Monarch Science Fair Projects

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What is the PURPOSE?

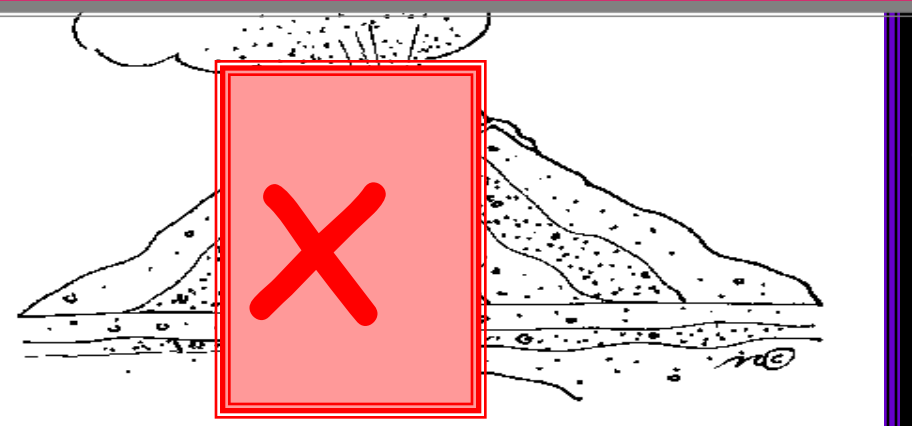
- Why is this a project worth doing?
- Why are the results important?
- Who would want to know the results?

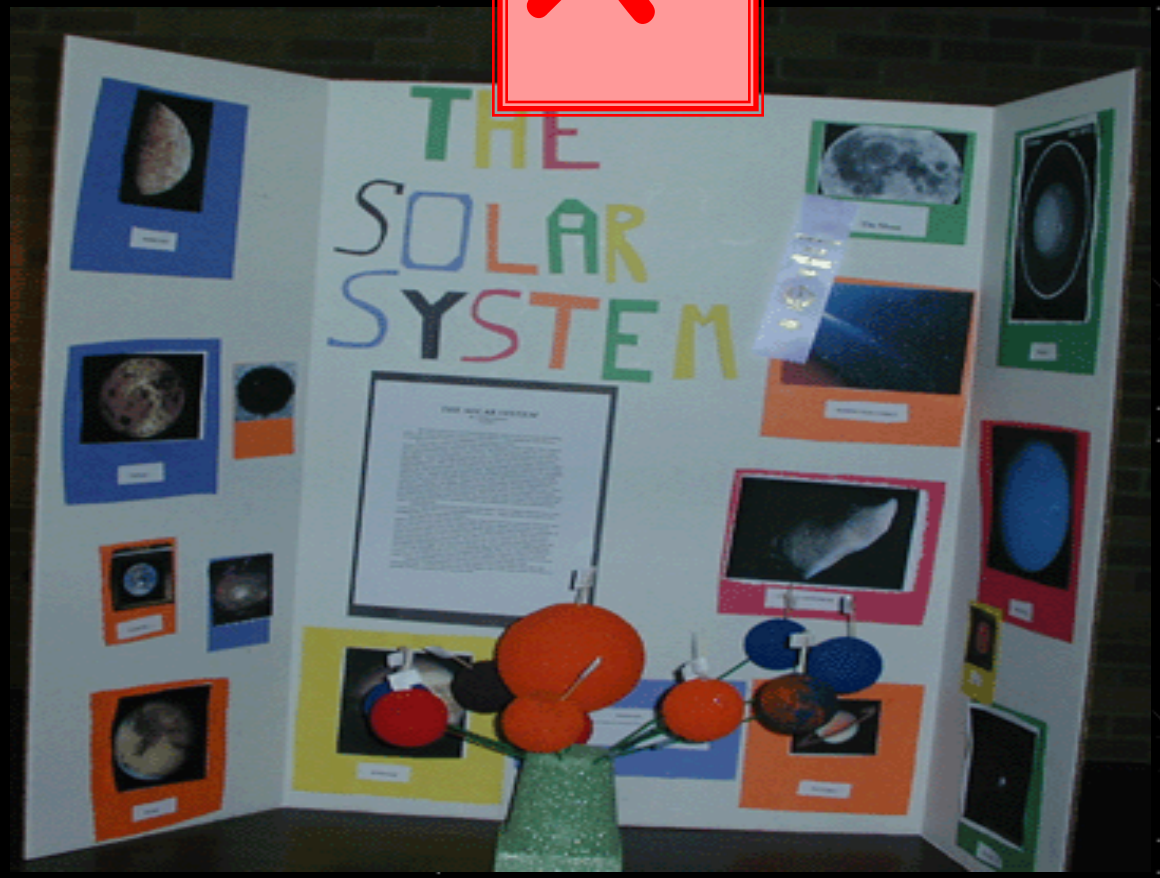
Participation in the Science Fair is optional. Science Projects are due on Thursday, March 5, 2014.

