PLANNING YOUR SCIENCE FAIR PROJECT

This information was obtained from CSRA Regional Science & Engineering Fair, Inc. website at http://www.csrascience.org/.

The Scientific Method

- **The scientific method is one way to solve problems.**
- **Scientists use this method because its step by step pattern and giving of facts is easy for others to understand.**

WHAT IS A SCIENCE FAIR PROJECT?

- **A good science fair project is a way of finding out about something you want to know more about.**
- **During your experiments, you write a DIARY or JOURNAL about what is happening.**
- **This diary or journal is called a LOG or LOGBOOK.**
- **After you finish the experiments, you will write a FORMAL REPORT about what you have done.**
- **Finally you will make a DISPLAY of your work.**

ALWAYS WRITE EVERYTHING YOU DO IN YOUR LOGBOOK

THE STEPS OF THE SCIENTIFIC METHOD

1. QUESTION or PROBLEM

- **This introduces your topic in a statement that will tell others what you are trying to understand.**
- **Think of some science question you want to answer.**
- **Or think or something in science you want to find more about.**

(*Write* the question or problem in your logbook.)

2. HYPOTHESIS

- **Read about your topic.**
- **Then make a good guess about what you <u>think will happen</u> when you work with your problem or question.**

(*Write* the hypothesis in your logbook.)

3. EXPERIMENTAL PLAN

- **Write down the steps you will use to find out about your question or problem.**
- **Find ways to test your hypothesis.**
- **Include any measurements you will be making.**

- **Include the materials you will be using.**

(*Write* the plan in your logbook.)

4. OBSERVATION or DATA from your EXPERIMENT

- **Follow your experimental plan.**
- **Everything you do with your experiment must be written in your logbook.**
- **This is usually done day by day.**
- **It may change according to your plan.**
- **All measurements should be in metric units.**

(*Write* in your logbook all the data or information.)

5. RESULTS

- **Put your data from the experiment in an order that helps you understand what has happened.**
- **Make a bar graph, line graph or pie graph to show what has happened.**

(*Write* all your results in your logbook.)

6. CONCLUSIONS

- **Explain how you arrived at your conclusions.**
- **Do the results of your experiments support your hypothesis?**
- **Explain how the results support your hypothesis.**
- **Or explain how the results DO NOT support your hypothesis.**

- **YOUR EXPERIMENT IS NOT A FAILURE JUST BECAUSE THE RESULTS DO NOT AGREE WITH YOUR HYPOTHESIS!**

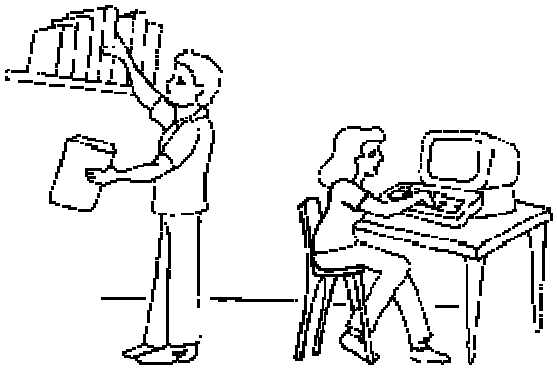
(*Write* your conclusions in your logbook.)

Continue to Page 2

DOING YOUR SCIENCE FAIR PROJECT

Anytime you see the word write, you can either print or use cursive writing.

PART A: YOUR TOPIC



- **CHOOSE YOUR TOPIC**
  - **Get a logbook.**
  - **Start your logbook by writing your question in it.**
  - **Make a list of things that interest you.**
  - **Think of five or six things you like to do, read about or watch on TV.**
  - **Choose a topic that will work.**

    Ask these questions:
    1. **Can I find enough information on this topic?**
    2. **Does the experiment need anything special?**
    3. **Do I have enough time to do the project?**
  - **Make sure you can experiment with the thing you are interested in..**
  - **Don't just make or build something.**
  - **Write the topic in the form of a question or problem statement.**
  - **What do you hope to learn by doing this project?**

Things that interest me	Questions I can ask about them
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
5. _____	5. _____

(*Write* in your logbook about everything you are doing.)

