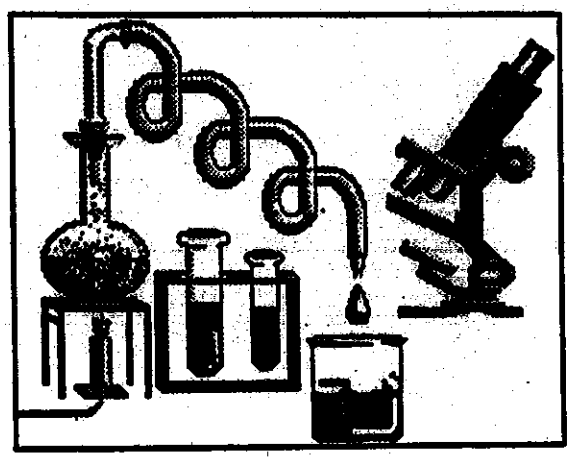
THE OBSERVATION



WHAT THE JUDGES ARE LOOKING FOR

OBSERVATION

LOG BOOK AND REPORT

Dates, times and tasks listed orderly and sequentially.
List of resources used and/or acknowledgments.

Describe the object and/or event that is to be observed. Write any information you may have gathered from other sources. List any resources used and/or acknowledgments.

THE QUESTION

What question springs from the process or object you are observing? The independent and dependent variables should be evident here.

PROCEDURE

How and when will you observe the object or process. What are the things that will be held constant or the same. Again identify the independent and dependent variables.

OBSERVATIONS AND REFLECTIONS

A suitable number of entries must be included in the log book within a minimum time span of 3 months. Include quantification of the observations if possible, so accurately measure and/or detail data or descriptions. Use metric when possible.

FINDINGS AND INTERPRETATIONS

Include charts, graphs, and tables using metric measurement when applicable. Analyze the observations and make interpretations from them.

CONCLUSIONS AND FURTHER STUDY

Compare the findings and observations to the expectations that were implied in the question. Include further questions and/or extended information.

The Log Book

The log is the most important part of experimenting in science. It also is the most important part of your science fair project. A log is like a diary. You write, or type, the date of each entry and what you did, observed, or read; whom you have talked to; the drawings you made; any facts or data; and/or your thoughts about your project.

Adults or friends can answer your questions or ask questions, but you are the **decision maker** and the **doer**. Be sure to consider safety for yourself and others while doing your study or making an exhibit. Start your LOG BOOK the day you begin to think about choosing your topic. All information is kept in the log book as it replaces the report. A bound composition book is preferred for your LOG BOOK.

Specific things that might be included in the log book:

A list of books that were read and notes taken from reading those books.

The statement of the problem being explored. Any questions you may have about any aspect of the project.

Your hypothesis, procedure, materials used and reflections.

Include where you found items for collection or got the materials for your model.

Acknowledgment of those who helped you. Remember not to list actual names.

The purpose is . . .

Getting to the Point

Narrow Your Topic

1. List the relationships that are found within the topic area.

   For example, in the area of plants, there are the relationships between plants and water, plants and sunlight, plants and fertilizer, and plants and temperature. All of these relationships are testable because one affects the other.

2. After you have established a relationship for the topic, ask a question about the relationship. The question should point out a cause and effect, which will be the purpose of your experiment.

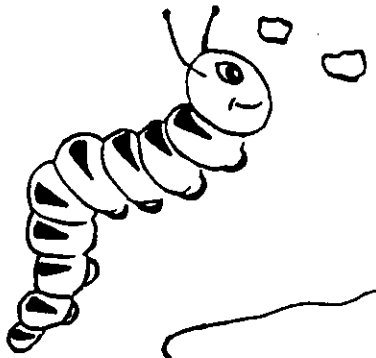
   For example, if the relationship between plants and fertilizers is chosen, this question could be asked. Will fertilizer "x" or "y" cause petunias to grow taller?

Here is a sample chart of topics, topic relationships, and questions.

Topics	Topic Relationships	Questions
Plants	plants and fertilizers	Will fertilizer "x" or "y" cause petunias to grow taller?
Weather temperature	weather temperature and insulation	Can insulation cause an ice cube to melt at a slower rate?
Friction	friction and rolling	Can surface texture cause a change in my skateboard speed?

