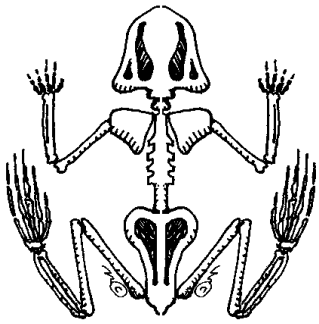
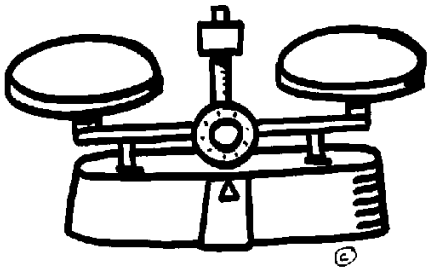
CUNHA INTERMEDIATE SCHOOL
SCIENCE FAIR





Parent and Student Information Booklet

This book belongs to: _____

BRING PROJECT TO SCHOOL ON: _____ DATE OF OPEN HOUSE:_____

TABLE OF CONTENTS

SELECTING A SCIENCE FAIR PROJECT TOPIC

Believe it or not, selecting a topic for a science project is the toughest part of the process for some students. Before you decide on your topic, make sure you understand the requirements of doing a project.

The project:

The student will select a topic of personal interest to investigate. The idea or question should be one that can be investigated through experimentation or data collection. **Research into the topic MUST be done before the hypothesis is determined.** An experiment must be designed and data must be collected. The student will reach a conclusion to their question by careful analysis of experimental results.

Considerations to help you select a project:

1. What are your interests? What is fun? Are there science-related social or environmental concerns that you would like to investigate? Make a list and try to find related topics.

2. Think about your experiences and questions you have about the world. There are many things we would like to know but haven't investigated.

3. What are your work habits? A science project requires a lot of work. You can do a little work over a long period of time, or do a lot of work over a shorter period of time. For example, doing a plant experiment may involve weekly measuring and watering (a small amount of work) over a long period of time. Most physical science topics require a lot of work in planning and construction of the experiment, but the experiment might require only a short period of time. Choose a topic that corresponds to how you like to work.

4. Consider your family schedule and life style. Use a calendar or timeline to plan how and when you will do your project.

5. Consider factors that might affect your experiment. For example, the season and weather are factors you must consider for outdoor plant experiments.

6. What about resources? Are they available? How much will materials cost?

7. Your science teacher is here to help you. Make an appointment outside of class to discuss your project.

8. There are many good books about science topics and science fairs. You may look through these to get ideas; but remember that originality and creativity are considered in the judging. You may lose points if your experiment is merely copied from one of these sources.

9. Pick three possible ideas. Sit down with your parents and discuss these ideas with them before you decide on a final choice.

10. Get your teacher's approval before you begin your project.

Some of these ideas are from previous projects, and some are new.

You are strongly encouraged to develop your own idea.

PROJECT IDEAS TO GET YOU THINKING!

- Use a microscope to study and describe soils, pond water, or other material.
- The effect of color on heat absorption.
- Wing design on balsa planes.
- What affects the rate of rust?
- Wind strength and direction.
- Conductivity of various substances.
- Effects of temperature on density.
- Effects of ultraviolet light on bacteria.
- What is a good design for rocket nosecones or fins?
- pH comparisons of household materials
- Ocean wave prediction.
- How do eyes change in light or dark?
- How does sound affect plant growth?
- Test some classical rule of force and motion (simple machines or gravity)
- Fossil densities in cliff rocks.
- How does temperature affect crystal growth?
- Viscosities of different fluids.
- Strengths of different structures or shapes.
- Go to a local nature preserve and ask a naturalist what you could study there.
- How does a change of length or mass affect the period of a pendulum?
- Monitor some condition in the ocean. (Visit the Nat'l Marine Sanct's office.)
- Study/compare flight patterns or habits of different types of birds.
- Earthworm distribution in a field.
- How does time of day affect speed or quantity of traffic?
- Salt content of seawater.
- Litter distribution on area beaches.
- Pollutants in area streams.
- Plant growth under different conditions.
- Variations in speed or direction of beach or ocean currents.
- Seasonal temperature fluctuations in stream, pond, or seawater.
- Wind velocity variations.
- Species counts in a coastal habitat.
- Soil studies.
- Highway 1 traffic studies.
- Salinity fluctuations in tide pools.
- Domestic water quality.
- Blood pressure variation.
- How does the speed of sound in air differ in different weather conditions?
- Wave patterns in different fluids.
- Behavior patterns of some animal.
- Air quality.
- What is found in dust?
- Root, leaf, vein, or other patterns in some type of plant.
- How do different insulators compare?
- Observe specific meteorological (weather) conditions.
- Weather variation with altitude.
- Kite design with respect to aerodynamics.
- Variations in your breathing, heartbeat, temperature, or other body processes.
- Pick a place and study what organisms you find there.
- Pick two places and compare some environmental condition.
- Study what affects the efficiency of some piece of machinery.
- Gas mileage of various types of cars.
- Study an environmental issue that concerns you.
- Porosity of soils.
- Where are your blind spots located?
- How sensitive is one of your senses?
- Erosion patterns.
- Trajectories of projectiles (angles & distances).

SCIENCE FAIR GUIDELINES

Project Construction and Safety Considerations

1) The student must do all work on the project. Students may obtain advice on the project from any source; but the student must design and implement the experiment and make the display.
2) A table space of 122 cm (width) by 76 cm (front to back) is allotted to each entry. Height is limited to 274 cm or less. Oversized projects will be disqualified.
3) The project must stand by itself and cannot be fastened to the table or walls in any fashion.
4) The following items should **not** be included in exhibits:
   A) Food – Food may are not permitted in the displays. Drawings or photos may be used.
   B) Bacteria – No Petri dishes or test tubes with gel and bacterial colonies are not permitted in the displays. Photos or drawings should be used.
   C) Open gravel, sand or dirt – Soils or dirt must be enclosed and sealed securely. If plants are displayed, the pot and any soil material should be completely covered and sealed.
   D) Animals (live, dead, mounted, or stuffed specimens) are not permitted in the displays.
   E) Dangerous chemicals, explosives, drugs, hypodermic syringes or needles, or open flames are not permitted in the displays.
5) Do not leave valuable items with the project after the judging day.
6) The exhibitor assumes all responsibility for project loss or damage.
7) Construction must be durable, with moving parts firmly attached to the project. No sharp objects or large rapidly moving parts, which might pose a safety risk, will be allowed.