PART B: GETTING READY FOR YOUR EXPERIMENTS

1. **GATHER INFORMATION**
   - **Visit the Media Center at your school.**
   - **Visit the public library or even a library at a college.**
   - **Don't forget to use magazines, books and other library materials besides just encyclopedia.**
   - **Ask the media specialist to help you select materials.**
   - **Write what you find in your logbook.**
   - **Make sure you write down the name of the book, who wrote it, who made the book, and the year it was printed.**
   - **Talk with experts.**
   - **Ask your parents, guardian or teacher to help you set up an interview with someone who knows about your topic.**
   - **Write for information from companies or experts.**

1. **MAKE A HYPOTHESIS**
   - **The hypothesis is my best guess based on what I know and read.**
   - **It will be what will happen because of changes I make.**
   - **The hypothesis should show that one thing will change another thing.**
   - **This is called cause and effect.**

My hypothesis:

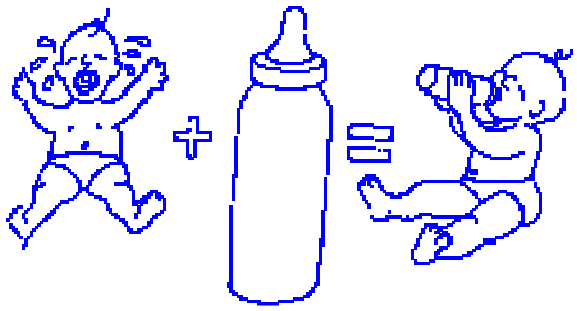
I predict that _____

because _____

(*Write* you hypothesis in your logbook.)

2. **IDENTIFY YOUR VARIABLES**
   - **Variables are all the things that can change in your experiment.**
   - **Only change one thing at a time!**
   - **Find out what causes something to happen.**
   - **You don't need to find a cause if you are just looking at something or counting something.**
   - **What happens when you change the cause and the effect.**
     - **The cause is the independent or manipulated variable.**
     - **The effect is the dependent or responding variable.**
   - **The only thing you change is the independent or manipulated variable.**
   - **What happens is the dependent or responding variable.**

Example:



Baby Crying + Bottle of Milk = Quiet, happy baby

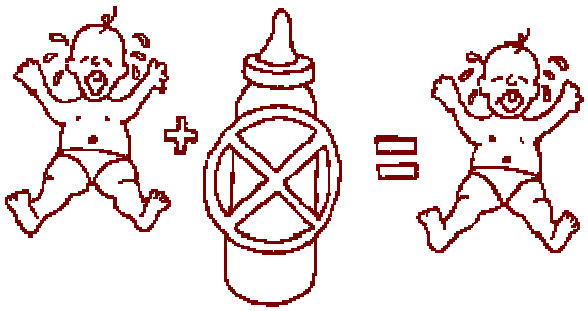
3. **QUESTION + INDEPENDENT VARIABLE = DEPENDENT VARIABLE**
4. **or, in other words**
5. **PROBLEM + MANIPULATED VARIABLE = RESPONDING VARIABLE**
6. **What things might affect my experiments? (These are my VARIABLES)**

1. _____
2. _____
3. _____
4. _____
5. _____

7. **PLAN A CONTROL EXPERIMENT**
8. **What is a CONTROL?**

- **How will you know if what you change is really causing the result?**
- **When you do the CONTROL experiment, MAKE NO CHANGES.**

This is the CONTROL experiment:



Baby Crying + NO Bottle of Milk = Baby still crying

QUESTION OR PROBLEM + NO CHANGE IN ANYTHING = CONTROL

- **If you have a project where you are just looking at something, you don't need a control.**
- **If you have a project where you are just counting something, you don't need a control.**

1. **PLANNING AHEAD**

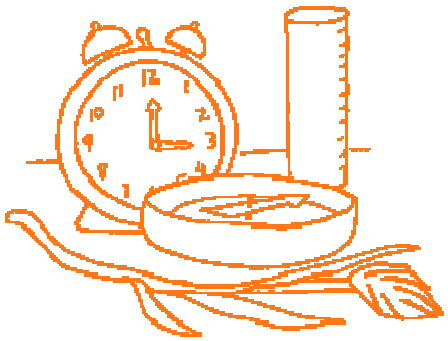
- **List your materials and equipment.**
- **Include how much, how many and what size.**

(*Write* your list of materials in your logbook.)