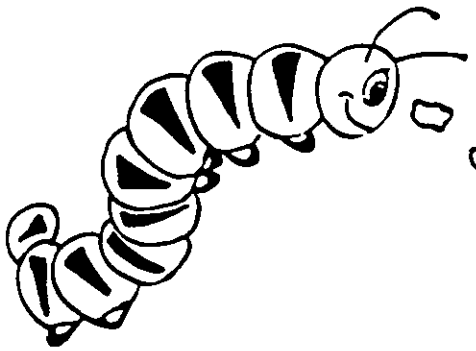
Write Your Hypothesis

You've already done the hard part - deciding on a topic, narrowing it, and researching it. Now, decide how you think your question should be answered. Change the question to an "if/then" statement. This statement is called the hypothesis.



I determined from my research that fertilizer "x" will cause greater growth in petunias than fertilizer "y." So, my hypothesis is, I F fertilizer "x" is used, then petunias will grow taller.

I determined from my research that proper insulation will cause an ice cube to melt slower than it would without being insulated. So, my hypothesis is, I F proper insulation is used, then ice will melt slower.



I determined from my research that rough surface textures cause a decrease in my skateboard speed. So, my hypothesis is, I F the surface texture is rough, then my skateboard will roll slower.

Review your question and determine your answer based on your research. Write your hypothesis.

If_____

then_____

Identify the Variables

Before you can begin your research, you need to identify the variables in your question. Both variables, the independent and the dependent, need to be researched.

Remember, the cause is the independent variable and the effect is the dependent variable.

Here are some samples:

> Will fertilizer "x" or "y" cause petunias to grow taller?
> independent variable: fertilizers "x" and "y"
> dependent variable: growth of petunias

> Can insulation cause an ice cube to melt at a slower rate?
> independent variable: insulation
> dependent variable: rate at which an ice cube melts

> Can surface texture cause a change in skateboard speed?
> independent variable: surface texture
> dependent variable: skateboard speed

Restate your question and identify the variables.

_____

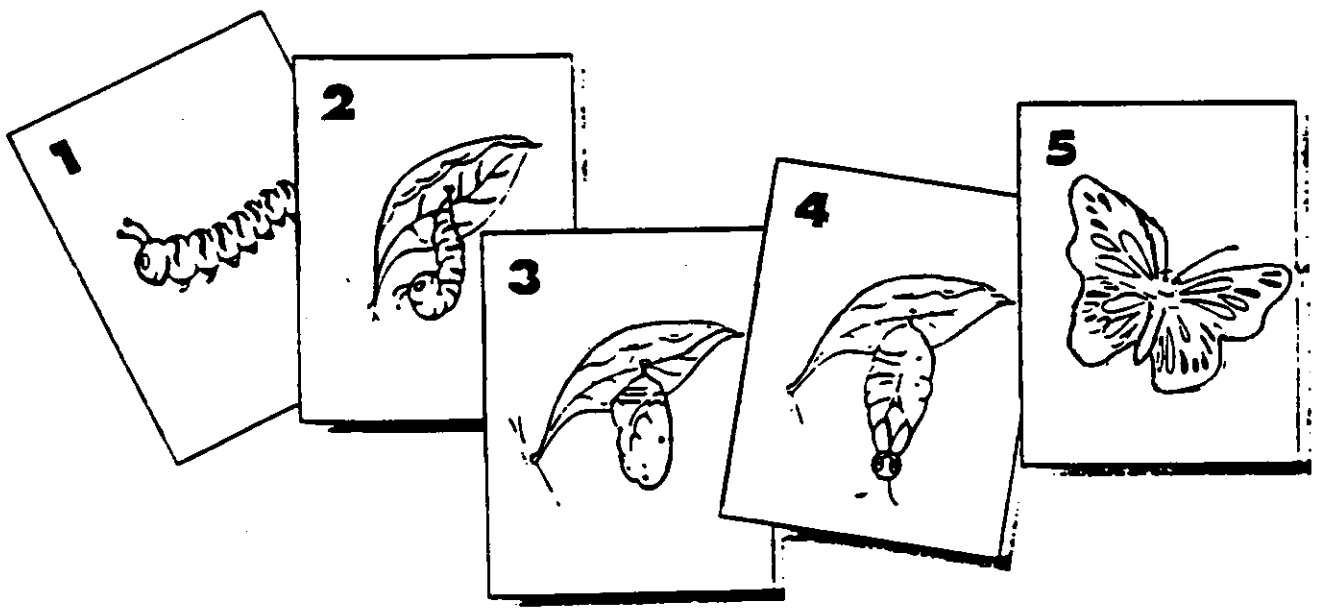
_____

independent variable:_____

dependent variable:_____

Record Results

It is important for you to keep accurate and organized data while conducting your observation. Using logs and drawings, write down all observations and results during the entire time you are conducting your observations (3 days - 2 weeks). Use the 2 days set aside on your time line for "recording results" to organize your information into tables, charts, and graphs.



