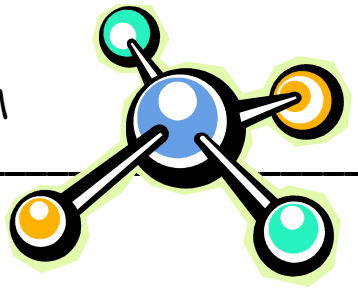
West Side School
5th and 6th Grade Science Fair

May 21, 2012
WSS Gym
6:30 – 7:30 PM



Over the next couple of months, all students in grades 5 and 6 will be preparing for West Side School's Spring Science Fair. This packet contains information that will serve as a guide to these students as they roll up their sleeves, conduct research, and prepare for their presentations. Please note that projects must be experiments that follow the guidelines of the scientific method and must have a control, an independent variable (one thing you choose to change) and a dependent variable (one thing you watch for to change). Most importantly, each project must be the work of the individual student.

We encourage parents to assist their child. Please remind your child to keep all papers, research materials, and other information in a folder or notebook dedicated to his or her Science Fair project. Projects may include animals, foods, and liquids. However, such items should NOT be displayed on the night of the Science Fair. Student projects must be displayed according to the 3-sided display sheet included in this packet and should be free-standing and stable.

All initial proposals must be submitted to Mrs. Baratta and Mrs. DeRosa for approval before moving forward with the project. Each student will be assigned a time to present the project to his or her class within two weeks of the Science Fair. Projects will be graded using the rubric that may be found on the following page.

Good luck!

Scientific Method Project Grading Rubric

- Provide a **catchy title** for their display board. (5 pts.)
- The **question** being addressed through experimentation was included. (5 pts.)
- A **hypothesis** was presented. (5 pts.)
- The **steps of the experiment** were included. (10 pts.)
- **Experimental steps** were written in a **detailed** form. (5 pts.)
- Experimental **results using a graph and/or chart** were included. (15 pts.)
- **Variables** of the experiment (independent variable and dependent variable) and the **controls** were mentioned. (10 pts.)
- A **conclusion** was made. (5 pts.)
- The display board was **colorful**, **labeled**, and **neatly organized**. (10 pts.)
- **Major components of the board were typed** on separate sheets of paper before being glued to the display board. (10 pts.)
- The project was **creative**. (10 pts.)
- The **presentation** was **well-prepared**. (10 pts.)

Getting Started

Students will develop a question about a topic they would like to know more about. They will perform an experiment and collect data from their observations which will help them to answer their research question using the scientific method.

The scientific method is a process for experimentation that is used to explore observations and answer questions. By using this method, students can be sure they are carrying out their projects according to scientific principles. Students must complete the steps in order and refer to the following pages for specific information on the scientific method:

Step 1: Choose a Topic
Step 2: Develop a Question
Step 3: Construct a Hypothesis
Step 4: Test Your Hypothesis (Your Experiment)
Step 5: Record and Analyze Your Results
Step 6: Draw a Conclusion
Step 7: Prepare Your Display and Presentation

Step 1: Choose a Topic

Things to consider when selecting your Science Fair topic:

- You notice something and wonder why it happens.
- You see something and wonder what causes it.
- You ask questions about what you observed.
- You want to explore something you are interested in or curious about.
- There is something about which you would like to find the answer.
- Your project topic doesn't have to be something that can easily be done in science class. For example, you may want to investigate claims that advertisers make about food, cleaning supplies, restaurants or even sporting equipment!

Consider the following when gathering research:

- Explore reliable Internet websites.
- Utilize our school library. Mrs. Fraiberg and your classroom teachers can help assist you as you look for books at West Side School.
- Cold Spring Harbor's public library is also an excellent resource.
- As you collect information, be sure to record your resources.
- Bibliographies must be included for all projects. Be specific.

Step 2: Develop a Research Question

Your research question is the most essential part of the scientific method and will be the driving force behind your work.

