

Monroe Science Fair 2010

Second Independent Project

It's time for an adventure....

It's time to explore science....

It's time to have some fun at home doing....

A SCIENCE FAIR PROJECT!

The 2nd Independent Project for all Monroe Mustangs involves participating in a Science Fair and doing a project of their choosing using the Scientific Method. The information in this packet is designed to give them, and you, some explanations and ideas to get them started.

Science Fair boards will come home with all students the second week of February, so there is no need to go to the store and purchase one. The PTO provides these boards so that all students have the same media to present their project. The last page of this packet is the heading labels that should be used for each section of the Science Fair Project board.

Students will be required to present their projects to their classmates and teachers. Their Science Fair presentation will be recorded for them on a DVD that will be kept at school and follow them recording each year's project through their years as a Monroe Mustang. The DVD will be given to all families upon the completion of 5th grade.

Grades K – 2

Projects are due on March 1st and will be displayed in the Gym and available for family viewing on March 3rd.

Grades 3 – 5

Projects are due on March 8th and will be judged by professional scientists from Marathon Oil Company. Projects will be available for family viewing on March 10th in the Gym after they have already been judged and scored. All judging is done on a "blind" format, so there should be no names written on the front of the board.

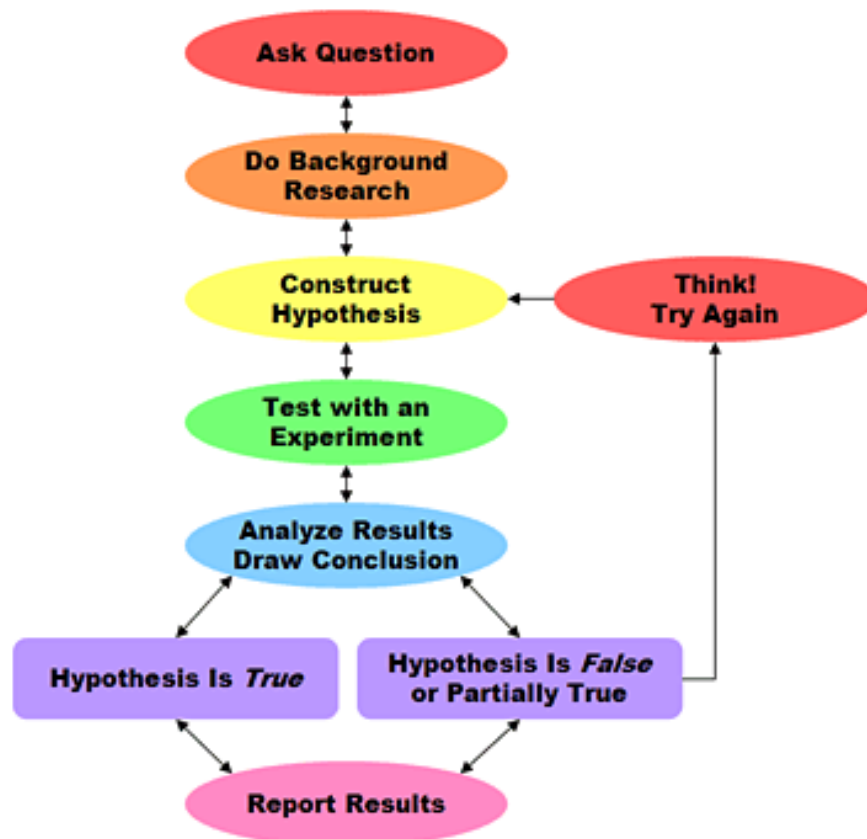
Thank you for your continued support!
Your Monroe Mustang Staff

Key Info

- The scientific method is a way to ask and answer scientific questions by making observations and doing experiments.
- The steps of the scientific method are to:
 - **Ask a Question**
 - **Do Background Research**
 - **Construct a Hypothesis**
 - **Test Your Hypothesis by Doing an Experiment**
 - **Analyze Your Data and Draw a Conclusion**
 - **Communicate Your Results**
 - **Cite your Resources**
- It is important for your experiment to be a fair test. A "fair test" occurs when you change only one factor (variable) and keep all other conditions the same.
- Doing a "Demonstration" is not a science fair project, you need to ask and answer a question by testing your Hypothesis!