Project Design and Judging Criteria

Your science fair project will be a formal, public presentation of a piece of your scientific research. It should conform to the standards of research of the scientific community to the greatest degree possible. The judges will apply a wide range of criteria. The following may affect how they rank your project:

1) Are the scientific problem and hypothesis clearly defined and stated?
2) Has the data been gathered in a reliable and careful fashion?
3) Have the variables been carefully controlled?
4) Is the analysis of the data scientifically and mathematically correct?
5) Have the relationships between the variables been correctly established?
6) Does the body of evidence support the conclusions that the student has drawn?
7) Has the student analyzed the effects of experimental error on the conclusions?
8) Has the student shown originality of thought in the formulation and design of the experiment? (In a separate section on the display provide specific information stating where the project idea came from, who contributed to the idea, and who influenced your choice.)
9) Has the student demonstrated thoroughness in the development of his or her ideas?
10) Is the workmanship in the project of a high quality?
11) How well does the student communicate through the project? Has the student used proper spelling, clear wording, and clear photos? Will the average person understand what is being displayed? Is the reader's eye drawn through the project in a sensible manner?
12) Does the display make the judges' job easy or hard?

SPECIAL PROCEDURES FOR CERTAIN EXPERIMENTS

All students who are considering science fair projects that involve research involving any of the following organisms or materials **must** follow the special procedures noted below:

1) Humans,
2) Any other animals,
3) Bacteria,
4) Recombinant DNA,
5) Animal tissue,
6) Pathogenic (disease-causing) agents, or
7) Controlled substances (substances regulated by law).

If you want to complete an experiment involving any of these organisms or materials you **must**

A. Read the Bay Area Science Fair **SCIENTIFIC REVIEW COMMITTEE (SRC) PACKET** and
B. Submit the appropriate completed parts of the **SRC PROJECT PROPOSAL FORM before** you begin your experiment!
C. If consent is required, you must complete the **SRC INFORMED CONSENT FORMS** before you begin your experiment.

The SRC Packet can be found at: http://www.sfbasf.org/srcpacket.pdf
The Proposal Form can be found at: http://www.sfbasf.org/srcproposalform.pdf
The Informed Consent form is at: http://www.sfbasf.org/informedconsentform.pdf

These forms take a significant amount of time. The forms should be neat, thorough, and accurately completed. If they are not well completed, you will probably be asked to redo them. Your teacher will need to review and sign the form, and may ask for revisions before signing. Therefore, you need to begin this process as soon as possible.

Below are the web sites for the Bay Area and California State Science Fairs. Please refer to these sites for the latest information on these fairs, including rules and guidelines.
Bay Area Science Fair home page: http://www.sfbasf.org/index.html
Bay Area Science Fair Guidelines: http://www.sfbasf.org/guidelines.pdf
California State Science Fair: http://www.usc.edu/CSSF/

SCIENCE FAIR PROJECT JOURNAL

As you work on your science fair project you are required to keep a journal of the daily progress that you accomplish, your research and background information, rough drafts, and thoughts and reflections on the project. You are expected to turn your journal in with your project.

Why do a science fair journal?

1. It will help you organize your thoughts and ideas.
2. If anything should happen to the final product of your project, you have a daily log of all the information that you collected and the steps that you performed.
3. If your teacher needs any extra information when assessing your project, they will be able to see what you did each time you worked on your project.
4. When you put together your backboard and write your conclusion, it will help you to remember the things that you thought about while you were conducting the experiment.

How should I present my journal and what should I put in it?

1. Your journal should be submitted in **a small loose-leaf notebook** or a report cover.
2. The journal should be divided into **four clearly labeled sections. Label the sections**:
   a. **Section 1**. **RESEARCH**
      i. Research is an integral part of any good experiment. In this section you should have:
         1. A **bibliography** of all your resources should be the **first page(s)** of this section. Pages 8 & 9 of this pamphlet show the format for your bibliography.
         2. **Photocopies and notes** of your research. Include notes or copies from books, encyclopedias, or magazines; printouts from web pages; and notes of other research you complete while you select your topic and gather background information on your project.
         3. **Notes from interviews** you complete. (Be sure to note date, location, and name.)
   b. **Section 2. RECORD OF DATA**
      i. Data include the information you collect from your experiment. These are facts and/or numbers. Usually data are the lengths, weights, temperatures, speeds etc.; but observations, such as color, shape, or texture are also data. Data help you make decisions and draw conclusions about your experiment. This section should include:
         1. Data chart(s) you used to record your original data and observations as you work.
         2. Copies of the data chart(s) you use on your backboard.
   c. **Section 3. LOG, PLANS, AND PROCEDURES**
      i. Record your progress as you work on your project. Keep track of all work you do, and when you do it. In this section you should include:
         1. A running, chronological, **day-by-day log** of your efforts. This is like a diary. You may include more than one entry on a page. This journal portion may be neatly handwritten or typed on a computer. In each entry, include:
            a. Note the **date and time** of your work.
            b. **Log your Progress, Thoughts & Reflections** – Write down what you thought about and what you did during the session.
            c. **Drawings or notes** to show developing ideas about procedures, materials, designs, etc.
            d. **Concluding Thoughts** – The final entry in your log should be you concluding thoughts on what went well on your project, what you learned, what could have gone better, and what you would change to improve the experiment if you were to do it again.
         2. Your **proposal, ten-week plan, and your procedures** should be displayed in this section.
   d. **Section 4. – ROUGH DRAFTS**
      i. You will likely go through more than one rough draft before you make the charts, tables, graphs and written materials for your backboard. This section should include:
         1. The rough drafts of all the papers on your backboard.
         2. If you rewrote any part of your journal, also place the rough drafts here.
         3. A sketch of the layout of your backboard.