Guidelines for choosing a research question:

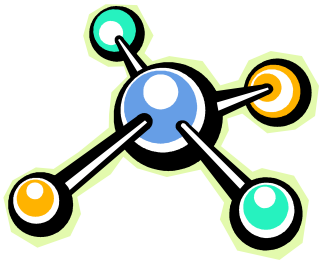
- Think about what interests you.
- DON'T choose a question that can be answered with a YES or NO. For example, do not choose questions such as: "Will there be any effect on a plant's growth if salt is added to the water given to the plant?" or "How much less will a plant grow over time if given salt water?"
- DO not choose a question that can be answered with exact measurements.
- The best questions are cause and effect statements written in "general" terms. For example, "What will happen to a plant that is being watered daily if sugar is added to the water?"
- Remember to focus on one question. Don't be too broad. They key is to narrow your focus.
- Make sure you have enough time to complete your project. Time management is crucial!

Step 3: Construct a Hypothesis

A hypothesis is an educated guess or prediction about the outcome of your experiment. It should be constructed in a way that will help answer your original research question.

When thinking of your question, it will be important to think about what the possible answer could be. This will be your hypothesis which you will eventually prove or disprove. Remember to give a reason for your guess. Explain why you think this will happen. Including the word "because" in your hypothesis will allow you to elaborate on your thinking and reasoning.

It will be important that you are able to measure the independent variables. This is another important characteristic of a good hypothesis. If we can readily measure the variables in the hypothesis, then we say that the hypothesis is testable.



Step 4: Test the Hypothesis

You will need to plan an experiment in which you can test your hypothesis. Make sure the method of investigation will address the question.

- Compile a list of all the materials needed to conduct your investigation.
- Begin doing your experiments, keeping very accurate records of everything you do.
- Remember to record your failures and successes (sometimes the greatest discoveries come from "failed" experiments!).
- Keep track of all steps you perform and all tests you make in your notebook.

It is important for your experiment to be a fair test. You can conduct a fair test by making sure that you change only one factor at a time while keeping all other conditions the same. A fair test will have variables (parts of the experiment that you will manipulate or change) and a control.

What Makes a Good Experimental Procedure?

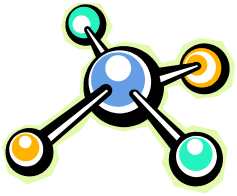
1. Including a description and size for all experimental and control groups
2. Including a step-by-step list of all procedures and describing how to change independent variable and how to measure that change
3. Explaining how the controlled variables will be maintained at a constant value
4. Being clear and detailed enough for another individual to be able to duplicate the experiment based on the experimental procedure you have written.

Control and Variable

When testing your hypothesis, you must be sure that your experimenting is done under control. You will change certain conditions and then observe how they affect your experiment. Variables are the conditions that change and only one variable should be changed at a time. You must control all the other variables so they do not change.

There are often two groups in a "controlled" experiment:

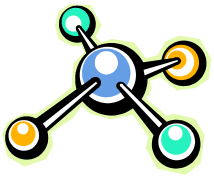
1. **Experimental group** - only change one variable at a time
    a. Independent variable- the one thing you choose to change
    b. Dependent variable- the one thing you watch for to change
2. **Control group** - no variables and the conditions need to stay the same



Step 5: Record and Analyze Your Results

Take a look at the results checklist below:

- ☐ My project is complete. Nothing has been left out.
- ☐ All data has been collected.
- ☐ My work has been edited for any errors.
- ☐ If necessary, I have calculated an average for the different trials of my experiment.
- ☐ I have clearly labeled all tables and graphs and, include the units of measurement (inches, grams, etc.).
- ☐ If I have a graph, my independent variable is on the x-axis and the dependent variable on the y-axis.
- ☐ My pictures are labeled with captions.
- ☐ All of my results are labeled neatly and are easy to read.



Throughout this process, you will be recording data and should have a notebook to write down everything you find important. For example, you might take down different measurements if you are watching something grow. Eventually, you will analyze your data to see if it agrees with your initial hypothesis. Results are usually reported in the form of a statement that explains or interprets the data. It is important to be concise and stay to the point.

Duplicating results is important and a general rule is that results should be duplicated three times. In some experiments, you can run the trials all at once. For example, if you are growing plants, you can put three identical plants (or seeds) in three separate pots and that would count as three trials.

