Elementary Science Fair Handbook

Student Name_____

Parents:

Please sign each time your child completes a section of the science fair project. This will ensure that students are not waiting to complete this assignment at the last minute. Sign below to indicate you have reviewed this handbook with your child.

Parent Signature_____

Science fair project sections DUE DATES

Each section will receive a grade, and late work will be deducted 10 points per day.

Section	Due Date	Grade	Parent Signature
Problem & Research 1 week	_____	_____	_____
Hypothesis 1 week	_____	_____	_____
Experiment & Observations 1 week	_____	_____	_____
Conclusion Statement 1 week	_____	_____	_____
Final Report & Backboard 2 weeks	_____	_____	_____

Science Fair Goal

It is the primary goal of our county schools to prepare students to become scientific problem solvers. One of the most effective tools a person can use to achieve this is the Scientific Method. During this journey each student will use this organized approach to complete a science fair project.

This handbook is designed to assist you in the completion of this project. Although this project will be completed mainly at home we will also use class time to guide you through the completion of your assignment as well.

The Scientific Method

1. Define the **Problem**: The question I want to answer. Must be something you can investigate. Match your area of interest with one of the categories below.
2. **Research**: Gather all the information you can find about your problem in books, encyclopedias, articles, interviews or on the internet.
3. Form a **Hypothesis**: A prediction of the answer to your problem.
4. **Experiment**: What I will do to test the hypothesis. This includes a materials list and step-by-step procedures I will use to conduct the investigation.
5. **Observe** and Record: Record and analyze results and observations. For your backboard this could be in the form of graphs or charts
6. **Conclusion**: I draw conclusions from my investigation, which either support or do not support my hypothesis.

Category Descriptions

ANIMAL SCIENCES
Animal Husbandry, Physiology,
Population Genetics

BEHAVIORAL AND SOCIAL SCIENCES
Clinical & Cognitive Psychology,
Physiological Psychology, Sociology

BIOCHEMISTRY
General Biochemistry,
Metabolism

CELLULAR AND MOLECULAR BIOLOGY
Cellular Biology,
Cellular and Molecular Genetics

CHEMISTRY
Inorganic, Organic Chemistry,
Physical Chemistry

COMPUTER SCIENCE
Artificial Intelligence,
Networking and Communications,
Computer Graphics,
Software Engineering, Programming Languages,
Computer System, Operating System

EARTH SCIENCE
Climatology, Weather
Geochemistry, Mineralogy
Geophysics, Planetary Science
Tectonics

ENGINEERING: Materials and Bioengineering
Bioengineering
Civil Engineering, Construction Engineering, Industrial Engineering, Material Science

ENGINEERING: Electrical & Mechanical
Electrical Engineering, Computer Engineering,
Mechanical Engineering, Thermodynamics,
Robotics

ENERGY & TRANSPORTATION
Aerospace and Aeronautical Engineering, Aerodynamics,
Alternative Fuels, Fossil Fuel Energy,
Vehicle Development, Renewable Energies

ENVIRONMENTAL ANALYSIS
Air Pollution and Air Quality,
Soil Contamination and Soil Quality,
Water Pollution and Water Quality

ENVIRONMENTAL MANAGEMENT
Bioremediation, Ecosystems Management
Forestry, Recycling, Waste Management

MATHEMATICAL SCIENCES
Algebra, Analysis, Applied Mathematics
Geometry, Probability and Statistics

MEDICINE & HEALTH SCIENCES
Disease Diagnosis and Prevention

MICROBIOLOGY
Antibiotics, Antimicrobials, Bacteriology

PHYSICS AND ASTRONOMY
Astronomy, Atoms, Molecules, Solids
Biological Physics, Instrumentation and Electronics
Optics, Lasers, Magnetics

PLANT SCIENCES
Agriculture, Development

The Process Necessary for an Awesome Science Fair Project

1. Choose a ***PROBLEM*** that can be tested. Keep in mind that you will be researching your topic and then setting up an experiment to test your hypothesis. Look for a cause and effect relationship when choosing a topic. **Write this in the form of a question.** *Example Problem:* Does drought influence plant's ability to flower?

2. While doing ***RESEARCH***, find out as much general information regarding your topic. This will help you predict (hypothesize), or give an educated guess, about your problem. Take notes about the information you find! *For example:* given the problem above you would research average rainfall, growing seasons, and plant types.

3. When writing your ***HYPOTHESIS***, decide how you think your question will be answered. Make your question an if/then statement.
   Example Hypothesis: **If** drought conditions influence the plants ability to produce flowers **then** the plants with the average amount of rainfall will have more flowers than the plants watered with less than average rainfall.

4. To determine if your hypothesis is correct, you will need to conduct a simple ***EXPERIMENT***. The step-by-step directions for this experiment are called a **procedure**. This explains what you did, what you used, and the order you did it in. The procedure is like a recipe.
   - Tell times, sizes, amounts.
   - Place the experiment steps in order.
   - Remember to record data from your experiment and from a control group.
   - Make a complete list of all the materials you will need to conduct your experiment.