RESEARCH – BACKGROUND INFORMATION

Once you've identified your topic, then the next step is to conduct your research. You should collect as much information as possible. Begin by getting an overview of your topic. Encyclopedias contain general information and should be used only to get general ideas about your topic. Use the online catalogue, Internet, National Geographic Index, and the Reader's Guide to Periodic Literature to obtain up-to-date, and more detailed, information.

Use the information from the catalogues to locate books on your topic. For books, you probably won't need to read the whole thing. Use the index to find the specific information you need. You may want to copy the pages with the pertinent references, and save the copies. When you find helpful information, copy down all the information you will need to write your bibliography. This information will also help you find the resource again if you need to return to it for more research. Also check the footnotes and references in any book for other sources of information.

Magazine and newspaper articles can also be helpful sources of information. Use the Reader's Guide to Periodical Literature for locating articles related to your topic. The Reader's Guide will tell you the magazine's name, the date of the issue, and the pages where the article appears. Most libraries keep back issues of many magazines. Just ask the librarian for help. Most libraries now use a computerized system to help locate magazine articles, as well. Some even have the pages of some of the magazines online.

The Internet has also become a good source of information for your project. However, you still need to keep bibliographic information from the web pages you use. Also, it is important to screen the pages you use to be sure that they are reliable. For example, a resource on a government or university web page likely will be more reliable than a middle or high school student's page. It helps to compare information from one page to information in other sources, to ensure reliability. If different reliable sources give different information, it is important to note that.

As you collect information, use your journal to record your findings, just as though you were using note cards. You may put more than one idea or reference on a page. Be sure to copy down information for your bibliography. You will need to list the title of the book or magazine, the title of the article, the author(s), the page(s), the date, and the publisher. For Internet articles, you need the author's name, article title, a complete http address, and the date the information was downloaded.

Libraries Computers Interviews

BIBLIOGRAPHY

Requirements: You are required to include a bibliography in the front of the "Research" section of your Journal. Your bibliography should include references for all sources you used in your research and the development of your science fair project.

You are required to include at least the following number of sources. For each source you should also keep copies, printouts, or notes to show the contents of each source:

- 4 Print sources (books, magazine articles, encyclopedias)
- 3 Internet sites (**not** science fair sites)
- 2 people with expertise/knowledge

FORMAT: In your bibliography, use the proper format and punctuation for each entry:

- **First**, divide your sources into sections, such as 'Print Sources,' 'Internet,' and 'Interviews.' Include a caption for each of these sections, such as "**Print Sources:**"
- **Second,** within each of your labeled sections,
  - Arrange the sources alphabetically by the author's last name (last, first).
  - If no author is available, alphabetize by the first important word of the title. (If the title begins with 'a,' 'an,' or 'the,' skip to the second word in the title.)
  - Remember to indent the second line of your citation as shown in the examples.
  - Follow the examples carefully for correct order and punctuation. Double check!
  - Single space within each citation, double space between the citations.'
  - Use a separate page(s) for your bibliography.
  - Do NOT number your sources.

BOOKS

SINGLE AUTHOR

Author's name (last, first). Title of book. City of publication: publisher, date.

Goldentyer, Debra. Gangs. Austin, TX: Raintree/Steck-Vaughn, 1994.

MULTIPLE AUTHORS

Author's name (Last, First), and Second author's name. Title. City of publication: publisher, date.

Starr, Cecie, and Taggart Ralph. Biology: The Unity and Diversity of Life. Belmont, CA: Wadsworth Pub. Co., 1998.

MAGAZINE ARTICLES

SINGLE AUTHOR

Author's name. "Title of article." Name of magazine. date: page(s).

Dunham, Elizabeth. "Bad Girls: Experiments of Teenage Gang Members." Teen August 1995: 52+.

WITH NO AUTHOR

"Title of article." Name of magazine. date: page(s).

"Should Cities Hire Gang Members?" Current Events 12 February 1996: 3.

Most samples from: http://www.madison.k12.wi.us/hamilton/lmc/bib.htm

BIBLIOGRAPHY, CONT'D

NEWSPAPER ARTICLES

Author's name. "Title of article" Name of newspaper. date: section, page.

Stone, Debbie. "Crime Spree May Hint at Gang Problems." Wisconsin State Journal 12 November 1995; A1,8.

PAMPHLET ARTICLES

Follow example for a book.

ENCYCLOPEDIA ARTICLES

"Title of article." Name of encyclopedia. Date of edition.

"Gang." World Book Encyclopedia. 1996 ed.

COMPUTER SOURCES AND ELECTRONIC REFERENCES

INTERNET

Author's name (if known). "Full title of the work." Document date (if known). <web address> (date of visit to the web site.)

Walker, Michael L. "Gangs in the 1990's" 5 June 1996.
<http://www.ocjs.state.oh.us/jj/gangs/html> (5 March 1997).

ONLINE ENCYCLOPEDIA DATABASE ARTICLE (Such as World Book Online):

Author's name (if known). "Full title of the work." Title of online database. Date of visit to the database. <Partial URL address found in location box>

"Canada." World Book Online. 29 Nov. 2000. <http://www.worldbookonline.com>

A CD-ROM REFERENCE SOURCE (Such as Career Visions 2000 or Encyclopedias):

"Title of Article." Title of CD-Rom program. CD-Rom. Publisher, date.

"Interpreter." Career Visions 2000. CD-Rom. University of Wisconsin, 2000.

VIDEOS, DVD's, SLIDE PROGRAMS OR FILMSTRIPS

Title. Director. Original release date (if relevant). Type of media (videocassette, DVD, etc.). Distributor, year.

Stand and Deliver. Dir. Ramon Menendez. 1988. Videocassette. Warner Communications, 1998.

INTERVIEWS

Name of person interviewed. The kind of interview (personal interview, telephone interview, Email interview). Day month year.

Baldwin, Tammy. Personal interview. 5 January 2000.

THE SCIENTIFIC PROCESS

Your project should apply the **scientific method**. If you understand the steps of this process, it will help you to complete a good project. Use the following outline to improve your understanding of the scientific method. For a more detailed example of the scientific process, refer to the 'Sample Project Plan' later in this pamphlet.