Chart

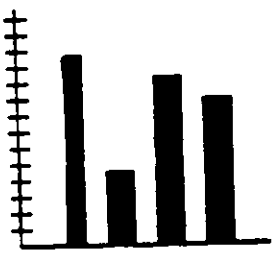
Make a drawing or chart to describe your observed results.

When I sprinkled the iron fillings on the magnet, I noticed the fillings made a pattern like this.

S

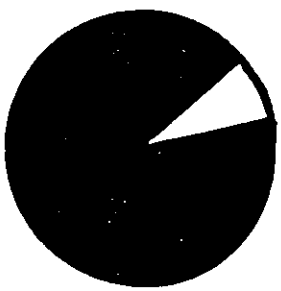
Graphs

A graph is another way to organize your data if the results are given in numbers. There are many types of graphs. Choose the one that presents your data most clearly.



bar graph

line graph



pie graph

3-5 Rubric

Academy of Science

The Academy, Monsanto Fund & Pfizer-St. Louis, working together to bring authentic science to the students of St. Louis City and St. Louis County.

MONSANTO FUND

Pfizer *Working for a healthier world™*

SCORE
(Total of 5 Sections Below)

ROW	POS	Sequence Nr.

Scientific Process	None 0	Below Average 2	Meets Expectations 4	Exceptional 5	Score
Problem	None	Problem lacks some clarity or is not testable	Asks a specific, measurable, cause & effect question	Exceeds expectations	
Hypothesis	None	Hypothesis does not state a clear prediction or variable	Predicts a reasonable outcome as a result of a specific change	Exceeds expectations references variables)	
Procedure	None	Procedure is vague and would be difficult to repeat	Procedure is clear and project can be repeated after reading them	Exceeds expectations (very precise and well thought out)	
Trials/Samples	None	1-2 trials or samples are shown	At least 3 trials or samples are shown	Exceeds expectations (at least 5 trials or samples)	
Data/Observations	None	Data table present but not labeled or unclear	Data/observations are shown in titled/labeled table	Exceeds expectations (must discuss data)	
Graphs	None	Graphs present but lack labels/titles/clarity	Appropriate labeled/titled graph help interpret data	Exceeds expectations	
Conclusion	None	Conclusion present but no hypothesis reference	Conclusion is clear and references hypothesis	Exceeds expectations (contains research)	
Constant Conditions *(all conditions not being tested should be held constant)*	None	Not all conditions are held constant	All other conditions held constant (automatic if not experiment)	Exceeds expectations (discusses constant conditions)	
Safety	None	Some minor additional safety precautions could have been taken	Project is completed in a safe manner with no possible safety violations	Great safety procedures are discussed	

Scientific Process Total from above chart = _____/45

LOGBOOK

Logbook Contains ...	20 Points
Diary of entire project	0 3 5
Drawings/Diagrams	0 3 5
Data/Observations	0 3 5
Contains bibliography of at least 3 sources	0 3 5

BACKGROUND

Project should ...	15 Points
Explain why this project was important to student	0 3 5
Explain why is known and interesting about the topic	0 3 5
Show evidence student understands the significance of project	0 3 5

WORKMANSHIP

Project shows ...	10 Points
Organized project board	0 3 5
Conveys enthusiasm/interest	0 3 5

CREATIVITY/ORIGINALITY

Project should ...	10 Points
Show problem relevant ot student	0 3 5
Offers interesting visuals	0 3 5

EXHIBITOR INFORMATION

DISPLAY CONSIDERATIONS

Label the sections and arrange them logically. Helpful sections include: background information, problem, hypothesis, procedure, results and conclusions.

Use photographs to show the procedure. Use large, bold printing of typing. Color code the study's variables. Reference your log book or report to critical information or data.

Acknowledge those who advised or assisted you. Do this in general terms such as; "teacher", "parent", etc.

Computer generated materials are fine. If it was not keyboarded by the exhibitor, state this on the first page of the log.

