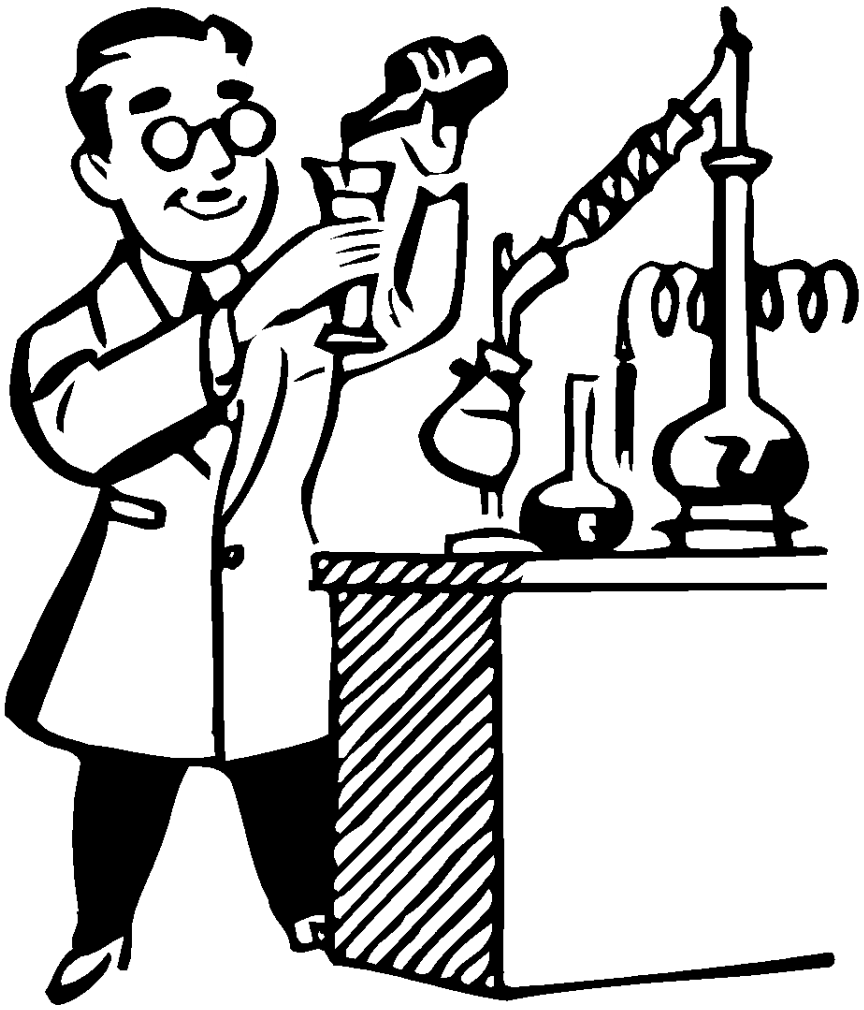
St. John's Lutheran School

Science Fair 2020



5th-8th Grade Student Handbook

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Dear Parents,

This school year St. John's Lutheran School will be hosting a Science Fair. Students in grades 3-8 will submit individual projects, while grades K-2 will create group projects for display. This handbook outlines the various components of the Science Fair in grades 5-8. All projects will be displayed in the school gymnasium as part of the congregation wide open house planned for Wednesday, April 15th, and the 2 top projects from each grade will go to Shoreland to compete at the LLAC Academic Fair later that week. We are once again looking forward to hosting this type of fair because it gives the children the opportunity to display their God given talents in a variety of ways.

Project Timeline:

Step # 1	January	Science Fair Information sent home.
Step # 2	February 14th	***Application for Science Fair Project Form*** due.
Step # 3	March 19th	***Experiment Documentation Forms*** due. ● Form 1: Identification of Variables and Experiment Procedures Form ● Form 2: Collection and Interpretation of Data Form ● Form 3: Experiment Conclusion
Step # 4	April 3rd	***Experiment Comprehension Analysis Form*** due.
Step # 5	April 6th-14th	Students bring final Science Fair projects to school for a 5 minute oral presentation of their project to their class.
Step # 6	April 15th	Projects are on display in the gymnasium as part of the St. John's Lutheran Church and School open house. Projects will be sent home with the students at the end of the week.

Students should plan on the project taking about two months. This will give them time to plan the experiment, gather data, interpret their data, make conclusions, write the report, create their display, and plan their oral presentation. The students can choose from the list of experiments from the Science Fair Idea Bank or choose one of their own. You are not limited to the suggested list, however the project should be something that can be scientifically tested. The teacher will be able to tell each student if they think it is an appropriate experiment when the student submits their Science Fair Application Form.

We wish you the Lord's blessings on your work. We feel it will be an educational experience for everyone involved. Please feel free to ask questions. We will do everything we can to make this a pleasant experience for you and your child. On the following pages, you will find the specific regarding this year's Science Fair.

Yours in Christ,
St. John's Faculty

Science Fair Purpose and Objectives

Purpose of a Science Fair:

Science as students learn it in school is defined as a process that one uses to investigate the world around them and how it works through observation and experimentation. A Science Fair provides students with the opportunity to study a specific topic within Science that interests them. Through hypothesizing, researching, experimenting, observing, and analyzing, students will gain a greater appreciation how intricately God's hand is involved in making our universe work.