Roper Mountain Science Center	
5th Grade	1 individual project 1 team project (2-6 students)
4th Grade	1 team project (2-6 students)
3rd Grade	1 class project

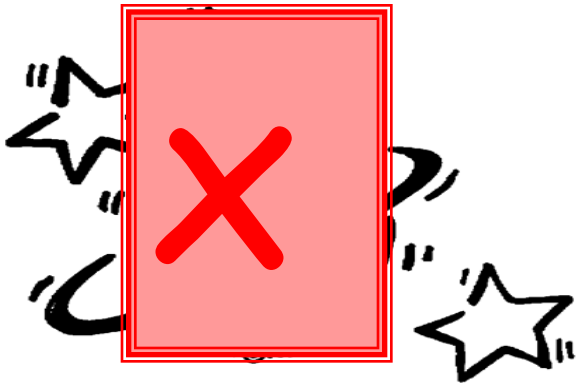
DO NOT MAKE A VOLCANO.

DO NOT MAKE A VOLCANO.
THIS IS A DEMONSTRATION.



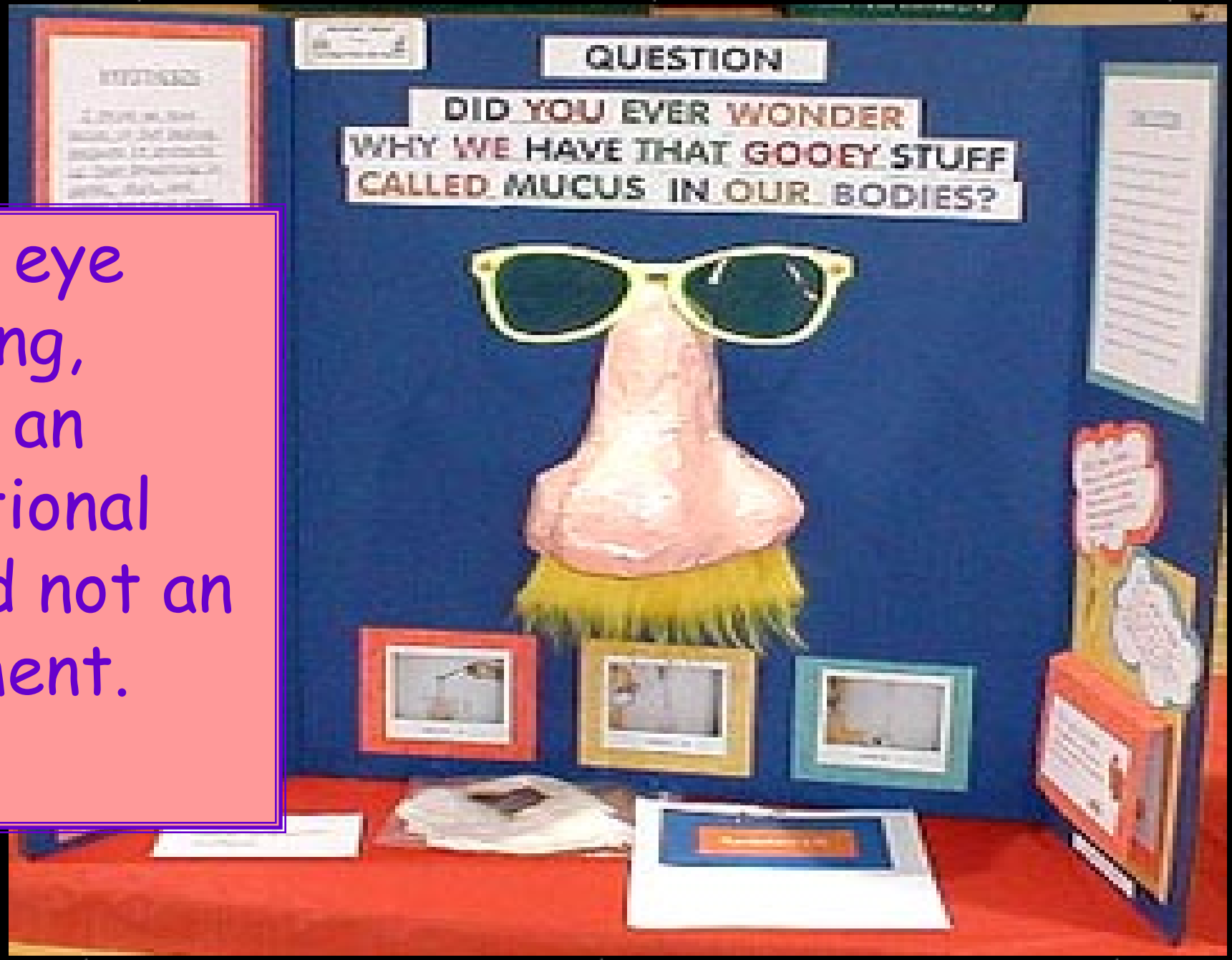


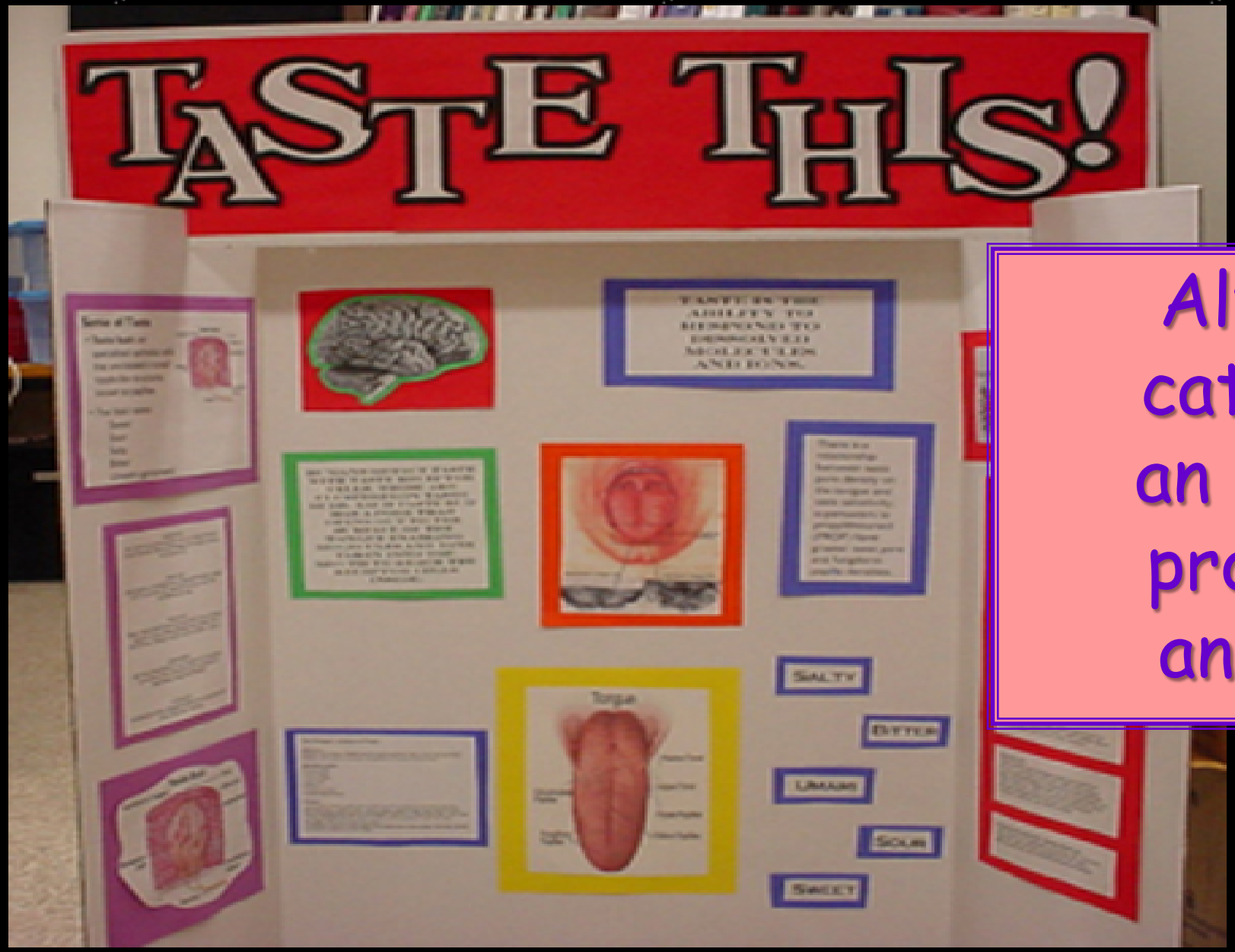
DO NOT USE THE SOLAR SYSTEM.



DO NOT MAKE A MODEL OF THE SOLAR SYSTEM.

Although eye catching, this is an informational project and not an experiment.





