

Fourth and Fifth Grade

USING THE SCIENTIFIC METHOD

For the fourth and fifth grade students, we are encouraging the complete use of the Scientific Method. The following pages contain detailed instructions about how to create, conduct, and display a Science experiment utilizing the Scientific Method.

Scientific Method

The scientific method is systematic approach to conducting scientific investigations.

Question - Form a question about something you want to investigate.

Research: Gather information about the topic before the experiment.

Hypothesis: The prediction (educated guess) about what will happen.

Procedure: The plan to conduct the experiment

Results: Data collected from the experiment

Conclusion: What was learned from the experiment.

Topic

Before you can conduct an experiment you need to find a topic of interest you would like to investigate. The first step in creating your project is to decide the topic. There are many areas of science to choose from. It is important to narrow down what it is you want to investigate. Some topics include: (astronomy, biology, botany, chemistry, computers, ecology, engineering, geology, medicine, and zoology).

Question *(also known as problem or purpose)*

State what you want to learn more about in the form of a question.

Research

Before forming a hypothesis, research your topic to find out as much as you can.

- Books
- Libraries
- Parents
- Teachers
- Experts
- Scientists
- Government agencies
- Personal knowledge
- Web Sites
- Businesses



Hypothesis

Next, state your hypothesis (educated guess), a statement of what you think will happen. You must be able to test your hypothesis to prove whether it is true or false.

Procedure

To make the experiment scientific the hypothesis must be tested more than once.

Materials

List all the items you will use to conduct your experiment, including the quantities of each item.

Experiment

Write down the step-by-step order in which you will conduct your experiment. State the variable or variables that are important to the experiment. The *Experimental variable* is the one condition that you change during the experiment. It is what you are testing or comparing. *Controlled variables* are the conditions that need to remain the same during the experiment so that they do not affect the results.

Results

Record the data you collected during your experiment. Charts, graphs, pictures, and journals are ways to display the information that was gathered. Keep notes about all aspects of your project. This can be done by recording in a journal that notes dates, times, and observations.

Conclusion

Was your hypothesis correct or incorrect? You do not have to be correct to have a successful experiment. What did you learn and what would you do differently next time.

Sample Project

Title: Grow faster with Gatorade!

Problem: Do plants grow faster with energy drinks?

Hypothesis: If I give a plant Gatorade and another plant plain water; the plant with water will grow faster than the plants with Gatorade.

Procedure:

Materials:

- o Four potted plants
- o Ruler
- o Dropper
- o Measuring cup
- o Construction paper
- o Writing paper
- o Glue
- o Water
- o Gatorade
- o Chipboard
- o Camera

Experiment:

1. Put four potted plants in the sun for four weeks.
2. Label each pot #1- #4.
3. Each day put 10 milliliters of water in pot #1 and pot #2. Then put 10 milliliters of Gatorade in pots #3 and #4.
4. Each day measure and record the height of each plant to the nearest centimeter.
5. Take pictures to visually record the plant's progress.
6. At the end of four weeks, see which plants grew the most

Experimental Variable:**Plain water and Gatorade****Data****Plain Water Plants**

Date	Plant #1		Plant #2	
	Water	Height	Water	Height
3/4	10ml	7cm	10ml	7cm
3/5	10ml	7cm	10ml	8cm
3/6	10ml	8cm	10ml	8cm
3/7	10ml	9cm	10ml	10cm
3/8	10ml	10cm	10ml	10cm
3/9	10ml	11cm	10ml	12cm

Gatorade Plants

Date	Plant #3		Plant #4	
	Gatorade		Gatorade	
3/4	10ml	7cm	10ml	7cm
3/5	10ml	7cm	10ml	8cm
3/6	10ml	8cm	10ml	8cm
3/7	10ml	9cm	10ml	9cm
3/8	10ml	9cm	10ml	9cm
3/9	10ml	9cm	10ml	10cm

Results:

Plants with water only: #1 grew 4 cm, from 7cm to 11cm, and plant #2 grew 1 cm, from 7cm to 8cm.

Plants with Gatorade only: #3 grew 2cm, from 7cm to 9cm, and plant #3 grew 3cm, from 7cm to 10cm.

Conclusion:

My hypothesis was correct. The plants with water grew better than the plants with Gatorade. I believe this was because the formulation of the energy drink was better suited for people. However, I believe that plants can benefit from energy drinks made especially for them.

How to Display Your Project

The project must be able to fit on a student's desk (24" inches long and 15" inches deep). Science three-panel display boards are encouraged, although other reasonable means of display are acceptable. There is no height limit. The display boards can be purchased from the PTA or at Wal-Mart, Target, and Michael's Craft stores.

Display tips:

- Check spelling and neatness
- Make it colorful with labels
- Include pictures, graphs, illustrations, charts, diagrams, and models

Sample Display Board Layout

	<u>Project Title</u>		
Question			Results
Research	Materials	Experiment	
Hypothesis		Data	Conclusion

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Make your Project a success!

- **Start early:** Don't wait till the last week to start your project. Gathering materials and setting up experiments takes time.
- **Repeat the experiment:** Your experiment must be repeated at least once to make it scientific.
- **Keep records:** Record all your work in a journal. It's easy to do, just record all the dates, times and any important data. When it is time to write your report, all the information needed is in one place.
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- **Be creative:** This is an opportunity for you to investigate something that interests you. Great discoveries have come from children dreaming up ideas that have never tried before.
- **Neatness counts:** A great experiment presented in a sloppy manner won't be well received. Take the time to check your spelling, accuracy of the information presented and the neat orderly manner in which your science display is presented.
- **Visual Aids:** Graphs, charts, diagrams, pictures, samples, and models are extremely helpful to display your science project.
- **Keep it safe:** Don't display anything that will be dangerous to any people viewing your work (i.e. chemicals, live creatures, live electrical items, sharp or breakable objects).
- **Have Fun:** You can learn a lot about science and have a good time, too!