- **List the steps in your experiment.**
  - **Number the steps.**
  - **Keep the steps in the correct order.**

(*Write* your steps in your logbook.)

PART C: DO THE EXPERIMENT



- **Do the experiment at least THREE times.**
- **Follow the steps you made.**
- **Write down everything you do each time.**
- **Write down everything you see each time.**
- **Write down everything that happens, no matter how *silly*.**
- **If you measure things, use metric system units such as centimeters, grams, or liters.**
- **Collect your data every day.**
- **Write down the time and date in your logbook.**
- **You can include drawings and photos of what is happening.**
- **Don't worry about a logbook that is not neat!**
- **Don't *ever* erase mistakes in your logbook!**
- **You may put a single line through your mistakes.**

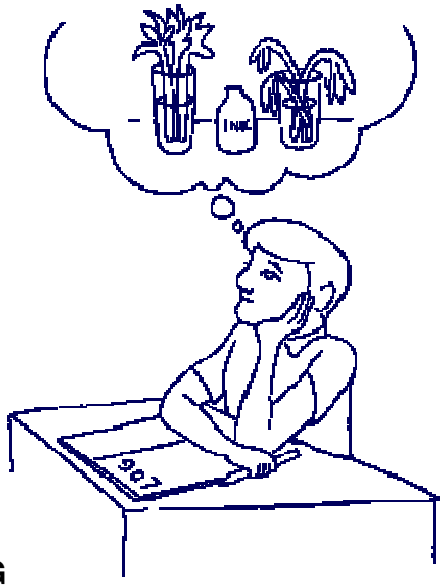
(*Write* everything you do in your logbook.)

PART D: PUT THE RESULTS IN ORDER

- **Put what you found from your experiments in a chart.**
- **If you can, make graphs from what happened in your experiments.**
- **DO YOU SEE A PATTERN?**

(*Write* any pattern down in your logbook.)

- **It is OK if what happens is not the same as what you expected.**



PART E: FINISHING

Figuring it all out

- **Think about everything that happened.**
- **Did the things that happened go along with what you expected?**
- **Were there any surprised in what happened?**
- **It is important that you try to find the reasons.**
- **Scientists call this the CONCLUSION.**

CONCLUSION: My results agree with my hypothesis because ...

or

CONCLUSION: My results do not agree with my hypothesis because ...

(*Write* your conclusion in your logbook.)

Continue to Page 3

Last Revision - 8/23/98

PART F: WRITE A FORMAL REPORT

- **The formal report is how people can read about what you have done.**
- **The information for your formal report comes from your logbook.**
- **Use these parts for your report:**

Title Page:
Make a good title for your project.

Abstract:
Write what you wanted to do, what you did, and what you found out. Do this using only three or four sentences.

Purpose:
Write why you did the project. Use no more than three sentences.

Hypothesis:
Write the hypothesis you used.

Library information:
Write what you found out about your topic when you went to the Media Center, Library, or talked with people.

Materials and Experiment:
List the materials you used for your project. Write how you did your experiment.

Results:
Write two or three sentences about everything that happened when you did your experiment.

Conclusions:
Write two sentences about everything you found out about your question or problem.

List of books:
List at least three books or magazines you used to do your project.

Who Helped Me:
Write the names of all the people who helped you with your project and tell what they did for you.

THE FORMAL REPORT FOR YOUNGER STUDENTS IN GRADES K-3

- **Students in grades Kindergarten through third grade may want to do a shorter report.**
- **Check with your teacher.**

The parts for the shorter report are these:

Title Page:

- **Make a good title for your project: _____**

Purpose:

- **Write why you did the project.**
- **Use one sentence.**

I did my project because

_____

Hypothesis:

- **Write the hypothesis you used.**

My hypothesis is _____

Library information:

- Write some things you found out in the Media Center or Library.
- Use one or two sentences.