DISPLAY RULES

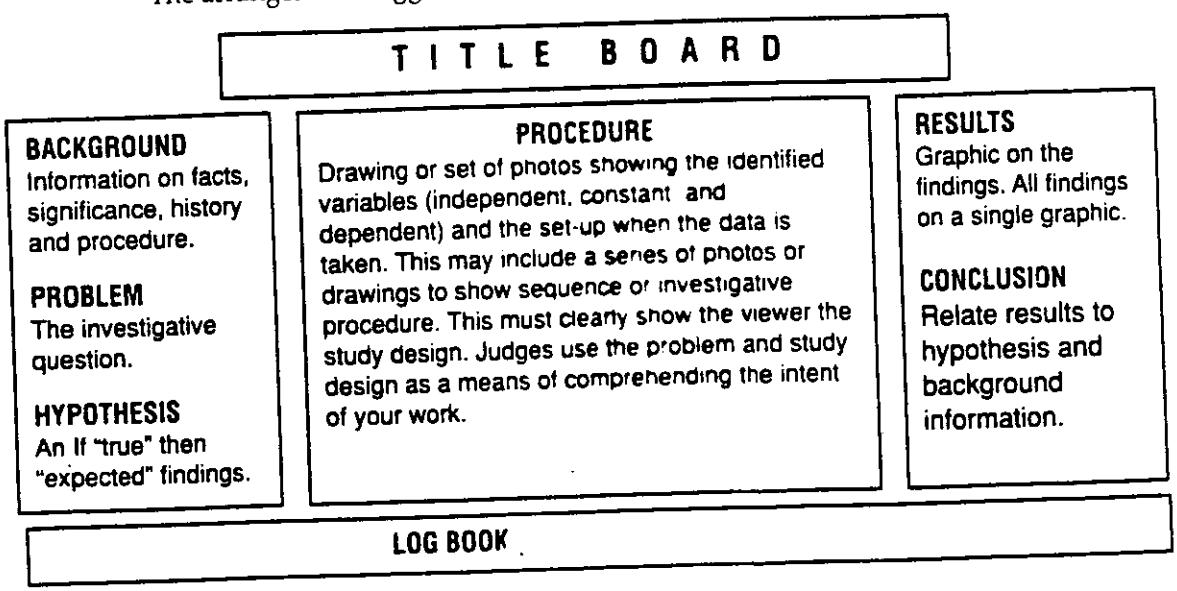
SAFETY: Examples are breakables, liquids, powders, animals, body fluids, plants, microbes, inflammables, soils, batteries, or electrical hazards **cannot** be displayed. Use photos or drawings to represent the real thing.

VALUABLES: Items which are valuable or valued by the exhibitor **are not** to be displayed. If the Fair removes an item, they will attempt to return it to the owner.

EQUITY: The name or an identifiable photo of the exhibitor or the exhibitor's school is not to be displayed or recorded on any written material. Identity is by the number which will be written, at school, on the exhibit.

EXHIBIT SUGGESTED LAYOUT

The assessment criteria indicate which sections are most valued by the points given for each of them. The arrangement suggested below takes those values into consideration.



Bulletin - Project Safety & Equity

— print page —

The following display rules ensure safety for the viewer, prevent the loss of exhibitor's valuable or valued items, assure equity of display area and compliance with federal regulations.

The Display must conform to the following list of items that are **NOT ALLOWED**:

A. Living organisms, including plants
B. Taxidermy specimens or parts
C. Preserved vertebrate or invertebrate animals
D. Human or animal food
E. Human/animal parts or body fluids (for example, blood, urine)
F. Laboratory/household chemicals including water (Exceptions: water integral to an enclosed apparatus or water supplied by the Display and Safety Committee)
G. Poisons, drugs, controlled substances, hazardous substances or devices (for example, firearms, weapons, ammunition, reloading devices)
H. Dry ice or other sublimating solids
I. Sharp items (for example, syringes, needles, pipettes, knives)
J. Flames or highly flammable materials
K. Batteries with open-top cells
L. Awards, medals, business cards, flags, endorsements and/or acknowledgements (graphic or written) unless the item(s) are an integral part of the project
M. Photographs or other visual presentations depicting vertebrate animals in surgical techniques, dissections, necropsies, or other lab procedures
N. Active Internet or e-mail connections as part of displaying or operating the project
O. Glass or glass objects unless deemed by the Display and Safety Committee to be an integral and necessary part of the project (Exception: glass that is an integral part of a commercial product such as a computer screen)
P. Any apparatus deemed unsafe by the Scientific Review Committee, the Display and Safety Committee (for example, large vacuum tubes or dangerous ray-generating devices, empty tanks that previously contained combustible liquids or gases, pressurized tanks, etc.)

DISPLAY SAFETY - Your display MAY NOT have any of the following items attached:

- Food
- Breakables
- Powders
- Plants
- Microbes
- Soils
- Electrical Hazards
- Sharp Items
- Liquids
- Animals
- Body Fluids
- Inflammables
- Batteries
- or other materials that may be considered hazardous

Procedure Check

Before going any further, check over your procedure. Identify the following four variables to be sure your "recipe" will be a fair test of your hypothesis.

1. What is the independent variable (IV)?

2. What is the dependent variable (DV)?

3. What are the constant variables (CV)?

4. What is the control?

Did you use metric measurements?