The Objectives of the Science Fair:

The Student…

1. Gains an appreciation of how intricately God's hand is involved in making our universe work.
2. Demonstrates the use of analytic-scientific procedures in a written, visual, and oral presentation by
    a. Stating a problem
    b. Developing a hypothesis
    c. Planning and executing an experiment
    d. Gathering and analyzing data;
    e. Interpreting findings;
    f. Reporting conclusions; and
    g. Using appropriate scientific research methods and skills.
3. Uses the Scientific Method to develop an understanding of controls and variables.
4. Takes an open and creative approach to problem solving.
5. Sharpens their writing skills.
6. Develops skills in library use and Internet research.
7. Recognizes that a successful outcome is based not on personal opinion but on scientific fact.
8. Develops time management skills.
9. Develops public speaking skills as they present projects to their classmates and teachers.
10. Develops poise and thinking on their feet in responding to questions presented to them about their project.
11. Gains recognition for academic achievement and pride in the effort used to complete their project.
12. Develops an interest and pleasure of science.

The Fair…

1. Helps everyone involved realize that science can help reveal the intricacies of God's creation, and give us an appreciation for how God's hand is actively involved in making our universe work.
2. Creates public awareness of science through publicity and public attendance at the fair.
3. Improves students' science skills problem solving skills through evaluation of student work and communication with peers and teachers.
4. Recognizes and rewards students' academic competence in science through certificates and awards.
5. Serves as the basis for projects to be entered at the LLAC Academic Fair.

Science Fair Categories

Projects submitted to the Science Fair should fall into one of the following categories:

Biology

The science of life or living matter in all its forms and phenomena, especially with reference to origin, growth, reproduction, structure, and behavior.

Examples:

1. On which food does fungus grow best?
2. Why does moss grow typically grow on the north side of a tree?

Chemistry

The science that deals with the composition and properties of substances and various elementary forms of matter. (Atoms and molecules)

Examples:

1. Will cola shine a penny?
2. How do vinegar and baking soda provide energy to launch a rocket?

Physics

The science that deals with matter, energy, motion, and force.

Example:

1. How does the composition of a baseball bat affect the flight of a ball?
2. What action-reaction forces are at work when a skateboarder jumps off his skateboard?

Earth Science

Any of various sciences, such as geography, geology, or meteorology, that deal with the earth, its composition, structure, origin, or any of its changing aspects.

Examples:

1. How does sunspot activity affect radio reception?
2. How does a geyser work?

Physical Science

Any of the sciences, such as physics, chemistry, astronomy, and geology, that analyze the nature and properties of energy and nonliving matter.

Examples:

1. What happens during electrolysis?
2. What are kinetic and potential energy?

Life Science

Any of several branches of science, such as biology, medicine, anthropology, or ecology, that deal with living organisms and their organization, life processes, and relationships to each other and their environment.

Examples:

1. How are our teeth affected by fluorides and acids?
2. How does eating breakfast impact our ability to learn?

Science Fair Guidelines

The purpose of the Science Fair is to encourage students to use their God-given talents in work other than that assigned in the classroom. The student should do the work independently of parents and teachers. Parents and teachers may provide minimal guidance or advice. Students are responsible for gathering their own materials. Please take this into consideration when selecting a project.

General Guidelines:

1. All students in grades 3-8 are required to submit at least one project for the Science Fair. Students in grades K-2 will create group classroom projects according to the directions provided by their individual classroom teacher.

2. The topic of the experiment and research performed should be neither too limited nor too broad. The data should be arranged in a clear and meaningful way that will create interests and show understanding of the subject to others.

3. Every project should have a unifying theme that is explained, proven, and applied to today.

4. While parents may lend their encouragement and advice, the students should do all of the physical work on their project.

5. Projects must be done independently of any class or club. This means that students must submit a project that has been done exclusively for this fair – not for a previous school assignment, Pioneer program, 4-H program, etc.

6. The majority of the project should be done at home. The students may do some of the research at school during their study time if they wish. **Instruction on how to form a science fair question and project will be discussed in science class. Help and work time on the research paper will be given in class as well.**

7. Students may choose a project from the attached list or select one of their own. However, kits and store bought models are not allowed. The project should be original.

Specific Guidelines:

1. Each student is required to complete an application for a science fair project. This is a written plan of what experiment and research will be performed including a problem or purpose for doing the experiment, a hypothesis explaining what you think the solution to your problem will be, and planned research ideas. This plan may need to be changed. In that case, a new application must be submitted to the classroom teacher before work can continue.

2. Each student is required to complete experiment documentation forms. These forms will answer four additional questions about your experiment. What parts of the experiment do I control? What is my procedure? What actually happened? What are the results of my experiment?

3. Each student is required to complete an experiment comprehension analysis form. This form will serve to answer five basic questions about the project. What background did you have on your experiment prior to conducting it? What documented scientific research exists regarding your experiment? What new knowledge/insight did you gain from conducting this experiment? What additional ways could you test your hypothesis or obtain different results by modifying the experiment? What impact does this experiment have on the world today?

4. Grades 5-8 are required to have a typed research report accompanying their project complete with title page, table of contents, written report, charts or graphs, as well as bibliography page. **Reports in grades 5th & 6th should be 5-8 paragraphs in length, while reports in grades 7th & 8th should be 7-10 paragraphs in length. This does not include the items listed prior such as title page, bibliography, etc.** Each report should include the question or purpose for doing the project, the work completed, the information found, and the application of the data to today. Careful editing is required. **Instruction and work time will be offered in school on this report.**

5. On the day that each individual student's project is due, they will give a 5 minute oral presentation in front of their class demonstrating the student's understanding of the subject. Each teacher will assign due dates between April 6th-14th for the projects in order to stagger the presentations. **If the student wishes to create a google slideshow to enhance their oral presentation they may do so.**

6. A display should be made for the project. This display includes the question or purpose for doing the project, the information found, the application of data to today, and ideas for further study.
    a. All two-dimensional science projects must be mounted on appropriate background. Suggestions are: colored construction paper, colored poster board, or cardboard.