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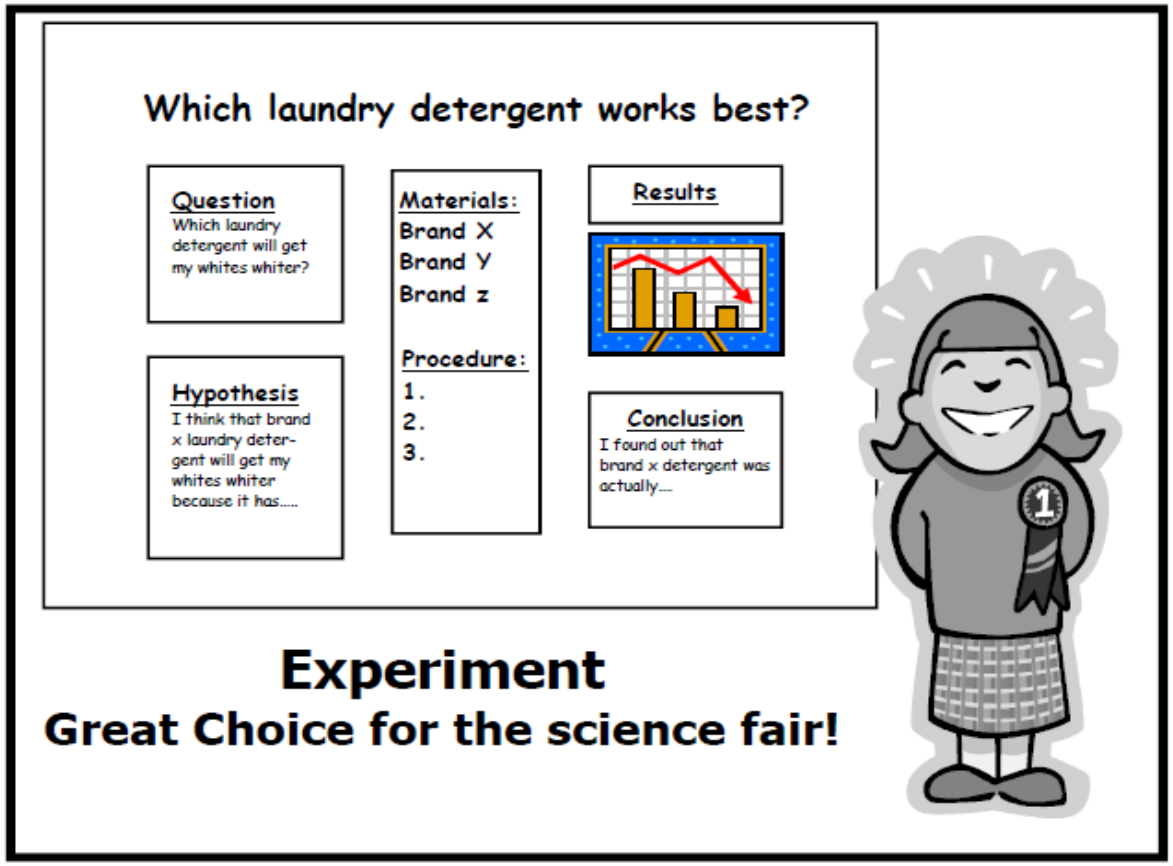
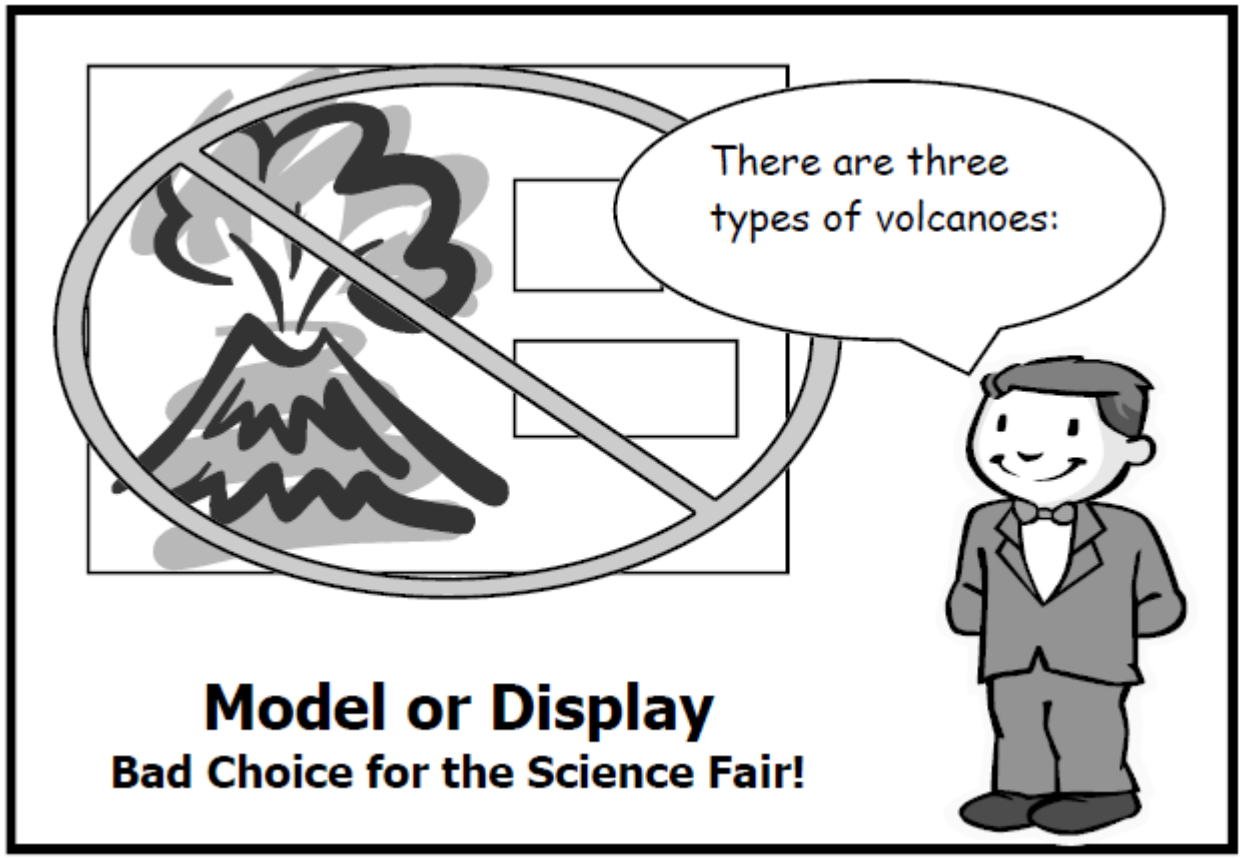
Science Fair Projects