In experiments that involve testing or surveying different groups of people, you will not need to repeat the experiment multiple times. However, in order to guarantee that your results are reliable, you need to test or survey enough people to make sure that your results are reliable.

Step 6: Draw a Conclusion

After choosing a research question and conducting a science experiment, you tested it a few times during which you recorded your data and kept track of your resources for your bibliography. You are now ready to write your conclusion which will answer your research question.

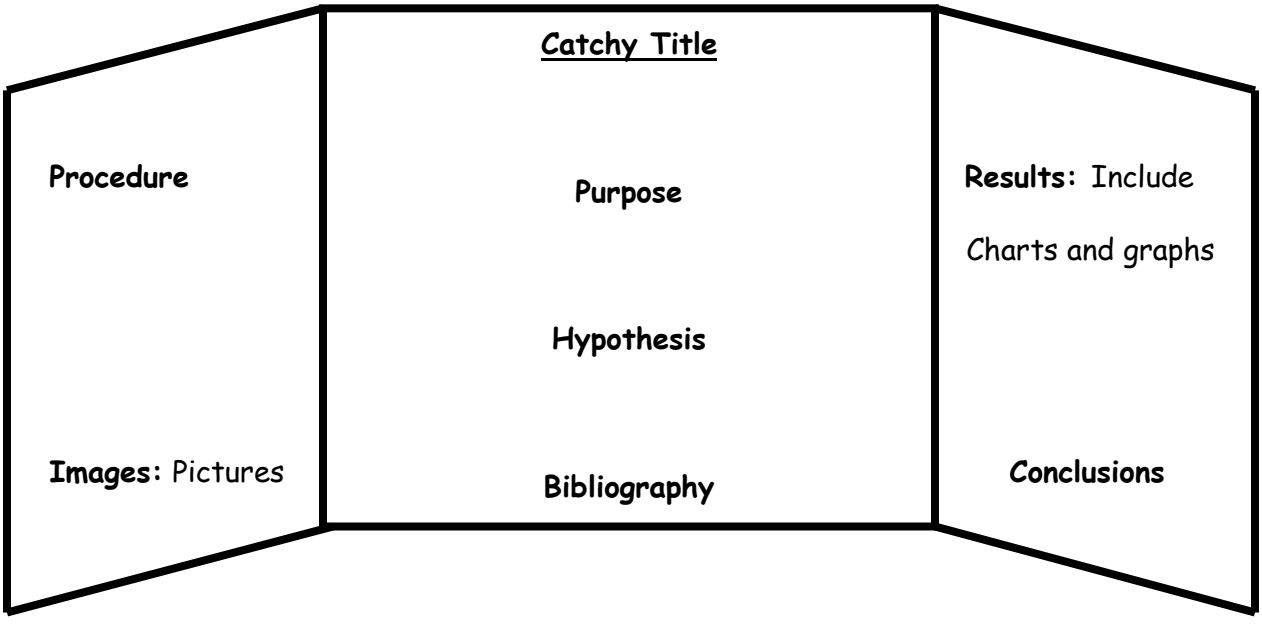
Remember to write clearly and to stick to the point. Your conclusion will summarize your research and tell whether your data supports your hypothesis or not.

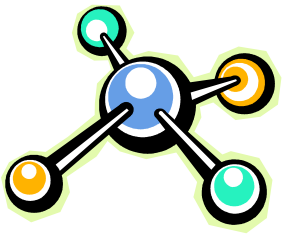
You can think of the following questions when writing your conclusion:

- Is your hypothesis correct?
- What did the results teach you?
- If you conducted this experiment a second time, would you get the same results?
- What happened when you tested the hypothesis?
- Did any problems arise during your research?
- Reflection - What would you change if you conducted this experiment again?

Step 7: Prepare Your Display and Presentation

Develop your display and presentation with the rubric in mind.





Science Fair Proposal

Topic:

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Research Question:

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Hypothesis:

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_____

Procedure:

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_____

_____

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_____

_____

Proposal Due Date: _____

Student's Signature: _____

Parent's Signature: _____

Teacher's Signature: _____