Science Fair Grading Criteria & Awards

Grading Criteria:

Students will be graded on their project in four different areas. The grading rubric for grades 5-8 are found on pages 23-24 of your handbook. The basic breakdown is the following:

Science Fair Project Grading:

1. Scientific Problem Solving
2. Written Report
3. Project Display
4. Oral Presentation

Points Scale: (in each category)

5 – Excellent
4 – Good
3 – Average
2 – Below Average
1 – Poor
0 – Not Complete

Calculating Final Grade:

The number of points earned in each category will be totaled and then divided by the number of different components that are graded to determine the final grade.

5.00	A+	3.49-3.25	C
4.99-4.75	A	3.24-3.00	C-
4.74-4.50	A-	2.99-2.75	D+
4.49-4.25	B+	2.74-2.50	D
4.24-4.00	B	2.49-2.25	D-
3.99-3.75	B-	2.24-0.00	F
3.74-3.50	C+		

Awards:

Two projects from each grade level in grades 5-8 will be entered in the LLAC Academic Fair Science Fair competition in the spring.

Guidelines for Selecting a Science Fair Project

I. Explore multiple possibilities for topics.

A. Look closely at the world around you for topics that you find curious.

B. Use more resources than just the Internet. Look for books specific to creating science fair projects, search your Science textbook, look for newspaper articles or magazine articles related to science, pay attention to advertisements and TV.

II. Select a topic that interests you.

A. A student will produce a better final result if the topic is one they are interested in.

B. In brainstorming topic ideas ask yourself questions such as: What am I curious about? What is in the news that is worth investigating? Why does something behave the way it does? What makes something happen?

C. Example Topics:

1. Mediocre Topic: *What is the reaction time for someone stopping car in front of a deer?*
2. Better Topic: *What is the reaction time for getting out of the way of a 98 mph fastball coming at a hitter's head from 60'6"?*

III. Select a topic that can be narrowed down to a question and answered by an experiment.

A. Your question should be open ended and not something that can be answered with a yes or no.

B. Your question should be able to be answered by performing an experiment.

C. Example Questions:

1. Too Broad: *Is there a health benefit to eating organically grown vegetables instead of vegetables grown with chemical pesticides?*
2. Better Question: *What effect do pesticides have on the taste of vegetables?*

IV. Choose a topic that allows you the necessary time to collect data.

A. Some experiments take months to complete. Select an experiment that will fit within the allotted time.

B. Example Topics:

1. Not Realistic: *How many years does it take from the time a Christmas tree is planted until it is ready for harvest?*
2. Realistic: *How many days after a fresh cut is put on a Christmas tree does it take for the tree to seal itself off and no longer accept any water?*

V. Understand the guidelines.

A. A science fair requires a project focused on the scientific method. That means whatever topic you choose should be something that can be tested.

B. Follow guidelines that detail what and how to document your experiment from the written report to the display and to the presentation.

VI. Focus on the experiment.

A. Your topic will only be successful if it lends itself to a specific, workable procedure that can be tested and evaluated.

Guidelines for Gathering Research

I. Formulate your problem/question.

A. The problem/question must be related to one or more of the science fair project categories. (Biology, Chemistry, Physics, Earth Science, Physical Science, Life Science)

II. Get help.

A. Seek guidance for testing your chosen problem/question from your teacher(s), parents, and/or other resource persons.

III. Research the problem/questions.

A. Keep your focus on investigating it as a natural science.
   1. Example: What data and conclusions have others gathered when they have performed my experiment?

IV. Brainstorm possible places to gather information.

A. Newspapers, magazines
B. Scientific publications (international, national, state, local)
C. Publications by private agencies
D. Internet web sites

V. Consider ways to gather information.

A. Case studies
B. Experiments
C. Observations
D. Graphic charts
E. Surveys
F. Statistical analysis
G. Interviews

VI. Consider ways to show information on the display board.

A. Charts
B. Diagrams
C. Graphs
D. Documented research
E. Mock-ups of the experiment
F. Photographs

Guidelines for Writing the Written Report

I. Take notes.

A. During experimentation, keep a detailed journal on the procedure of your experiment, the data, the outcome, and what the results tell you.

B. During the research surrounding your experiment, keep notes clear and short when listing where you found the information.

II. Organize your notes.

A. Combine the notes that deal with the same topic together. Put these notes into paragraphs.

III. Write the rough draft.

A. The rough draft of the written report should be a work in progress. Type a double-spaced draft of what you did. You should go through the rough draft to make corrections to spelling and grammar as well as any major thoughts you would like to cut or add to the report.

Use the following report outline to organize information:

1. Introduction:
    a. A leading THESIS STATEMENT that captures your reader's attention.
    b. Explain the reason behind choosing the topic you did.
    c. Discuss what you have learned about God's creation from conducting the experiment.
    d. State the thesis (problem/question) of your project and the category it falls into.
2. Scientific Problem Solving:
    a. State the hypothesis you arrived at prior to beginning the experiment.
        i. Why do you believe your hypothesis will happen?
    b. Discuss your dependent and independent variables.
        i. Identify the variables in your experiment that you can control and how you controlled them.
        ii. Identify the variables in your experiment that you cannot control and how they affected the experiment.
    c. Explain the procedures necessary to perform the experiment.
        i. Discuss the materials that you used to conduct the experiment.
        ii. Specifically explain the steps you followed in your experiment.
        iii. Describe how you collected your information and what procedures you used to do so.
    d. Provide the results of your experiment.
        i. Explain in words the information found on your charts and graphs.
        ii. Interpret the data you collected and how it either supports or negates your hypothesis.
    e. State the conclusion of your experiment.
        i. State the conclusion that you arrived at upon completing your experiment.
        ii. Explain in greater detail why you think it supports or rejects your hypothesis.