YES



NO

Adapted from Lora Holt. *Elementary Science Fair Planning Guide. 2006*

Scientific Method/ Process

Ask a "How does" question

Research

Make a hypothesis

Experiment

Record data from several trials

Organize data

Form a conclusion

Write about what you learned

Select a Topic

MAKE SURE IT IS A TOPIC YOU CAN INVESTIGATE.

Select a topic that genuinely interests you.

Where can I find ideas for Science Fair Projects?

Watch commercials on television. Test their claims.

Does that deodorant really stop wetness better than another one ?

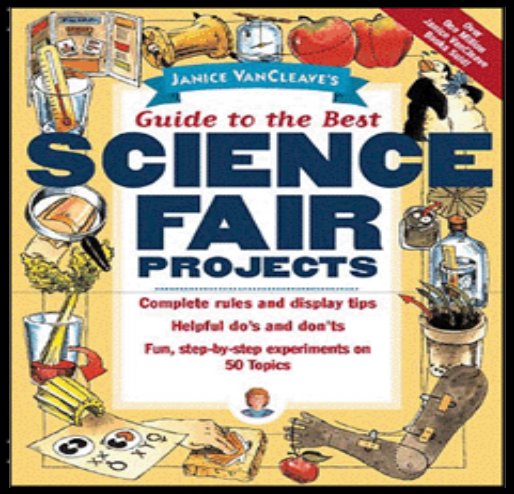
PRODUCTS THAT CLAIM TO BE THE BEST CAN BE COMPARED WITH OTHER PRODUCTS THAT CLAIM TO BE THE BEST.

Think about current events. Look in the newspaper.

Use your experiences.

Remember a time you thought "I wonder what would happen if..." then turn that into a project.

Make sure you do an experiment. Sometimes demonstrations and models are included in Science Fair books.



Browse and look at book titles, then look inside the books that look interesting to you.

Picking a Topic

Good	Poor
What is the effect of the mass of the bob on the period of a pendulum?	How do volcanoes erupt?
How does the pH of the medium affect the reproduction rate of yeast?	Microscopes

Step 1: Asking questions

The EFFECT Question

- *What is the effect of _____ on _____?*
- sunlight — on the growth of plants
- temperature — on the size of a balloon
- oil — a ramp

The HOW DOES AFFECT Question

- *How does the _____ affect _____?*
- color of light — growth of plants
- humidity — the growth of fungi
- color of a material — absorption of heat

The WHICH/WHAT and VERB Question

- *Which/What _____ (verb) _____?*
- Paper towel — is — most absorbent
- Detergent — makes — the most bubbles
- Paper towel — is — the strongest

Adapted from Lora Holt. *Elementary Science Fair Planning Guide. 2006*

Question

What do I want to find out ?

The question or problem has to be something that I am able to measure.

Step 2: Doing Research

So How do you become an expert?

YOU READ!!!!

READ about your topic. READ encyclopedias. READ magazine articles and books from the library. READ articles from the internet. Take note of any new science words you learn and use them. It makes you sound more like a real scientist. Keep Track of all the books and articles you read. You'll need that list for later.

YOU DISCUSS!!