1. Select and define a **question**

Define your problem in the form of a **question**. Your hypothesis, experimental design, data and conclusion will be guided by this question. Do **not** use a yes/no question. (*Examples: How does age affect a student's reaction time? or If we change the age of the subjects, how will this affect the response times? **Not**: Does age affect reaction time?)*

2. **Research**

Research your topic. Solid research will help you form your question, write a reasonable hypothesis, and design a good experiment. Books, libraries, the internet, individuals, university professors, relevant organizations, and even your own initial observations are all good sources of information. Keep bibliographic information.

3. Formulate your **Hypothesis**

Write your **hypothesis.** This is your educated guess about the solution to your question. It should be **based on your research**. It should be worded to answer your question. (*Examples: "I predict that the average reaction time of older students will be longer than that of younger students."* Or *"If the student is older, then his/her reaction time will be longer.*)

4. Design and execute your **Experiment**

Your **experiment** is the process by which you test your hypothesis. You should try to design a **controlled experiment**, in which all factors that might affect your results are kept the same, except for the one factor that you are testing. The one factor that you change is called your **independent variable.** (*Example: the age of the people whose reflexes are being tested*) The factor you measure or observe is your **dependent variable.**[*] (*Example: time of reaction*) Many experiments also contain a **control group**. (*Example: If you tested salt's affects on the plant growth, your **control group** would be plants grown without salt.*) You also need an adequate sample size. More samples tend to make more reliable data.

5. Collect, organize, and analyze your **Data**

Data is the information that you obtain from observation or measurement. Carefully observe your experiment at predetermined intervals and keep your data neatly in a data chart. Quantitative data should include numbers and units. Qualitative observations should be carefully and fully described. Record the date and time of all observations, and note any other factors that may have influenced your results. Organize your data into tables and graphs that show the patterns in your data. Carefully analyze your data.

6. **Conclusion**

Your **conclusion** grows out of your hypothesis and data. In your conclusion, state whether your data does or does not support your hypothesis, then use specific references to patterns in your data to support your conclusion. (*Partial example: My results do not support my hypothesis. Based on the half-second difference in their average response times, 8th graders have shorter response times than do 6th graders.*) Also discuss any outside factors that may have affected your results.

[*] For more discussion of variables, see 'Experimental Design.'

EXPERIMENTAL DESIGN

By this time you should have a topic, a question, and a hypothesis based on your research. Now it's time to design your experiment! If you are detailed and organized when you design your experiment, it will be easier to run the experiment and analyze the data you collect.

OVERALL DESIGN

Think carefully about the design of your experiment. Your design should consist of procedures that test your hypothesis, and test only your hypothesis. Many different factors can affect the outcome of an experiment. Therefore you will carefully identify your variables and design your experiment to control any other factors that could alter your results.

VARIABLES

Independent Variable: Your **independent variable** is what you will change or adjust. In your experiment you should test what happens when you manipulate your independent variable. You will then observe or measure what happens as you change your independent variable.

Dependent Variable: Your **dependent variable** is what you will observe or measure. What happens to your dependent variable **"depends"** on what you do to your independent variable. Your data describes how your dependent variable responds or changes when your independent variable changes. Your observations, measurements, and descriptions of your dependent variable make up your data; your data are the results of your experiment.

EXPERIMENTAL CONTROLS

Your experiment should be well controlled. You do not want your results to be changed by some unexpected factor as you change your independent variable. So, as you manipulate your independent variable and observe your dependent variable, you should strive to keep all other factors the same. These other factors that you keep the same are your **experimental controls**.

SAMPLE SIZE

Your **sample size** is the number of different subjects you test. Each test on a subject is a **trial**. If you have too few subjects or trials, your data may not be reliable; but too many could waste time and resources. Accurate measurements, a larger number of *randomly chosen* subjects, and a larger number of trials for each subject, will provide better verification that your data is reliable.

STEPS OF THE EXPERIMENT:

Clearly describe the steps you follow to complete your experiment. List and number these steps **with enough detail that someone else could accurately repeat your experiment**. Described your procedures in Section 3 of your Journal and in your Proposal. Include the following:

- How you chose your subjects and sample size.
- How you set up the experiment.
- How you adjusted or changed your independent variable.
- How you controlled other factors during your experiment.
- The steps you followed to complete your experiment.
- How often you collected your data.
- How you measure or observe your dependent variable. (Including what you observed, how you observed it, and what units of measure you used.)

SAMPLE PROJECT PLAN

This is NOT to be used as a project.

Question: How does age affect a student's reaction time?

Purpose: I wanted to explore reaction time because I like to play games with my friends. While we were doing this it seemed like my younger friends were slower and we argued about it. So I wanted to test whether this is generally true.

Research: I collected background information from a pediatrician in the area, and I found books about the development of children so I could make an informed hypothesis. I plan to continue my research as I work to collect my data. The books I've used so far are: (books listed).

Hypothesis: I think that as the age of students increases, their average reaction time will decrease. This is because the books I read say that response time improves with practice, and that's what I observed with my friends.

Variables: **Independent variable:** I will test different **ages of students**, as follows:

6th grade	11 – 12 yrs.
7th grade	12 – 13 yrs.
8th grade	13 – 14 yrs.

Dependent variable: I will measure the reaction time of the students. To measure their reaction rate I will drop a ruler and measure the distance the ruler drops before the student catches it. The shorter the distance the ruler falls, the faster the reaction time of the student.

Controlled variables: I will control the following variables as I collect my data:

I will use the same ruler for all experiments.
I will ask each participant to start with their fingers 4 cm apart.
I will hold the end of the ruler 1 cm above their fingers before I drop it.

(This list is just a start. You should outline as many controlled variables as you can. Work hard to have a well controlled experiment.)

Steps of My Experiment:

1. I collected my materials - a metric ruler, paper and pencil.
2. I made a data chart for my data, with 5 columns - one each for name, age, and the distance measured for 3 tests.
3. I randomly found at least 25 students from each grade (6th, 7th, and 8th) by drawing names.
4. I filled out and submitted the forms I needed in order to use human subjects in my experiment.
5. I set up a schedule to meet with, and test, all of my test subjects.
6. I listed my controlled variables so I don't forget them, and made a couple of trial runs.
7. I dropped the ruler twenty five times for each participant. For each test, I recorded the distance (in centimeters) at which the ruler was caught.