3. Conclusion:
    a. Understanding:
        i. What background information did you have on your experiment prior to conducting it?
        ii. What documented scientific research exists regarding your experiment?
        iii. What new knowledge/insight did you gain from conducting this experiment?
        iv. What additional ways could you test your hypothesis or obtain different results by modifying the experiment?
    b. Application:
        i. What impact does this experiment have on the world today?

IV. Write the final draft.

The final draft of the written report is the finished copy telling in words the problem/question you set out to answer in your project, what you did, what you found, and how this information applies today. The report informs the reader if you understand what you have researched. ***Please print 2 copies – 1 to be displayed at the Science Fair, the other to submit for grading.***

The final draft should include:

A. Title Page

i. title of project (centered, 1/3 of the way down from the top)

ii. name, school, grade, and date (centered, 1/3 up from bottom)

iii. may include a picture

B. Table of Contents

i. documenting where the four major parts of the report can be located.

C. Written Report (Final draft)

i. 1" margins (top, bottom, left, right)

ii. size 12 font, Arial Font

iii. double spaced

iv. name & page number in the upper right corner (not on 1st page)

v. topic sentence of each paragraph indented (use tab button)

D. Charts or Graphs

i. documentation of data collected during the experiment

E. Bibliography Page

i. bibliography (centered at top)

ii. alphabetical listing of sources used to research project

V. Document the sources used.

The way you cite your source will depend on what type of source it is. Below you will find examples of citing the most commonly used types of sources. Only use the styles below for the sources you used.

A. **Citing a Book Reference:** For most books, arrange the information into three units, each followed by a period and one space: the author's name; the title and subtitle, underlined; and the place of publication, the publisher, and the date.

Tan, Amy. The Bonesetter's Daughter. New York: Putnam, 2001.

B. **Citing an Encyclopedia Source:** When an encyclopedia or a dictionary is well known, simply list the author of the entry (if there is one), the title of the entry, the title of the reference work, the edition number (if any), and the date of the edition.

Posner, Rebecca. "Romance Languages." The New Encyclopaedia Britannica: Macropaedia. 15th ed. 1987.

"Sonata." The American Heritage Dictionary of the English Language 4th ed. 2000.

C. **Citing a Magazine Source:** List, in order, separated by periods, the author's name; the title of the article, in quotation marks; and the title of the magazine, underlined. Then give the date and the page numbers, separated by a colon. If the magazine is issued monthly, give just the month and year. Abbreviate the names of the months except May, June, and July.

Fay, J. Michael. "Land of the Surfing Hippos." National Geographic Aug. 2004: 100+.

**If the magazine is issued weekly, give the exact date.

Lord, Lewis. "There's Something about Mary Todd." US News and World Report 19 Feb. 2001: 53.

D. **Citing a Newspaper Source:** Begin with the name of the author, if known, followed by the title of the article. Next give the name of the newspaper, the date, and the page numbers (including the section letter).

Brummitt, Chris. "Indonesia's Food Needs Expected to Soar." Boston Globe 1 Feb. 2005: A7.

E. **Citing a Website Source:** Begin with the name of the author or corporate author (if known) and the title of the site, underlined. Then give the names of any editors, the date of publication or last update, the name of any sponsoring organization, the date you accessed the source, and the URL in angle brackets. Provide as much of this information as is available.

Peterson, Susan Lynn. The Life of Martin Luther. 2002. 24 Jan. 2005 <http://www.susanlynnpeterson.com/luther/home.html>.

F. **Citing a DVD or Video Source:** Begin with the title, underlined. For a film, cite the director and the lead actors or narrator ("Perf." or "Narr."), followed by the name of the distributor and the year of the film's release. For a videotape or DVD, add "Videocassette" or "DVD" before the name of the distributor.

Finding Neverland. Dir. Marc Forster. Perf. Johnny Depp, Kate Winslet, Julie Christie, Radha Mitchell, and Dustin Hoffman. Miramax, 2004.

G. **Citing a Television Show Source:** Begin with the title of the radio segment or television episode (if there is one) in quotation marks, followed by the title of the program, underlined. Then name the network, the local station (if any), and the date the program was broadcast.

"Monkey Trial." American Experience. PBS. WGBH, Boston. 18 Mar. 2003.

H. **Citing a Personal Interview Source:** To cite an interview that you conducted, begin with the name of the person interviewed. Then write "Personal interview," followed by the date of the interview.

Akufo, Dautey. Personal interview. 11 Aug. 2005.

V. Edit your work.

Check carefully for spelling, punctuation, capitalization, and grammar errors. Have someone else read your report to proof it as well.

VI. Final Draft of Written Report Due Date:

April 6th -14th (determined by the day of the student's in class presentation)

Guidelines for Creating a Display Board

Display boards are used to show the steps taken to complete the science fair project. This is a very important part of your project and should be done in an eye-pleasing and eye-catching manner, with a splash of showmanship. Your display should attract people to it and provide important information that you would want someone to know on your subject. Make it a colorful, artistic, and above all, neat and complete display.

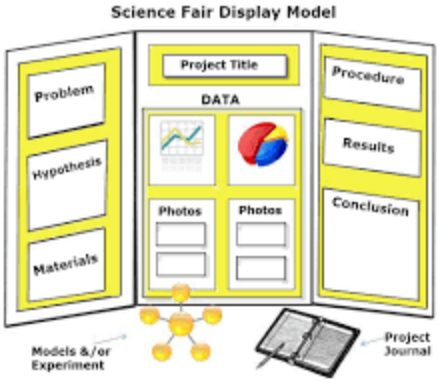
<u>This paragraph should be used as a recommended reference, not as required.</u>
Information placed on the display boards should flow in a left to right manner. That is your problem, hypothesis, procedures, etc. should be on the left panel as you face the display board. The middle panel then might contain your name and grade level, observations – graphs, charts, pictures of you performing the experiment. Finally on the right panel you might display conclusions, documented scientific research, and additional ways to test your hypothesis.

