (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.	States problem as a question, and while there is no evidence of connection to a specific interest or experience of the student, it appears to represent a genuine learning opportunity for the student.	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.
Preliminary Research	Cites only one source. Or, the description of the research is incomplete, or has little or no connection to the problem, or is not written in the student's own words.	Cites two or more sources from one or more types of resources (e.g., text, encyclopedia, businesses, magazines, catalogs, internet, or interviews). The student generally connects the research to their problem in their own words.	Cites two or more sources. Different types of sources are cited. The student clearly connects the research to their problem in their own words.
Hypothesis *(Double Points)* **(x2)**	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), testable, and clearly addresses the stated problem. Student shows a direct connection to their research.
Procedure & Materials	Experimental design is not relevant to the hypothesis or the procedures outlined are seriously incomplete or not sequential, or materials list is missing or incomplete.	Experimental design is adequate to test the hypothesis, but may leave some unanswered questions. Procedures are outlined in a step-by-step fashion, but there may be 1 or 2 gaps that require explanation. Major materials are listed.	Experimental design is a well-constructed test of the stated hypothesis. Procedures are outlined in a step-by-step fashion that could be followed by anyone without additional explanations. All relevant materials are listed.
Results *(Double Points)* **(x2)**	Performed experiment only once and data are not summarized clearly.	Performed experiment one or more times. Summarizes the data in a way that describes what was discovered using graphs and charts with few errors or omissions.	Performed experiment several times. Summarizes the data in a way that describes what was discovered using accurate graphs and charts.
Conclusions	Conclusion does not answer the problem, or does not refer back to the hypothesis, or contradicts the results.	Conclusion addresses the problem, states if the hypothesis was supported or rejected, and attempts to explain why.	Conclusion completely answers all aspects of the problem, states if the hypothesis was supported or rejected, and clearly cites evidence to explain why.
Visual Quality of Display	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.)

Science & Engineering Fair *Experimental Projects* (K–2nd Grade)

Targets for an Excellent Science Fair Project

	Advanced Proficient 5	"TRANSLATED"
Problem *(Double Points)* **(x2)**	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.	Ask a real question where you don't know the answer.
Preliminary Research	Cites two or more sources. Different types of sources are cited. The student clearly connects the research to their problem in their own words.	Find good information. Use what you find to help with your question.
Hypothesis *(Double Points)* **(x2)**	Hypothesis is complete (in one sentence), testable, and clearly addresses the stated problem. Student shows a direct connection to their research.	Guess the answer to your question using the information you found.
Procedure & Materials	Experimental design is a well-constructed test of the stated hypothesis. Procedures are outlined in a step-by-step fashion that could be followed by anyone without additional explanations. All relevant materials are listed.	Plan an experiment to answer your question. List all the steps and materials needed. Plan to repeat the experiment to be sure the results are good.
Results *(Double Points)* **(x2)**	Performed experiment several times. Summarizes the data in a way that describes what was discovered using accurate graphs and charts.	Show what happened in your experiment. Use pictures, graphs, and words to make it really clear.
Conclusions	Conclusion completely answers all aspects of the problem, states if the hypothesis was supported or rejected, and clearly cites evidence to explain why.	Use your data to answer your original question. Explain why your guess was right or wrong.
Visual Quality of Display	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.	Make your project fun to look at with pictures and colors. Use large, clear lettering. Check grammar and spelling.

Experimental Projects (3rd – 5th Grade)

Rubric for School Site Science & Engineering Fair

	Attempted **1point**	Proficient **3 points**	Advanced Proficient **5 points**
Problem *(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.	States problem as a question, and while there is no evidence of connection to a specific interest or experience of the student, it appears to represent a genuine learning opportunity for the student.	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.
Preliminary Research	Cites only one source. Or, the description of the research is incomplete, or has little or no connection to the problem, or is not written in the student's own words.	Cites two or more sources from one or more types of resources (e.g., text, encyclopedia, businesses, magazines, catalogs, internet, or interviews). The student generally connects the research to their problem in their own words.	Cites two or more sources. Different types of sources are cited. The student clearly connects the research to their problem in their own words.
Hypothesis *(Double Points)* **(x2)**	Hypothesis is either not testable or does not connect to the stated problem, or shows no connection to the research.	Hypothesis is brief and complete, testable, addresses the stated problem, and shows some connection to the research.	Hypothesis is brief and complete, testable, and clearly addresses the stated problem. Student shows a direct connection to their research.
Procedure & Materials	Experimental design is not relevant to the hypothesis or the procedures outlined are seriously incomplete or not sequential, or materials list is missing or incomplete.	Experimental design is adequate to test the hypothesis, but may leave some unanswered questions. Procedures are outlined in a step-by-step fashion, but there may be 1 or 2 gaps that require explanation. Major materials are listed.	Experimental design is a well-constructed test of the stated hypothesis. Procedures are outlined in a step-by-step fashion that could be followed by anyone without additional explanations. All relevant materials are listed.
Results *(Double Points)* **(x2)**	Performed experiment only once and data are not summarized clearly. Or, does not discuss any relationship between variables or note any pattern or trend.	Performed experiment one or more times. Summarizes the data in a way that describes what was discovered using graphs and charts with few errors or omissions. Mentions at least on relationship between variables or points out a pattern.	Performed experiment several times. Summarizes the data in a way that describes what was discovered using graphs and charts with no errors or omissions. Discusses connections between variables or points out any patterns.
Conclusions	Conclusion does not answer the problem, or does not refer back to the hypothesis, or contradicts the evidence collected.	Conclusion answers the problem, states if the hypothesis was supported or rejected, and attempts to explain why.	Conclusion completely answers all aspects of the problem, states if the hypothesis was supported or rejected, and clearly cites evidence to explain why.
Visual Quality of Display	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.

Science & Engineering Fair *Experimental Projects* (3rd – 5th Grade)

Targets for an Excellent Science Fair Project

	Advanced Proficient 5	"TRANSLATED"
Problem *(Double Points)* **(x2)**	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.	Ask a real question where you don't know the answer.
Preliminary Research	Cites two or more sources. Different types of sources are cited. The student clearly connects the research to their problem in their own words.	Research thoroughly. Connect the research to your question.
Hypothesis *(Double Points)* **(x2)**	Hypothesis is brief and complete, testable, and clearly addresses the stated problem. Student shows a direct connection to their research.	Try to answer your question using your research.
Procedure & Materials	Experimental design is a well-constructed test of the stated hypothesis. Procedures are outlined in a step-by-step fashion that could be followed by anyone without additional explanations. All relevant materials are listed.	Plan an experiment to answer your question. List all the steps and materials needed. Plan to repeat the experiment to be sure the results are good.
Results *(Double Points)* **(x2)**	Performed experiment several times. Summarizes the data in a way that describes what was discovered using graphs and charts with no errors or omissions. Discusses connections between variables or points out any patterns.	Show what happened in your experiment. Use pictures, graphs, and words to make it really clear. Explain what made a difference and what didn't.
Conclusions	Conclusion completely answers all aspects of the problem, states if the hypothesis was supported or rejected, and clearly cites evidence to explain why.	Use your data to answer your original question. Explain why your hypothesis was right or wrong.
Visual Quality of Display	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.	Make your project fun to look at with pictures and colors. Use large, clear lettering. Check grammar and spelling.