(Do you think these steps meet the criteria listed under "Experimental Design"?)

RECORDING OBSERVATIONS AND DATA

Record your observations and data for your experiment on a data chart. A data chart contains the raw data or observations that you collect as you run your experiment. They often are grids with hand-written numbers. Data charts are different from graphs of data. Data charts have raw numbers or observations; graphs organize your data to show patterns or trends in the data.

You can make your data chart in your journal or on separate pages. Data charts should be organized, clearly labeled, and easy to read. Be sure to make and label your data chart before you start collecting data, so you have a place chosen to write the information. Otherwise, your data may be sloppy and hard to figure out. If your chart doesn't work well, you may need to reorganize it to make it easy to record your data.

Data will often be in the form of numbers, or quantitative data (measurements). If you make measurements, be sure to record the **units** as well as the **numbers**. Data may also be qualitative observations in words, such as color, shape, texture, etc. If you collect qualitative data, you may want to create a rating scale, in numbers. (For example, the darkness of green could be ranked from 0 to 5, with 0 being almost white, and 5 being the darkest green.) If you do this, be sure to make the scale before you start your experiment, so the scale doesn't change as you go.

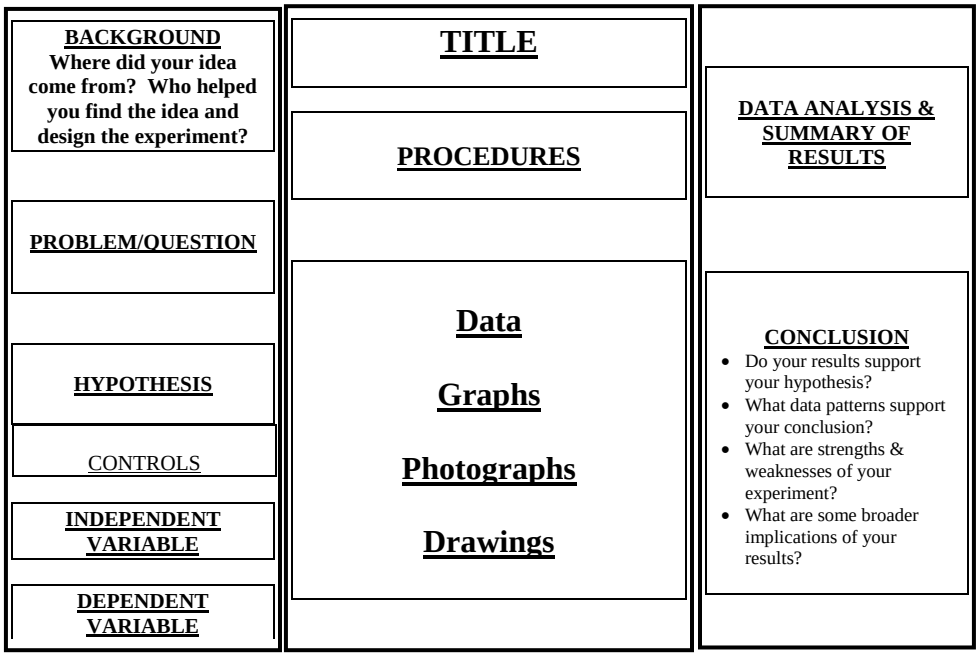
After you collect your data, you should analyze your data, using averages, means, or other statistical calculations. (The need to analyze your data is a good reason why you might want to make a numerical ranking scale for qualitative data.)

Data collected for 25 7th graders, age 12-13
Individuals Tested - Reaction time stated to nearest CM

Trial #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	12	9	11	13	11	18	15	19	8	15	16	10	12	13	11	13	11	19	17	14	18	15	15	16	18
2	14	18	12	15	10	17	15	11	18	14	17	11	14	18	12	15	15	11	18	13	8	19	12	9	11
3	12	12	13	19	13	10	13	12	13	19	16	14	12	12	13	19	13	12	13	19	18	11	12	18	19
4	18	13	18	18	10	9	18	14	13	11	18	13	13	14	18	11	15	14	13	15	13	12	14	17	10
5	17	12	12	13	8	14	13	22	10	12	16	17	18	12	12	12	15	22	15	19	13	14	13	13	12
6	10	13	14	11	11	12	15	5	10	14	18	11	13	13	14	11	11	5	19	11	15	13	11	18	11
7	9	18	12	12	12	13	19	10	13	22	16	14	15	18	12	12	12	13	12	12	19	12	9	11	13
8	14	13	13	14	8	17	15	13	15	5	13	12	19	14	13	14	12	17	13	14	12	9	11	13	11
9	12	15	18	12	12	11	12	16	10	13	15	14	11	13	18	12	12	11	15	13	18	19	11	12	15
10	8	19	14	13	10	14	15	14	11	15	19	10	12	17	18	13	14	14	19	15	18	11	15	14	13
11	18	11	13	18	12	12	14	13	12	19	18	13	8	11	17	18	12	12	15	19	18	12	13	13	11
12	13	12	19	19	13	14	17	17	14	11	17	15	18	14	10	8	13	14	12	11	17	14	15	11	19
13	13	13	11	18	8	12	12	11	13	12	10	19	13	11	9	18	15	12	12	12	19	10	19	12	11
14	15	18	14	12	13	13	14	14	17	12	16	11	13	15	8	13	12	13	14	14	19	5	11	14	12
15	19	17	18	14	8	18	12	12	11	14	14	12	15	13	12	13	17	18	12	12	14	13	18	13	9
16	11	10	17	22	11	15	13	14	14	13	12	10	19	15	10	15	10	11	13	14	12	17	13	11	13
17	12	9	10	18	6	19	18	12	12	11	13	12	9	19	13	19	9	12	18	12	12	11	15	18	11
18	14	14	9	19	12	11	12	13	14	18	17	14	12	11	8	12	10	19	13	14	14	14	19	13	14
19	22	12	14	15	8	12	14	18	12	12	16	13	14	12	12	11	15	18	22	18	12	12	11	15	13
20	5	11	12	18	10	14	13	12	13	14	14	17	13	12	9	11	13	15	18	13	13	14	12	19	5
21	14	12	13	18	14	13	15	15	10	12	16	11	11	13	18	12	10	19	14	15	18	12	12	11	11
22	13	13	17	18	9	11	13	18	10	13	14	14	13	12	8	19	13	14	12	19	22	13	14	12	13
23	17	18	11	13	10	17	19	13	14	18	16	12	12	12	11	15	11	12	14	11	18	18	12	12	15
24	11	11	14	14	12	13	15	14	10	18	13	14	13	18	12	12	10	14	13	12	13	15	13	14	7
25	14	12	12	16	8	15	12	12	15	14	18	12	13	14	12	12	12	12	11	15	13	12	18	12	12
Average	13	13	14	16	10	14	15	14	12	14	16	13	13	14	12	14	12	14	15	14	15	13	14	14	12