All of these topics are included in your written report. Be sure to use it for ideas. Neatness, creativity, and careful work are graded on your display board along with spelling, grammar, and punctuation.

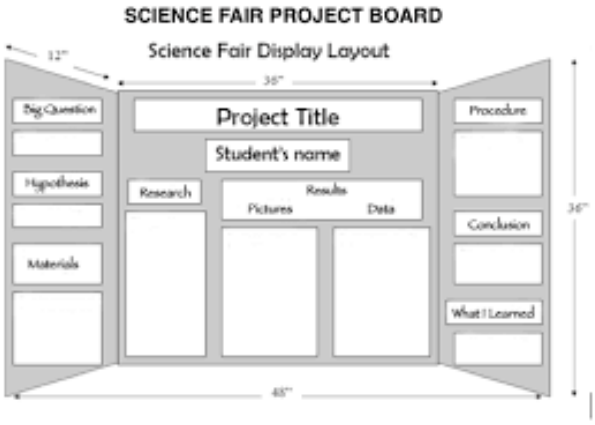
Don't be afraid to spice up your display with flashy paper, fonts, etc. Be artistic, creative, and informative!

Here are two sample displays:

Sample 1



Sample 2



Guidelines for Giving an Oral Presentation

Giving an oral presentation is the way you will demonstrate for your classmates and teacher your knowledge of your topic. This is also a very important part of your project and should be well prepared and rehearsed. Oral presentations are not reading of your research report. Rather it is an informative speech that engages your peers and teacher in an exciting discussion of your topic. Giving a good oral presentation has several components to it.

1. Eye Contact – looking at your audience as you are speaking to them. Not reading something off of a piece of paper, a note card, or a screen.
2. Volume, Speed, Clarity of Speech – speaking loudly enough for your audience to comfortably hear you, speaking at a pace that is easy to understand, and speaking clearly, enunciating your words.
3. Presentation Time – limiting yourself to a brief overview of your project that provides insight into your topic and allows for time at the end for your peers to ask questions.
4. Poise and Confidence – not displaying nervous habits, standing up straight and tall, and showing a certain level of comfort in the front of the classroom.
5. Content – demonstrating a knowledge and interest in the topic you studied, its vocabulary, and research.
6. Critical Thinking – explaining certain areas that someone may continue studying or topic that you did not research.
1. Practice – begin practicing ahead of time, by yourself at first, then to a family member, then until you know your presentation inside and out.

Taking the parts of a good oral presentation, the following are some guidelines for specifically discussing a Science Fair topic. The following must be included as a part of your oral presentation.

1. An attention getting beginning that gives a brief introduction of yourself and the title of your topic.
    a. This could include asking a question, giving a surprising fact, telling an interesting or surprising story, having your audience imagine something, or reciting a famous quotation.
    2. A statement of your project's purpose.
        a. This is an informative summary that gives your audience an understanding of what you set out to accomplish by researching this project and how you went about doing the research. This can include an overview of the sources you used to research your topic.
    3. A summary of the content within your project.
        a. This should be the main part of your presentation demonstrating your knowledge of the content and vocabulary that you studied by describing each part of your experiment clearly in a way that your audience can understand and enjoy.
    4. An application of why this topic matters today and ideas for further study.
        a. This conclusion should explain why your topic is important and what are other things you could have researched about it.
        b. This may include one last interesting fact or story, a summary of your main points, or stating a final idea that for the audience's thoughts.

**A Google Slideshow can be created to aid in your oral report. All requirements above should be included in your slideshow if you wish.

Science Fair Project Application Due: February 14th 2020

Student Name: _____ **Date:** _____ **Grade Level:** _____

Project Title: _____

Project Area: (Circle one)
Biology Chemistry Physics Earth Science Physical Science Life Science

State the Problem: What is the problem or purpose I am trying to discover in doing my experiment?
The problem is the question you want to answer when you set out to do your experiment. The problem of the experiment should be stated as a question. The question could be: What if…?,
How come…?, Why does it…?, How could…?, Would this affect this…?, Does this really happen? The problem of your experiment could also be a statement: I wanted to see if… I think that when I do this… Allow yourself to be creative to come up with other possibilities.

Example Problem: Which will heat up faster, sand or water?

State the Problem of Your Experiment: _____

_____

Formulate Your Hypothesis: This is what I think the answer to my problem will be:
Your hypothesis is a possible answer to the problem of the experiment that you stated above. Make sure that your hypothesis is something that can be tested and scientifically measured. A hypothesis is usually an educated guess as to how you believe the experiment will turn out before you actually conduct the experiment itself.

Example Hypothesis: Sand will heat up faster than water.

State Your Hypothesis for Your Experiment: _____

_____

Planned Research Ideas: Here are specific ways I intend to get information for my project.
Planned research ideas should provide you with specific direction as to where you can get the information you need to achieve answering the question or accomplishing the purpose for your project.

Example Planned Research Ideas: Mythbusters: Science Fair Book. New York: Scholastic, 2011

Your Planned Research Ideas: _____

_____

This is the investigation I propose for the completion of my Science Fair Project.

Student Signature: _____ **Date:** _____

The investigation proposed by this student meets the preliminary requirements for a Science Fair Project.

Teacher Signature: _____ **Date:** _____

I will support my child's efforts in completing the proposed Science Fair Project.

Parent Signature: _____ **Date:** _____

Science Fair Experiment Documentation Form 1:
Identify and Control the Variables and Procedure of Experiment
Due Date: March 19th, 2020

Identify and Control the Variables: What Parts of the Experiment Do I Control?
In a science experiment there are some variables you can control or change and there are some that you cannot. The Independent Variable is the part of the experiment that you can control or change, and the Dependent Variable is the part of the experiment that you observe as a result of changing the independent variable.