Overview of the Scientific Method

The scientific method is a process for experimentation that is used to explore observations and answer questions. Scientists use the scientific method to search for **cause and effect** relationships in nature. In other words, they design an experiment so that changes to one item cause something else to vary in a predictable way. Just as it does for a professional scientist, the scientific method will help you to focus your science fair project question, construct a hypothesis, design, execute, and evaluate your experiment.



Steps of the Scientific Method

Ask a Question: The scientific method starts when you ask a question about something that you observe: How, What, When, Who, Which, Why, or Where?

And, in order for the scientific method to answer the question it must be about something that you can measure, preferably with a number.

Do Background Research: Rather than starting from scratch in putting together a plan for answering your question, you want to be a savvy scientist using library and Internet research to help you find the best way to do things and insure that you don't repeat mistakes from the past.

Construct a Hypothesis: A hypothesis is an educated guess about how things work:

"If _____[I do this] _____, then _____[this]_____ will happen."

You must state your hypothesis in a way that you can easily measure, and of course, your hypothesis should be constructed in a way to help you answer your original question.

Test Your Hypothesis by Doing an Experiment: Your experiment tests whether your hypothesis is true or false. It is important for your experiment to be a fair test. You conduct a fair test by making sure that you change only one factor at a time while keeping all other conditions the same. You should also repeat your experiments several times to make sure that the first results weren't just an accident.

Analyze Your Data and Draw a Conclusion: Once your experiment is complete, you collect your measurements and analyze them to see if your hypothesis is true or false. Scientists often find that their hypothesis was false, and in such cases they will construct a new hypothesis starting the entire process of the scientific method over again. Even if they find that their hypothesis was true, they may want to test it again in a new way.

Communicate Your Results: To complete your science fair project you will communicate your results to others in a final report to your class and a display board. Professional scientists do almost exactly the same thing by publishing their final report in a scientific journal or by presenting their results on a poster at a scientific meeting.

SOURCE: http://www.sciencebuddies.org/mentoring/project_scientific_method.shtml

Helpful websites with science fair ideas:

This site has a questionnaire that asks the student questions about what they are interested in and then suggests multiple projects based on the timeline that you specify:

http://www.sciencebuddies.org/science-fair-projects/recommender_register.php

Browse this site by topic or age level for possible ideas:

<http://www.all-science-fair-projects.com/>

This site gives some more detailed projects by subject:

<http://www.sciencefair-projects.org/>

This site offers a lot of resources to reference and examples to look at:

<http://www.juliantrubin.com/fairprojects.html>

Elementary School Science Fair Project Tips and Ideas

Elementary school projects aren't supposed to be rocket science (though of course they could be). Look for a project that you can do over a fairly short time span, such as over a weekend. Keep in mind, judges will disqualify you if they suspect your parents did the project and not you, so though you may get help from adults, be sure the project is really yours. Resist the temptation to make a display or do a demonstration. Try to answer a question or solve a problem.