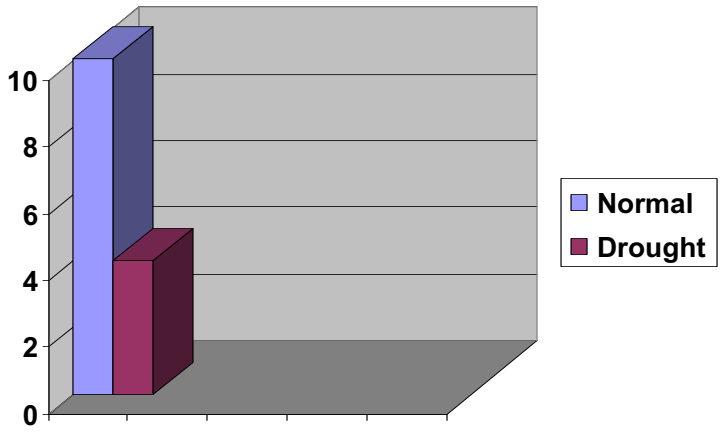
5. It is important for you to keep accurate and organized data while conducting your experiment. Write down all observations and results during the entire time you are conducting your experiment. The best way to do this is with a data table. **You must choose to make a table/chart or graph to organize and display your data.**

Example Chart: ***TITLE***

Description/groups	Number of Flowers/day (Oct 1-6)				
Plants with normal rainfall (3ml/day)	4				
Plants with drought conditions (1ml/day)	2				

Example Graph: Average Number of Flowers in Normal and Drought Conditions

Number of flowers



6. Your ***CONCLUSION*** should tell:
   - Exactly what happened during and after the experiment
   - Whether the results supported your hypothesis. (Remember! An incorrect hypothesis is as valuable to scientists as a correct one because they still learn something from the process!)
   - Answer all other questions that came up during the experiment
   - State any other information discovered in the process

   Example Conclusion: My hypothesis was proven correct because the plants with the average amount of water had more than twice as many flowers (average 10) than the plants in the drought conditions (average 4).

7. Have fun with this process! Take little steps and **do not wait until the last minute**.

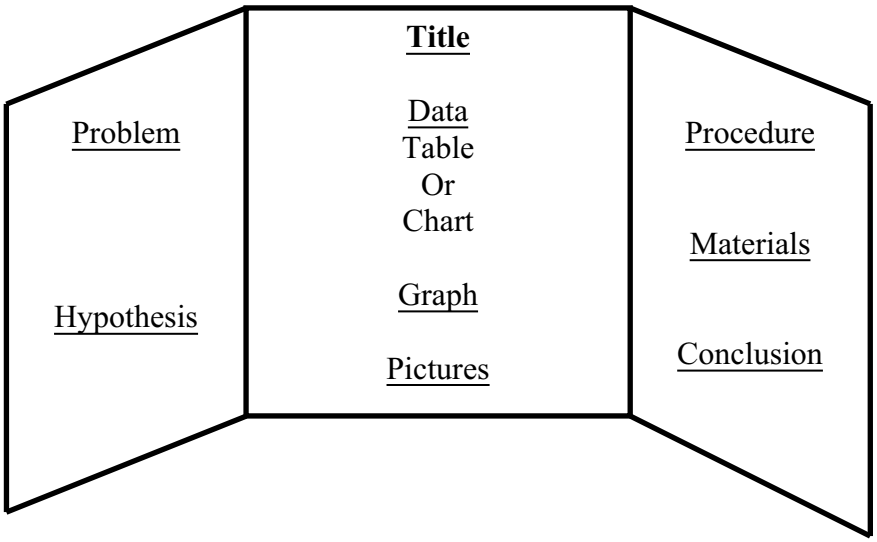
Written Report

The written portion of this project is the neater form of all the pieces turned in throughout the weeks of this project. You must rewrite in pen or type each section and place it in order in a folder or presentation binder. The pieces are listed on the front page and include any visuals you may have added to the project. The items needed in the folder are:

- Problem-State the question you want to answer. Include why you chose this particular problem.
- Log Book-Keep records from start to finish of your investigation.
- Research Notes-Find information about your topic. Explain where you located this information (do not use printouts from internet)
- Hypothesis-A hypothesis is a good guess to the answer of the problem. How did the research lead to the hypothesis?
- Experiment & Observations-Give details to the design of the experiment and explain the chart, graph or picture.
  - **Variables are things that can change. Be sure to change only one variable in order to create a fair test or experiment.** *In the example only the amount of water changed. The amount of sunlight and soil should stay the same.* **Keep all other variables the same!**
- Conclusion Statement-Explain how the data collected supports or doesn't support your hypothesis. Describe the next logical step you could take past this project. In other words, in what direction does the information take you?

The Display

Your exhibit is an attractive, well organized display of all your hard work. It should look neat and professional. An eye-catching title is the hook used to capture the viewer. Make it as interesting as possible! It is important that you use neat lettering and that your work is arranged on a display board as follows:



Labels: Cut these out for your project board.

Problem Hypothesis

Experiment Chart

Graph Materials

Procedure Pictures