Example Independent Variable: What kind of light source is used to heat both the sand and the water?

Example Dependent Variable: How does the light source effect how the substances are heated up?

State the Independent Variable for Your Experiment: _____

_____

State the Dependent Variable for Your Experiment: _____

_____

Procedure of Experiment: How Will We Find Out The Answer To Our Problem?
In order to find out the problem of your experiment you will need to make a list of everything that you will need. It is important that you be very precise so that you have an exact plan for your experiment.

This exact plan is called the procedure. Think about the procedure carefully and then write it down. The procedure is something that you will also want to be a visible part of your display at the science fair, both in your report and on your display board. This procedure is the set of directions by which any one can do your experiment the same way under the same conditions. Never assume that someone else will know what you are doing.

A good procedure brings up the topic of variables. Remember that just above we discussed the independent and dependent variables. Everything else in your experiment is a constant. A constant means just that: things will remain the same every time your experiment is done.

Example Procedure:

I. Materials Needed:
- 2 – 16 quart pie pans
- 1 – pie pan filled with 4 quarts of water
- 1 – pie pan filled with 4 quarts of sand
- 2 – thermometers that measure degrees Celsius
- 2 – desk lamps with 60-watStep 1: Fill 1st pie pan with 4 quarts of water.

Step 2: Fill 2nd pie pan with 4 quarts of sand.
Step 3: Place 1 thermometer into the pie pan filled with water.
Step 4: Place 1 thermometer into the pie pan filled with sand.
Step 5: Place first desk lamp next to the pie pan filled with sand and adjust the bulb to sit 7 inches away from the level of the sand.
Step 6: Place second desk lamp next to the pie pan filled with water and adjust bulb to sit 7 inches away from the level of the water.
Step 7: Record measurements from each pie pan at 0 minutes, 1 minute, 2 minutes, 3 minutes, 4 minutes, and 5 minutes.
Step 8: Adjust distances of desk lamp from the level of each substance and take recordings at the same intervals.
Step 9: Interpret data collected from readings on a graph displaying how time affects temperature.
Step 10: State the conclusion of the experiment based upon the information collected and interpreted.

I. Materials Needed:

_____

_____

II. Set Up:

Step 1: _____

Step 2: _____

Step 3: _____

Step 4: _____

Step 5: _____

Step 6: _____

Step 7: _____

Step 8: _____

Step 9: _____

Step 10: _____

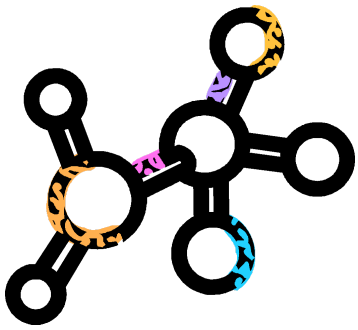
Step 11: _____

Step 12: _____

Step 13: _____

Step 14: _____

Step 15: _____



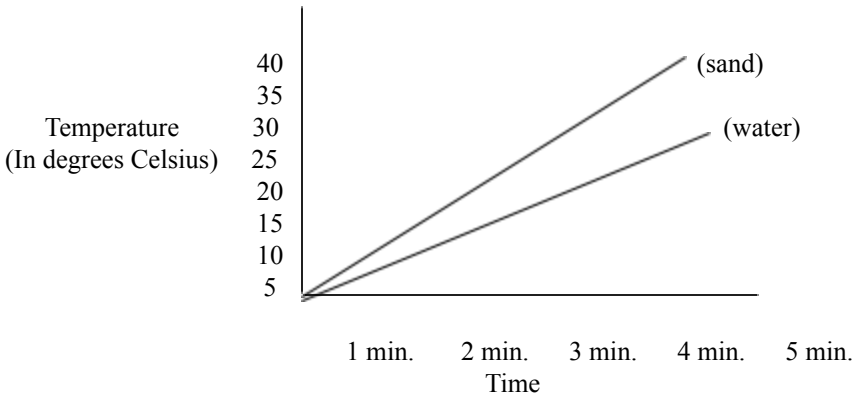
Science Fair Experiment Documentation Form 2:
Collect and Interpret Data
Due Date: March 19th, 2020

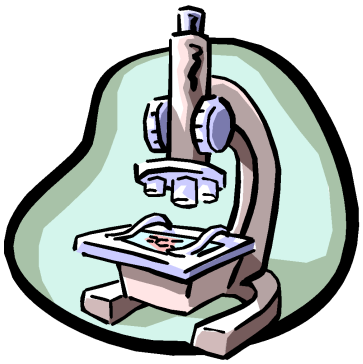
Collect and Interpret Data: What Actually Happened?
All of the information that you gain from your experiment is called data. This data is best displayed in chart form, or graph form on your science fair display board. This gives people a brief picture of what it is that you did, what it is that happened, and what it is that you learned. Every scientist's graphs and charts may be done differently. Display your information in your own type of chart or graph that visually displays the data that you collected:

Example Charts for Collecting Data:

Temperature of Sand and Water

Time (Minutes)	0	1	2	3	4	5
Water	22	24	26	27	28	29
Sand	22	25	27	29	31	33





Example of Interpreting Data:
Through the collection of my data it appears that sand heats up faster than water.

Collecting Data: Using a separate sheet of paper, create a chart or graph showing the data collected.

Interpreting Data: What does the data collected in your experiment tell you?

_____

_____

_____

_____

_____

_____

Science Fair Experiment Documentation Form 3:
State Your Conclusion
Due Date: March 19th, 2020

State Your Conclusion: What are the results of my experiment?