A 3-PANEL DISPLAY

***** This diagram is provided as a model only! *****
You may organize yours differently!

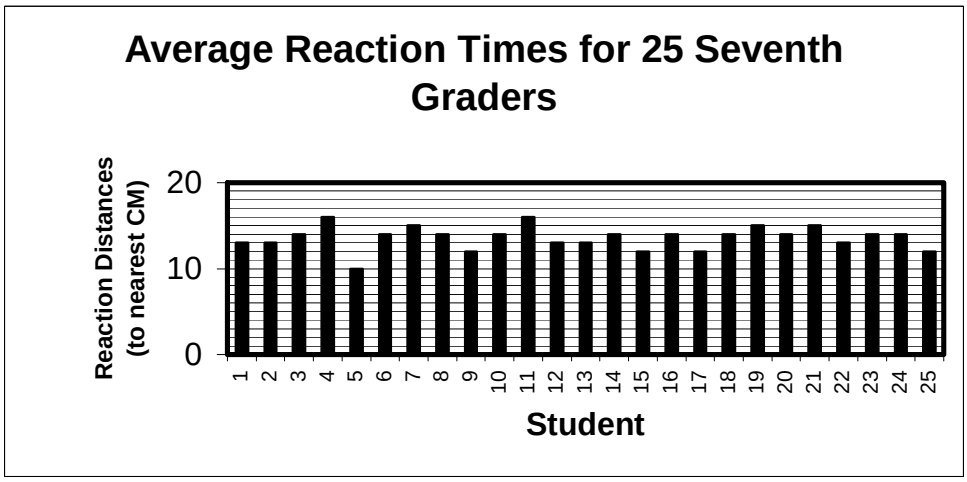


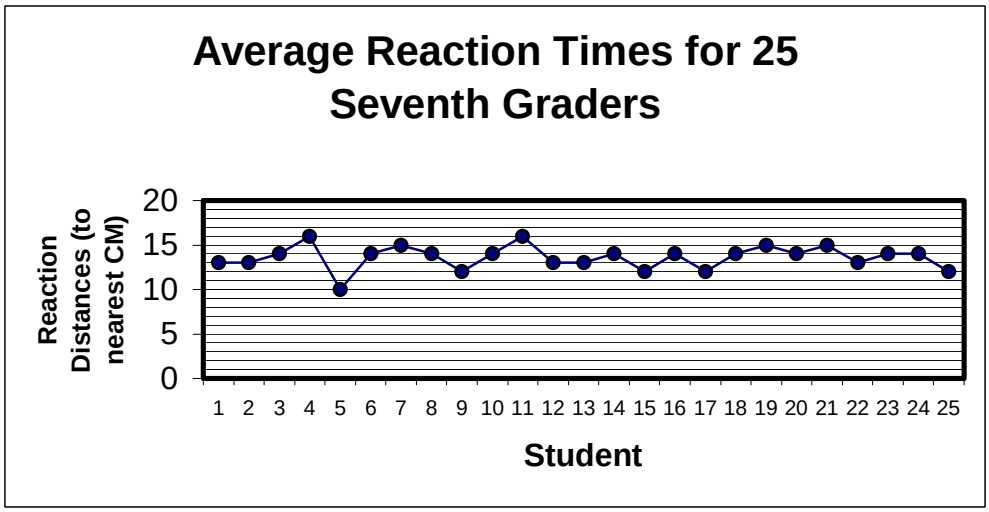
- Your **journal** should be placed on table in front of display.
- You may also display equipment, models, or other materials you used during your experiment.
- You may **not** display used petri dishes, dangerous or caustic chemicals, explosives, drugs, hypodermic needles, or open flames (see rules).

- Make your display logical, easy to understand, and attractive.
- You may organize your display differently from the example.
- Think about the flow of ideas. We read from left to right, top to bottom. Will this influence how people read your backboard? Large, centered or colorful parts may draw the attention of your audience. Use your design to help express your ideas!
- Make sure that the writing on your display is large enough to be seen and read easily.
- Check your spelling and grammar. Errors distract the reader from your message.
- Size limitations: **Height**: 274 cm (2.74 m) **Width**: 122 cm **Depth**: 76 cm

GRAPHING DATA

You are required to present your data in graphic form. Below are two examples of how someone might graph the data from the sample problem that we have been working with.





The bar graph is able to show the data more clearly than the line graph. Indeed, a line graph is not an appropriate graph to use here. A line graph shows how something changes over time. In the example we are using, the graph shows averages for several different students, not how one student changes over time.

There are many different types of graphs that you are able to use. Try to find ones that best demonstrate the patterns of your data. If you have any questions about what type of graph could best represent your data, contact your math or science teacher. Also note that a graph is not complete without proper x-axis and y-axis **labels**, including units, **appropriate intervals** for the axes, and a **title** that describes what your graph represents.

Science 7 Name: _____
Mr. Pittenger Date: _____ Period: _____

SCIENCE PROJECT TEN WEEK TIME PLAN

This Time Plan is designed to help you organize your time. Hopefully this will lead to the successful completion of your project with small amounts of work completed each week. This can help you avoid the too much work and frustration at the last minute. Your parents should initial each week after they review your plan and your week's progress with you.