Talk about it with your parents. Talk about it with your teachers. Talk about it with experts like Veterinarians, Doctors, Weathermen or others who work with the things you are studying. Sometimes websites will give you e-mail addresses to experts who can answer questions…. *But again, do not write to anyone on the internet without letting an adult supervise it.* (*hint: take pictures of yourself interviewing people)

Adapted from Lora Holt. *Elementary Science Fair Planning Guide. 2006*

Gather Background Information

Gather information about your topic from books, magazines, the Internet, people and companies. Keep notes about where you found your information.

Step 3: The Hypothesis

Write a Hypothesis 

Now it is the time to PREDICT what you think will happen if you test your problem. This type of "SMART GUESS" or PREDICTION is what real scientists call A HYPOTHESIS. Using this fancy word will amaze your friends and will have you thinking like a full fledged scientist.

So how do you begin? Well, just answer this very simple question:

What do you think will happen, (even before you start your experiment)?

Example Problem: *Which Paper Towel is more absorbent?*

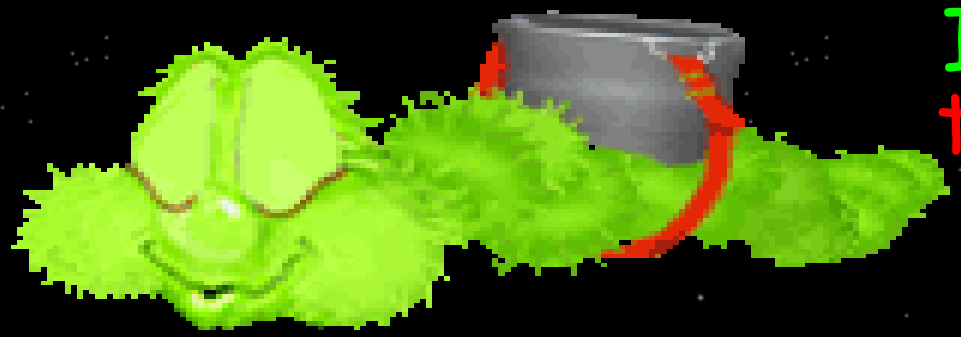
Example Hypothesis: *I think Brand X will be more absorbent because it's a more popular brand, it is thicker and the people I interviewed said that the more expensive brands would work better*

(This hypothesis not only predicts what will happen in the experiment, but also shows that the "Scientist" used research to back up his prediction.)

Adapted from Lora Holt. *Elementary Science Fair Planning Guide. 2006*

Hypothesis

What do I think will happen?



If……., then I hypothesize) that…

Step 4: The Experiment

This is the FUN art of the project. But, it requires some work and planning!

1. Gather your materials
2. Write your procedure
3. Identify the variables
4. Test, test, test
5. Collect the data

Science Fair Projects MUST be EXPERIMENTS

An experiment is a test to find out something. Experiments are repeated 3 times. I can label this as Trial 1, Trial 2, and Trial 3.

Step 4: The Experiment— Variables, Constants and the Control

Variable	Constants/ controlled variables	Control
• The one “thing” you change on purpose. This is called the independent variable (manipulated) variable	• Factors that remain the same throughout the experiment	• The trial done without changing the original factors

Variables

I need to identify the variables in my experiment.

Independent Variable – the one factor I change

Dependent Variable – the one factor that I measure

Controlled variables – all the factors that I keep the same

Variables

Variables are the things that have an effect on my experiment.

My **independent variable** is the one factor I change (or use in different amounts). All other factors are given the exact same conditions and are called my **controlled variables**. I need to explain things I did to make it a controlled experiment.

The **independent variable** is the one condition that you change in the experiment. It is the factor that you are comparing or testing. What may affect the results of my experiment? Choose one variable to change and keep the others the same or controlled.

The **controlled variables** are the conditions that need to remain the same during my experiment so that they do not affect the results.

The **dependent variable** is what I use to measure the independent variable.

My dependent variable is what I use to measure the independent variable.

For example, if my question is, "Which brand of dog food do my dogs prefer?'

The brands of food used is the independent variable and the dependent variable is how much food of each brand is eaten during the 3 test trials.