When your experiment is complete and your data collected, then you are ready to write your conclusion. The conclusion will tell in words what your graphs and charts show you. It will also tell if your data supports or rejects the hypothesis that you stated prior to beginning the experiment. If your original hypothesis has been rejected, write a revised hypothesis for your conclusion. DO NOT go back and rewrite your original hypothesis.

Example Conclusion: After completing my experiment of attempting to find out which substance heats up faster, sand or water, I have come to the conclusion that indeed sand does heat up faster than water.

State the Conclusion of Your Experiment:

_____

_____

_____

_____

_____

_____

Experiment Comprehension Analysis Form
Due: April 3rd, 2020

Student Name: _____ **Date:** _____

Teacher's Name: _____ **Grade Level:** _____

Project Title: _____ **Project Area:** _____

I. What background did you have on your experiment prior to conducting it?

_____

_____

II. What documented scientific research exists regarding your experiment?

_____

_____

III. What new knowledge/insight did you gain from conducting this experiment?

_____

_____

IV. What additional ways could you test your hypothesis or obtain different results by modifying the experiment?

_____

_____

V. What impact does this experiment have on the world today?

_____

_____

Student Signature: _____ **Date:**_____

Parent Signature: _____ **Date:** _____

Science Fair Project Project Grading Rubric **Grades 5-8**

Student Name: _____ **Grade Level:** _____

Project Title: _____ **Project Area:** _____

Rubric Scale: 5 – Excellent, 4 – Good, 3 – Average, 2 – Below Average, 1 – Poor, 0 – Not Complete

I. Scientific Problem Solving – Scientific Method (25 Points)

A. Problem or Purpose _____/**5**
- Problem is clearly stated and assists to provide the title.
- Purpose is neither too broad nor limited.
- Gives direction for experimenting, gathering, and analyzing data.

B. Hypothesis _____/**5**
- Hypothesis is clearly stated.

C. Procedure _____/**5**
- Procedure is thorough and organized.
- Independent and Dependent Variables are identified.

D. Results _____/**5**
- Collection of data is thorough.
- Interpretation of data through charts and graphs is evident.

E. Conclusion _____/**5**
- Conclusion points to an acceptance or rejection of the original hypothesis.

II. Display (20 Points)

A. Layout _____/**5**
- The layout of the project is neat and well organized.

B. Neatness _____/**5**
- The display is attractive and easy to read.

C. Creativity and Originality _____/**5**
- The display exhibits creativity and imagination.

D. Spelling & Grammar _____/**5**

III. Oral Presentation (30 Points)

A. Eye Contact _____/**5**

B. Volume, Speed, & Clarity of Speech _____/**5**

C. 5 Minute Presentation Time (Time: _____) _____/**5**
- This does not include questions asked by peers.

D. Poise & Confidence _____/**5**

E. Content _____/**5**
- Demonstrates knowledge of content, vocabulary, and research used in the development of the project.

F. Critical Thinking _____/**5**
- Relates how the research topic may be extended and refined.

Total: _____/**75**

Science Fair Project Report Rubric **Grades 5-8**

Student Name: _____ **Grade Level:** _____

Project Title: _____ **Project Area:** _____

Written Report (40 Points)

A. Introduction _____/**5**
- The project is introduced, defined, and applied.

B. Problem or Purpose _____/**5**
- Statement of the problem or purpose is described.
- Hypothesis statement regarding the problem is stated.

C. Scientific Problem Solving _____/**5**
- Describes the problem solving steps necessary to test the hypothesis of the experiment.

D. Understanding _____/**5**
- Demonstrates what was learned.
- Shows evidence of critical thinking.

E. Application _____/**5**
- Explains the impact this experiment has on the world today.

F. Format & Sources _____/**5**
- The report is complete with a properly formatted title page and bibliography page.

G. Data Collection _____/**5**
- Report includes charts and graphs used in data collection.

H. Spelling & Grammar _____/**5**

Comments:

Total: _____/**40**

Science Fair Idea Bank

Remember, your science fair project should start with a question. What topic interests you most? What have you always wondered about that topic? Once you've decided the question you want to answer, everything from the hypothesis to the procedure will flow from there. Here are some topics that might interest you.

Biology:

1. What kind of soil is best for water retention?
2. Will antacids help soil polluted by acid rain?
3. Does human hair affect the growth of plants?
4. How does a garden mist spray affect plant growth?
5. How does the duration of insulation affect plant growth?
6. What is the percentage of water in various fruits and vegetables?
7. Which plants and vegetables mate the best dye?
8. Which type of wildflower grows best under artificial light?
9. How does temperature affect the water uptake in celery plants?
10. Does the type of water affect the growth of plants?
11. Is soil necessary for plant growth? (hydroponics study)
12. How does rotation affect plant growth?
13. Does music affect plant growth?
14. Does a plant grow best in sunlight or artificial light?
15. Can plants deprived of sunlight recover?
16. What is the relationship between root and stem growth?
17. How does gibberellic acid affect plant growth? (growth hormones study)
18. Which color of light causes green beans to grow best?
19. Can potatoes be grown without soil?
20. How do worms affect plant growth?
21. What is the effect of urine on grass?
22. What affect do Epsom salts have on plant growth?
23. Which household cleaner will kill bacteria the best?
24. How will the introduction of an unfamiliar person to a cricket's adopted home affect the cricket's chirping rate?
25. What's the difference in grass growth when chemical or natural fertilizers are used?
26. How does the taste of organic vegetables compare to the taste of conventionally grown vegetables?
27. How will different liquids affect the growth rate of bean seeds?
28. How do different types of liquid affect fruit-fly growth?
29. How does electricity affect fruit flies?
30. How does ethylene affect ripening fruit?
31. On which foods does fungus grow best?
32. How do different proportions of plants and animals affect the overall health of a closed system?
33. How far do airborne germs travel?