Monday Date	Work to complete during week	Parent Initials
1 Week of Monday, _____	To do: _____ _____	Parent Initials: _____
2 Week of Monday, _____	To do: _____ _____	Parent Initials: _____
3 Week of Monday, _____	To do: _____ _____	Parent Initials: _____
4 Week of Monday, _____	To do: _____ _____	Parent Initials: _____
5 Week of Monday, _____	To do: _____ _____	Parent Initials: _____
6 Week of Monday, _____	To do: _____ _____	Parent Initials: _____
7 Week of Monday, _____	To do: _____ _____	Parent Initials: _____
8 Week of Monday, _____	To do: _____ _____	Parent Initials: _____
9 Week of Monday, _____	To do: _____ _____	Parent Initials: _____
10 Week of Monday, _____	To do: _____ _____	Parent Initials: _____

INSTRUCTIONS FOR SCIENCE FAIR PROPOSAL AND TEN WEEK PLAN

Science Fair Proposal

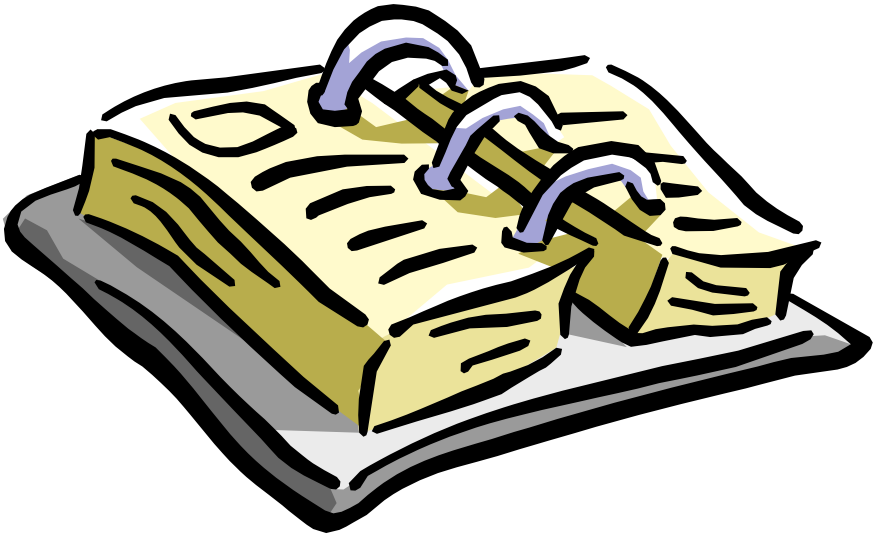
The last two pages of this booklet (17 & 18) contain the form for your Science Fair Proposal. Fill in each blank on the form with the information indicated by the labels.

Once your proposal is complete, you will turn your Proposal in to your teacher. Be sure you know the date that your teacher has set for you to turn in your proposal. Use this booklet to help you fill out the Proposal. If you have any questions, be sure to ask your teacher with enough time to complete the Proposal on time. It is a good idea to write a rough draft on a separate sheet before you write on the form. You may make a copy of the form to use for a rough draft. After your teacher checks your Proposal, you should place it in Section 3 of your Journal.

Ten-Week Time Plan

Page 15 of this booklet contains your Ten Week Time Plan form. This Plan will be written out at the beginning of the process. For each of the ten weeks, fill in the date of the Monday in the first column, and then fill in the second column with a description of the work you plan to complete during that week. After you begin the process, at the end of each week, review your work with your parents, and get your parent's initials.

The Ten Week Time Plan is designed to help you complete your project without getting stuck doing all the work right at the end. Ask your parents to initial the plan at the end of each week in the space marked "Parent Initials". Their signature indicates that you have completed the work outlined on the form for that week. This will help your parents assist you with your time management. After this form is completed, you should keep it and place it in Section 3 of your Journal.



Period: _____ **Date:** _____ **Name:** _____

SCIENCE FAIR PROPOSAL

The title of my project is: _____

The general topic my project will explore is: _____

_____

My question is: _____

_____

My hypothesis is: _____

_____

_____

My independent variable is: _____

My dependent variable is: _____

My controlled variables are:

1. _____

2. _____

3. _____

4. _____

5. _____

Specific places where I have looked (or plan to look) for background information. Use correct bibliographic form for any sources you have already used:

<u>Books</u>:

1. _____

2. _____

3. _____

4. _____

<u>Magazines/Periodicals</u>:

1. _____

2. _____

<u>Internet</u>:

1. _____

2. _____

<u>Interviews</u>:

1. _____

2. _____

The materials I will need:	**Where I will get them:**
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____

My experiment will follow the following procedures. These procedures should be as detailed as possible, so that someone could follow them to repeat your experiment:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