Step 4: The Experiment—Materials

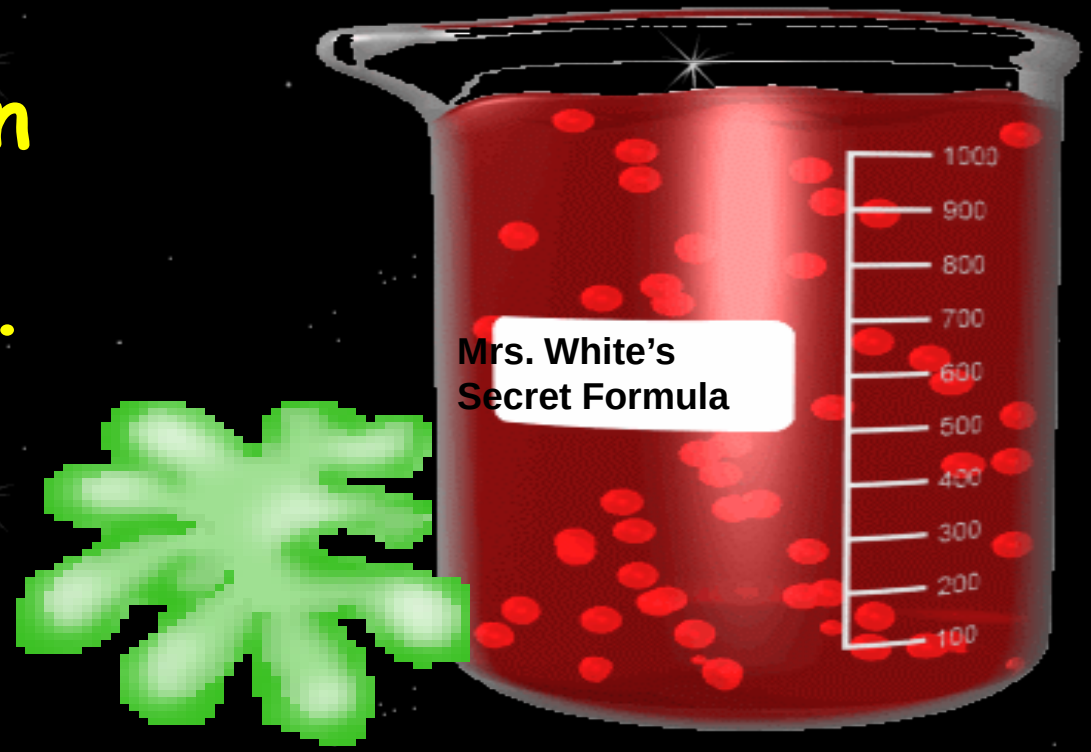
List all the materials you use in the experiment including what, how much, and what kind.

Good Listing of Materials	Poor Listing of Materials
250 mL graduated beaker	Measuring cup
750 mL water at 20 degrees C	Water
1- 20X20 cm sq cake pan	Container
Celsius thermometer	Thermometer
Stop watch	clock

Materials

What will I use?

Materials can be shown as a detailed list with exact quantities listed.



Step 4: The Experiment—Procedure

The procedure is a sequenced list of clear and precise directions (like a recipe). It should be written so that anyone could repeat your experiment.

Well-written procedure	Poorly-written procedure
1. Wear safety goggles. 2. Add 3 mL magnesium sulfate solution to one test tube. 3. Observe the contents for 5 minutes.	1. Use safety equipment. 2. Pour magnesium sulfate into a test tube. 3. Observe.

Procedure

What will I do ?

My procedure needs to be specific, concise like a step by step recipe. As I plan my experiment, I need to identify the three types of variables.

Step 5: Recording the Data

Data is all the information you gather during the experiment. Writing in a notebook or journal is an effective way to keep track of your observation and data. Remember: This is a primary source of information that records your thoughts and ideas. Do NOT go back and change any of your previous thoughts or data!

Data notebooks/journals should include:

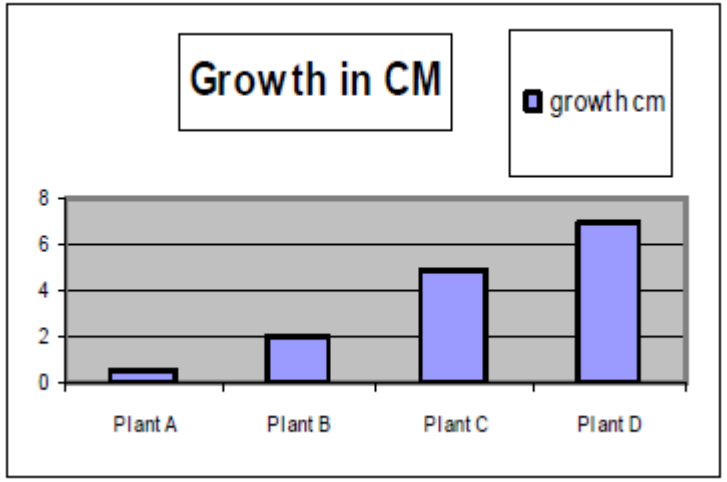
- ✓ A list of all the materials you use
- ✓ Notes on the research and preparations you did before starting the experiment
- ✓ Day-by-day notes on the progress of your project
- ✓ Data from the experiment

Plant	Amount of water per day	Size it grew in two weeks
(controlled variable)	(independent variable)	(responding variable)
Plant A	none	.5 cm
Plant B	5 ml	2 cm
Plant C	10 ml	5 cm
Plant D	20 ml	7 cm

BE ACCURATE AND NEAT!