Chemistry:

1. Are safe homemade cleansers as effective as commercial cleansers?
2. Which vegetables make the best dye?
3. What does it take to change an enzyme's shape? What is an enzyme?
4. What effects do different types of exercise have on the production of carbon dioxide in humans?
5. How does temperature affect the life span of a bubble?
6. What's the best solvent for separating out the elements of purple, red, and green markers, or of instant drink mix?
7. How much chlorine is in the river around a sewage treatment plant?
8. Which types of soils can best neutralize acid rain?
9. Which metal is most rust-resistant?
10. Which type of antacid can best neutralize stomach acid?
11. What is a good alternative to road salt for melting ice on sidewalks and roads?
12. Can a layer of oil prevent or reduce the evaporation of water?
13. What is the difference in strength between recycled paper and new paper?
14. How do you make invisible ink?
15. How do you create carbon dioxide?
16. How do you make yeast work?

Physics:

1. Which is heavier hot air or cold air?
2. Can air hold up water?
3. Which falls faster?
4. What happens when you throw a curveball?
5. How does increasing the number of nails affect the amount of pressure on each individual nail using a balloon?
6. What is the difference between the weight of an object in and out of water?
7. How does Bernoulli's principle work?
8. How can a lever help lift objects?
9. How can you make a simple clock?
10. How can machines store energy?

Earth Science:

1. What evidence can we find about the rotation of the earth from the star trails?
2. What is the size of the earth? (Eratosthenes method)
3. How does the color of a background affect its absorption of solar insulation?
4. How does sunspot activity affect radio reception?
5. Does the amount of water affect the size of the wave?
6. How does the volume of a stream affect its flow rate?
7. Where is the current of a stream the fastest?
8. Is there a relationship between phases of the moon and our weather?
9. How can we prevent the weathering of our sidewalks and driveways?
10. How does topography affect local weather conditions?
11. How do changes in air pressure affect weather?
12. How are all weather factors related?

13. What is in our drinking water?
14. Are our local waters acidic?
15. Do our soils show the effects of acid rain?
16. What is the lime content of various samples of water?
17. How polluted is our water? (the trapping and study of bacteria with a Millipore filter)
18. What effect does cloud cover have on nighttime temperatures?
19. How can you use pine cones to measure the humidity of the air?
20. How do the shapes of buildings affect how they handle an earthquake?
21. How do you determine the epicenter of an earthquake?
22. Which papers break down the fastest in the sewage system?

Physical Science:

1. How does particle size affect settling rates?
2. How do environmental conditions affect how disposable grocery bags biodegrade?
3. What is the effect of equal amounts of pressure on an eggshell's durability?
4. Which fruit or vegetable conducts electricity the best?
5. How does a compass work?
6. How does infrared radiation compare to visible light?
7. What factors make an electromagnet stronger?
8. Which fabrics retain moisture the longest?
9. What is the effect of wind chill on different inanimate objects?
10. What is the effect of air pressure on an object not supported on all sides by equal air pressure?
11. What is the effect of the color of roofing on a house's temperature?
12. What effect does water have on sound?
13. Where is the fastest moving current of water in a stream?
14. How much weight can a helium-filled balloon lift?
15. How do different ground surfaces interact with rainwater?
16. Where will the greatest concentration of air particles be found?
17. How accurately can you predict the weather when compared with the local meteorologist's forecast?
18. How does the strength of homemade glue compare to the strength of store-bought craft glue?
19. How do pulleys work, and how many pulleys are needed to lift 100 pounds?
20. What is the average wind speed around your home?
21. What's the proper ratio of two or more liquids of different densities that will cause the "lava" to float in a liquid motion lamp?
22. What effect do magnets have on recorded items?
23. How does a camera work?

Life Science:

1. What are eating disorders? (research and survey)
2. Is there a relationship between eating breakfast and school performance?
3. How are teeth affected by fluorides and acids?
4. What is the effect of our internal clocks on awakening at an unusual hour?
5. What effect does playing video games have on reaction time?
6. How accurately can moms identify their children's clothing using only the sense of smell?

7. What effect does chewing mint-flavored gum have on the temperature of a person's mouth?
8. How does smell affect taste?
9. How does a person's body temperature vary during the day?
10. How does a person's handedness affect foot, eye, and ear preference?
11. What effect does caffeine have on a person's typing speed?
12. How do different kinds of music affect heart rate?
13. How does gender affect working memory?
14. How does color affect taste?
15. What effect does heredity have on fingerprint characteristics?
16. How does involuntary smoking (secondhand smoke) affect kid's vital lung capacity?
17. What effect does the loss of calcium have on bone strength?
18. What happens in your stomach as you digest food?
19. How do you create an artificial lung?

Helpful Websites

The Scientific Method:
http://school.discoveryeducation.com/sciencefaircentral/scifairstudio/handbook/scientificmethod.html

Science Fair Project Resource Guide
http://www.ipl.org/div/kidspace/projectguide/

Science Fair Projects (all levels):
www.all-science-fairprojects.com
www.school.discovery.com/sciencefaircentral/
www.pbskidsorg/dragonflytv/scifair/index.html
www.glencoe.com/sec/science/biology/bio2000/scifair.shtml
www.homeworkspot.com
www.sciencebuddies.org
www.cdli.ca/sciencefairs/
www.sciencefairs.bc.ca/process.html
http://faculty.washington.edu/chudler/fair.html

Getting your Display Ready
http://www.ctsciencefair.org/student_guide/display_help.html

United States Geological Survey:
http://earthquake.usgs.gov/learning/kids/sciencefair.php

Kids Zone:
www.agclassroom.org/kids/science.htm