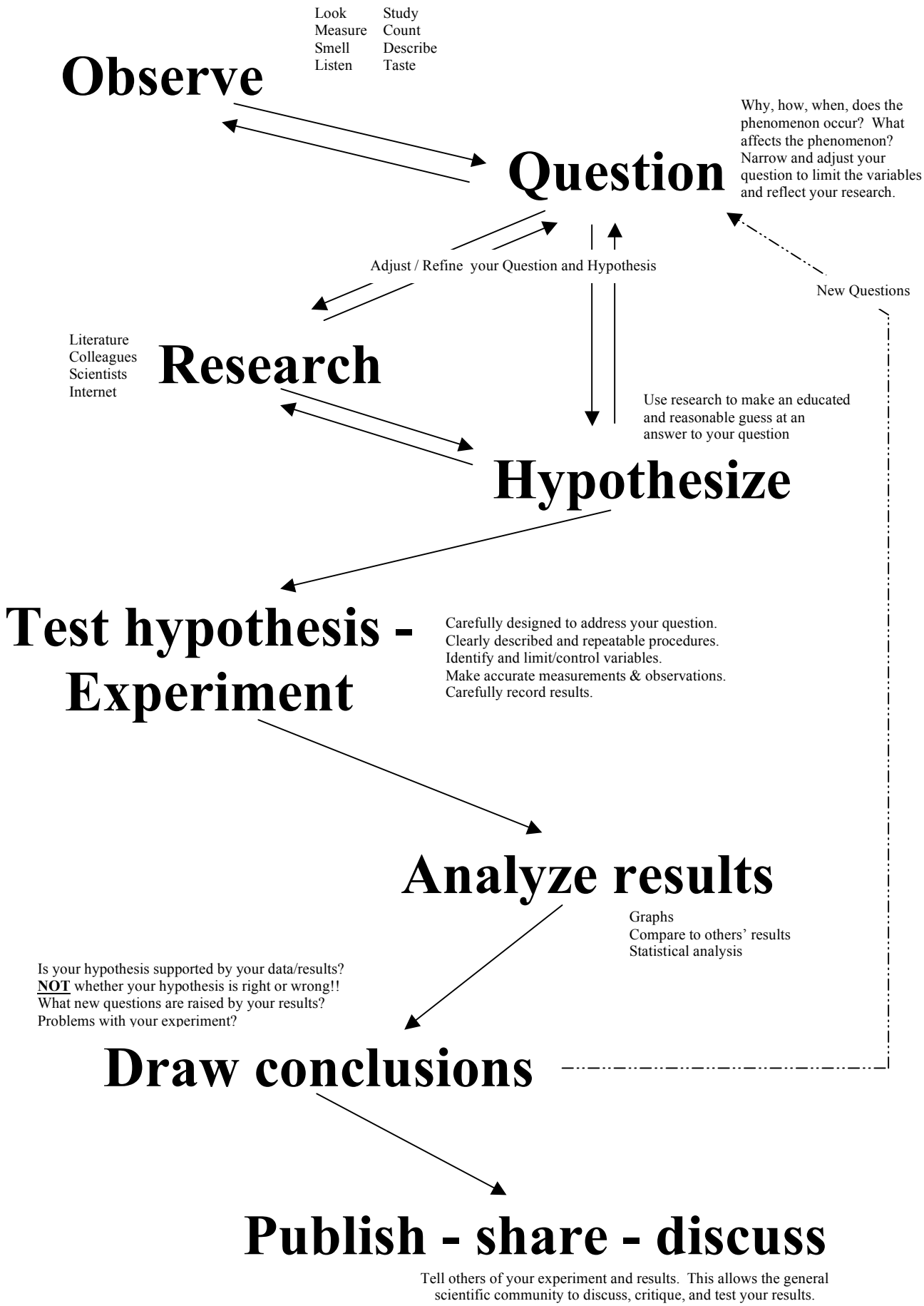
Cunha Intermediate School Science Fair **Project Judging Criteria**		***<u>DO NOT FILL IN THIS SHEET FOR ALL PROJECTS</u>*** *<u>PLEASE FILL IT OUT ONLY FOR THE PROJECTS YOU NOMINATE FOR A PRIZE. (1st – Hon. Mention)</u>*

Judge: _____

Subject Area: (circle one) Life Physical Earth Behavioral

Project Number: _____ Student: _____

Criteria:	**Ranking (points)**
A. <u>Scientific Content/ Scientific Process (40 points)</u>	(Circle the number of points awarded)
1. States a clear **<u>question</u>**. **<u>Hypothesis</u>** based on research, and is appropriate to the question. **<u>Research</u>** (background / information) supports hypothesis.	1 2 3 4 5 6 7 8
2. Identifies **<u>independent & dependent variables</u>**. **<u>Controls other variables</u>**. Uses **<u>control group</u>**.	1 2 3 4 5 6 7 8
3. <u>Experiment</u> well designed to test hypothesis.	1 2 3 4 5 6 7 8
4. Discusses/explains the **<u>results & data.</u>**	1 2 3 4 5 6 7 8
5. Uses results to explain **<u>conclusions.</u>**	1 2 3 4 5 6 7 8
	Sci. process Subtotal (points) _____
B. <u>Depth/Complexity (20 points)</u>	
1. Project demonstrates **<u>sophisticated thought and analysis</u>**.	1 2 3 4 5
2. Project approach is **<u>thorough, reasoned, & methodical</u>**.	1 2 3 4 5
3. Applies the appropriate **<u>mathematical & technical skills</u>**	1 2 3 4 5
4. Explores and applies **<u>underlying scientific principles</u>**.	1 2 3 4 5
	Depth Subtotal (points) _____
C. <u>Creativity (15 points)</u>	
1. Idea for the project is **<u>original or unique.</u>**	1 2 3 4 5
2. Process shows **<u>imaginative or creative technique</u>**.	1 2 3 4 5
3. Work in the project is **<u>student driven</u>**.	1 2 3 4 5
	Creativity Subtotal (points) _____
D. <u>Appearance (25 points)</u>	
1. Project is **<u>striking & unique in appearance or effect</u>**	1 2 3 4 5
2. <u>Primary components are prominently displayed</u> (Question, hypothesis, method, results/data, conclusion)	1 2 3 4 5
3. Student uses **<u>clear, visible, understandable language</u>**	1 2 3 4 5
4. Student uses **<u>neat, clear, and well-labeled graphs, drawings, photographs, or models</u>** to describe the project.	1 2 3 4 5
5. <u>Journal (binder)</u> is complete.	1 2 3 4 5
	Appearance Subtotal (points) _____
	TOTAL SCORE _____


Look
Measure
Smell
Listen
Study
Count
Describe
Taste
Observe
Why, how, when, does the phenomenon occur? What affects the phenomenon? Narrow and adjust your question to limit the variables and reflect your research.
Question
Adjust / Refine your Question and Hypothesis
New Questions
Literature
Colleagues
Scientists
Internet
Research
Use research to make an educated and reasonable guess at an answer to your question
Hypothesize
Test hypothesis - Experiment
Carefully designed to address your question.
Clearly described and repeatable procedures.
Identify and limit/control variables.
Make accurate measurements & observations.
Carefully record results.
Analyze results
Graphs
Compare to others' results
Statistical analysis
Is your hypothesis supported by your data/results?
NOT whether your hypothesis is right or wrong!!
What new questions are raised by your results?
Problems with your experiment?
Draw conclusions
Publish - share - discuss
Tell others of your experiment and results. This allows the general scientific community to discuss, critique, and test your results.