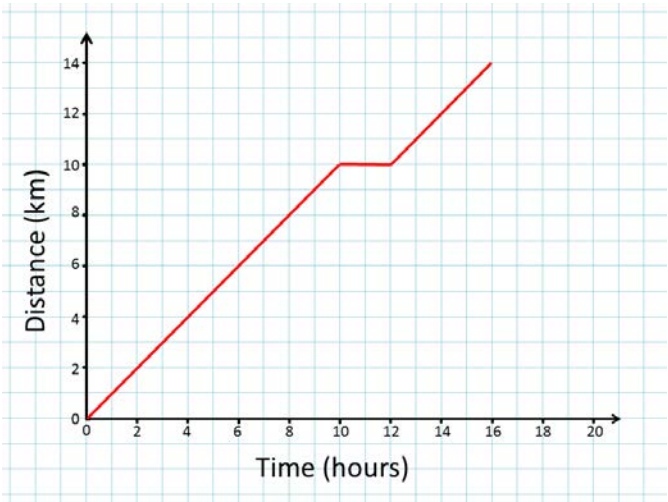
Step 6: Organize the Data

BAR GRAPH: Use if you are comparing amounts of things. Usually, the bars go up and down. The x-axis (horizontal) is what's being measured (like plant A, B, C, D) and the y-axis (vertical) is labeled to show the Unit being measured (plant growth in centimeters)



PIE GRAPH: Use if you area showing percentages or groups. REMEMBER: You can't have more than 100% and all of the pieces MUST add up to 100%. This is great for surveys.

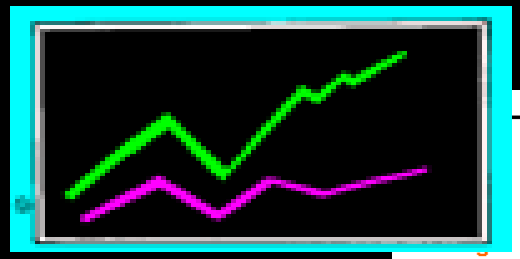
LINE GRAPH: use if you are showing changes over time. The x-axis shows the independent variable (what you change); the y-axis shows the dependent variable (the result).

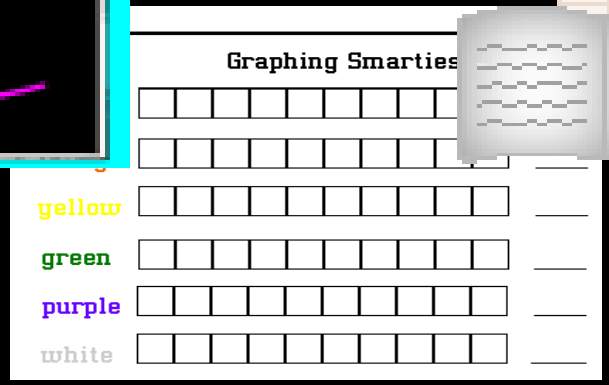


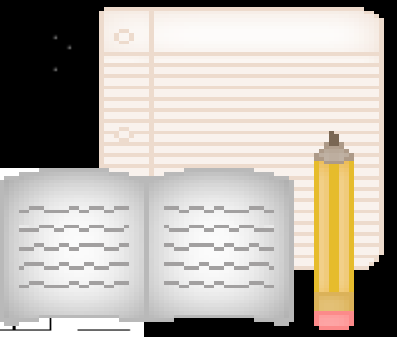
Results

What actually happened?

This is where I show my data collection using charts, graphs, journals, photographs or other visual aids.








What color bird feeder
do birds prefer?

Steps 7 & 8: Conclusion and What I Learned

The following information should be part of the conclusion:

1. Statement of support or non-support of the original hypothesis (not “prove” or “disprove”)
2. Description of any problems or unusual events that occurred during your experiment
3. Explanation of what you might do differently of change the next time
4. Discussion of additional questions or experiments that could be a continuation of the current investigation
5. Discussion of the relevance of your investigation for business/industry or humans in general

Conclusion

What did I learn?

Based on my results I learned…

My conclusion is clearly supported by data, tells what I have learned and its application, and if my prediction or hypothesis was correct or incorrect. I have included a statement about what I might do differently if I did this project again and if I have any new questions to investigate.

Resources

Site	Web address
All Science Fair Projects	http://www.all-science-fair-projects.com/
Science A-Z	http://www.sciencea-z.com/scienceweb/resource/Science
Science Buddies	http://www.sciencebuddies.org/
Kids.gov	http://kids.usa.gov/science/science-fair-projects/index.shtml
Try Science	http://tryscience.com