  In the library I found out

_____

Materials and Experiment:

- Use one or two sentences.
- Write some things you used for your experiment.

  I used _____

- Write how you experimented.

  I _____

Results:

- Use one or two sentences.
- Write what happened when you experimented.

  When I experimented this happened:

_____

- Write what you found out

  I found out this:

_____

List of books:

- Write the title and author of at least one book you used for your project.

  _____

Who Helped Me:

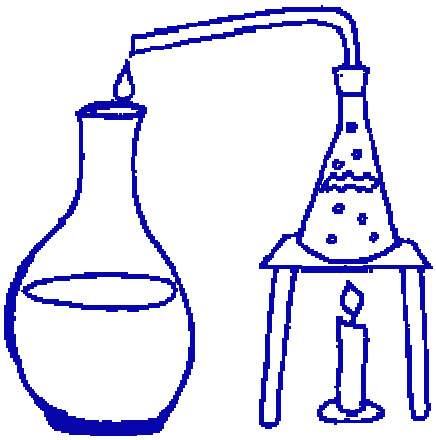
- List the names of all the people who helped you do your project.

  These people helped me:

_____

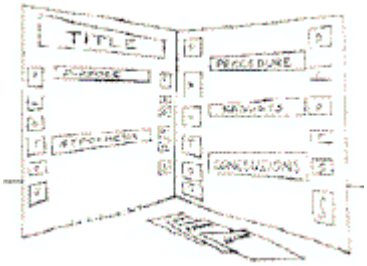
You may want to draw some pictures about your project.

Don't use these -- draw your own.

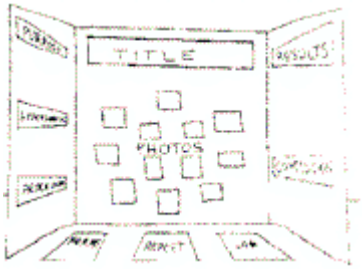


PART G: MAKING YOUR BACKBOARD

- **You can buy cardboard backboards or make your own from cardboard boxes. Some people make backboard from wood.**
- **Follow the pictures below for a couple of ways to make your backboard. The materials can go in a different order or place if you want. Don't use the <u>word</u> "TITLE", just <u>write</u> the title!**



This is one way to do your backboard.
Click on the picture to make it bigger.



This is another way to do your backboard.
Click on the picture to make it bigger.

The maximum size limits are:

- **76 cm (30 in) front to back**
- **122 cm (48 in) side to side**
- **274 cm (108 in) above the floor. (The tables are about 76 cm [30 inches] high).**

HOW MY TEACHER MAY HELP!

- **Depending on the student's ability, it is recommended that the teacher read and explain the handbook and guide the student in the project.**
- **Demonstrate the scientific method numerous times.**
- **Introduce and explain the vocabulary.**
- **Suggest reference materials and sources from libraries, magazines, trade journals, local hospital or medical places, local businesses, the agriculture department, etc.**
- **Suggest references for a topic early in the year, by asking me questions about things I am interested in.**
- **Act as the Adult Sponsor, if assigning and/or providing guidance for the project.**
- **Check my progress along the way by ...**
    - **reviewing the science fair rules before starting the project.**
    - **making sure necessary forms are completed.**
    - **applying proper safety measures.**
    - **demonstrating correct use of metric system.**
- **Provide access to computers and programs to assist with the project.**
- **Allow 12 weeks for the development and completion of the project.**
- **Check for spelling errors on the display.**

HOW MY PARENTS MAY HELP!

Parents may give guidance and support by ...

- showing **interest** and giving **encouragement**.
- providing technical assistance when requested.
- checking grammar and mechanics.
- providing space at home to work - assuming responsibility for safety.
- suggesting resources.
- acquiring materials.
- transporting child to the library
- acting as a sounding board for the student's ideas.

Parents may also help by realizing that ...

- the student must **do** the project him/herself.
- the project should be age appropriate.

- the project **need not** be expensive.
- the primary purpose of the project is that the students learns, understands and enjoys the experience.
- the secondary purpose is winning.

Last Revision - 8/23/98