- Can you predict what things will glow under a black light?
- Will chilling an onion before cutting it keep you from crying?
- What ratio of vinegar to baking soda produces the best chemical volcano eruption?
- What type of plastic wrap best prevents evaporation?
- What plastic wrap best prevents oxidation?
- Are night insects attracted to lamps because of heat or light?
- Can you make Jell-o using fresh pineapples instead of canned pineapples?
- Do white candles burn at a different rate than colored candles?
- Does the presence of detergent in water affect plant growth?
- Can a saturated solution of sodium chloride (salt) still dissolve Epsom salts?
- Does magnetism affect the growth of plants?
- Does the shape of an ice cube affect how quickly it melts?
- Do different brands of popcorn leave different amounts of unpopped kernels?
- How accurately do egg producers measure eggs?
- How do differences in surfaces affect the adhesion of tape?
- If you shake up different kinds or brands of soft drinks (e.g., carbonated), will they all spew the same amount?
- Are all potato chips equally greasy (you can crush them to get uniform samples and look at the diameter of a grease spot on brown paper)? Is greasiness different if different oils are used (e.g., peanut versus soybean)?
- Do the same types of mold grow on all types of bread?
- Does light effect the rate at which foods spoil?
- Can you use a household water filter to remove flavor or color from other liquids?
- Does the power of a microwave affect how well it makes popcorn?
- Can you tell/taste the difference between ground beef, chuck, and round after they have been cooked?
- If you use invisible ink (several recipes in the how-to section), does a message appear equally well on all types of paper? Does it matter what type of invisible ink you use?
- Do all brands of diapers absorb the same amount of liquid? Does it matter what the liquid is (water as opposed to juice or... um.. urine)?
- Do different brands of batteries (same size, new) last equally long? If a brand lasts longer than others, does this change if you change the product (e.g., running a light as opposed to running a digital camera)?
- Do all brands of bubble gum make the same size bubble?
- Do all dishwashing detergents produce the same amount of bubbles? Clean the same number of dishes?
- Is the nutritional content of different brands of a vegetable (e.g., canned peas) the same?
- How permanent are permanent markers? What solvents (e.g., water, alcohol, vinegar, detergent solution) will remove the ink? Do different brands/types of markers produce the same results?
- Do consumers prefer bleached paper products or natural-color paper products? Why?
- Is laundry detergent as effective if you use less than the recommended amount? More?
- Do all hairsprays hold equally well? Equally long? Does type of hair affect the results?
- How does the rate of evaporation of the crystal-growing medium affect the final size of the crystals? You can change the rate of evaporation by sealing the container (no evaporation at all if there is no air space) or by blowing a fan over the liquid or enclosing the jar of medium with a dessicant. Different places and seasons will have different humidities. The crystals grown in a desert may be different from those grown in a rain forest.

- How do crystals grown from uniodized salt compare with those grown from iodized salt?
- How do different factors affect seed germination? Factors that you could test include the intensity, duration, or type of light, the temperature, the amount of water, the presence/absence of certain chemicals, or the presence/absence of soil. You can look at the percentage of seeds that germinate or the rate at which seeds germinate.
- Is a seed affected by its size? Do different size seeds have different germination rates or percentages? Does seed size affect the growth rate or final size of a plant?
- How does cold storage affect the germination of seeds? Factors you can control include the type of seeds, length of storage, temperature of storage, and other variables, such as light and humidity.
- What conditions affect the ripening of fruit? Look at ethylene and enclosing a fruit in a sealed bag, temperature, light, or nearness to other pieces of fruit.
- How are different soils affected by erosion? You can make your own wind or water and evaluate the effects on soil. If you have access to a very cold freezer, you can look at the effects of freeze and thaw cycles.
- How does the pH of soil relate to the pH of the water around the soil? You can make your own pH paper (check the website referenced below), test the pH of the soil, add water, then test the pH of the water. Are the two values the same? If not, is there a relationship between them?
- How close does a plant have to be to a pesticide for it to work? What factors influence the effectiveness of a pesticide (rain? light? wind?)? How much can you dilute a pesticide while retaining its effectiveness? How effective are natural pest deterrents?
- What is the effect of a chemical on a plant? You can look at natural pollutants (e.g., motor oil, runoff from a busy street) or unusual substances (e.g., orange juice, baking soda). Factors that you can measure include rate of plant growth, leaf size, life/death of the plant, color of plant, and ability to flower/bear fruit.
- What percent of an orange is water? Get an approximate mass percent by weighing an orange or other fruit, liquefying it in a blender, and measuring the strained liquid. Note other liquids will also be present, such as oils, though in small amounts. The mass of a ml of water is 1 g. Alternatively, you could bake the weighed orange until it is dried and weigh it again.
- Does the temperature of a soda affect how much it sprays? You can refrigerate a soda, warm one in a hot water bath, shake them up, measure how much liquid is sprayed out. How do you explain the results?
- Do all brands of soda spray the same amount when you shake them up? Does it matter if it's diet or regular soda?
- Do all brands of paper towels pick up the same amount of liquid? Compare single sheet of different brands. Soak a sheet until it is saturated, let the excess liquid drip off, squeeze the liquid from the wet paper towel into a measuring cup. Note you may need to use teaspoons to measure this liquid.

(Source: <http://chemistry.about.com/od/sciencefairprojects/a/sciproelem.htm>)